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*Robert Bell*  
*See p. 124*

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Established 1882

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MONTREAL, JUNE, 1905.

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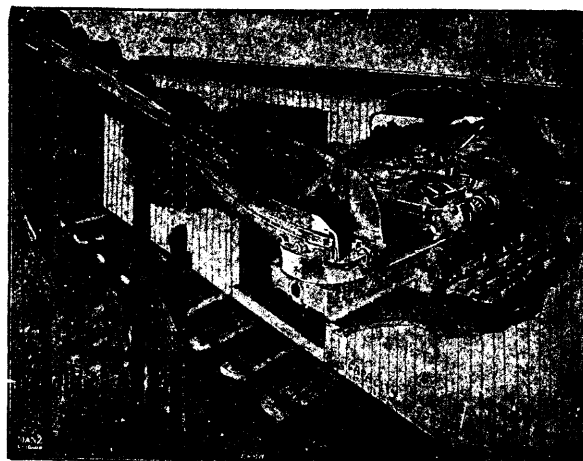
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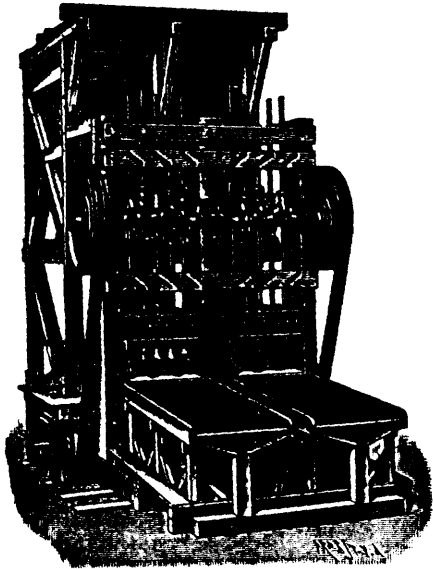
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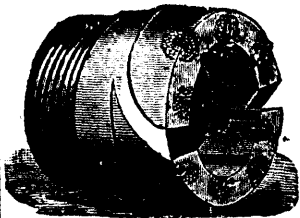
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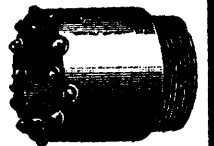
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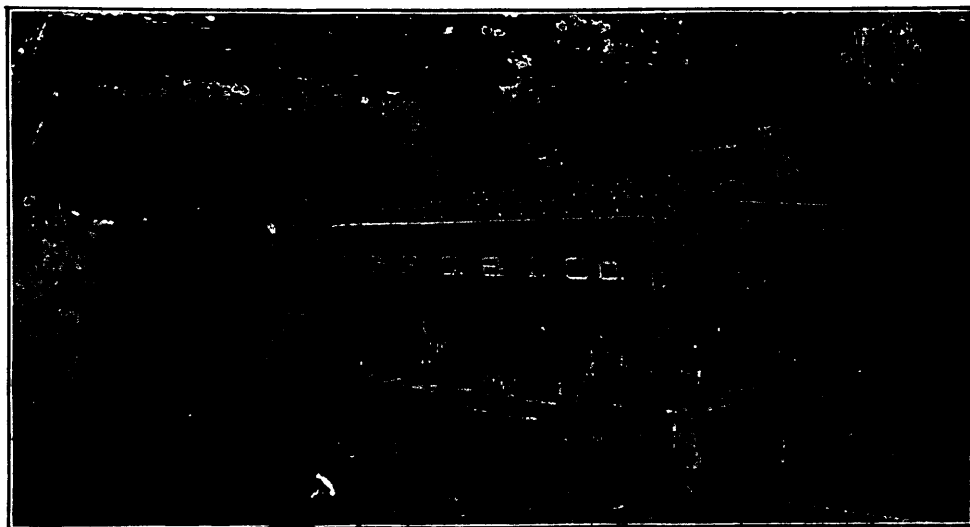
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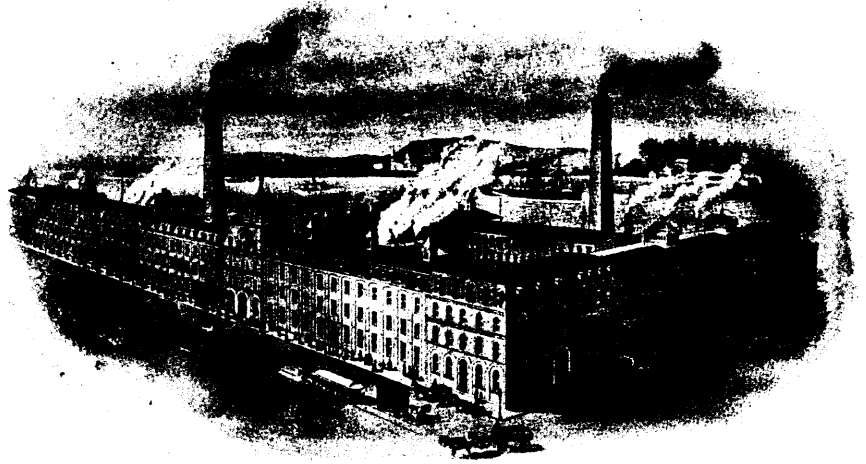
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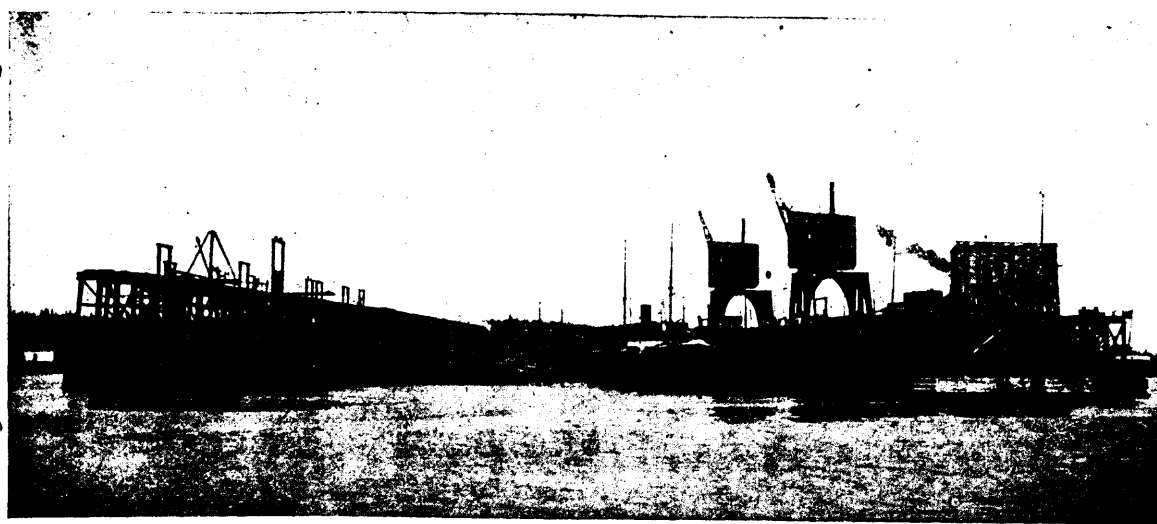
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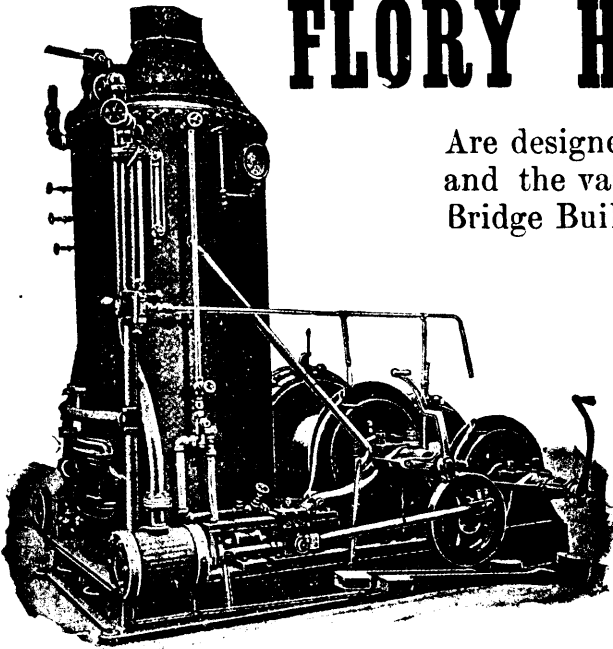
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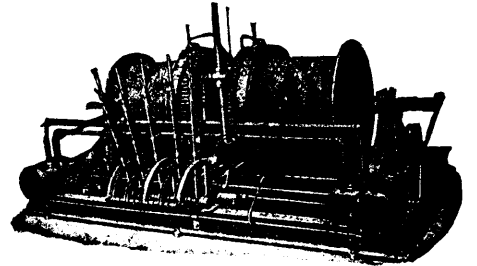


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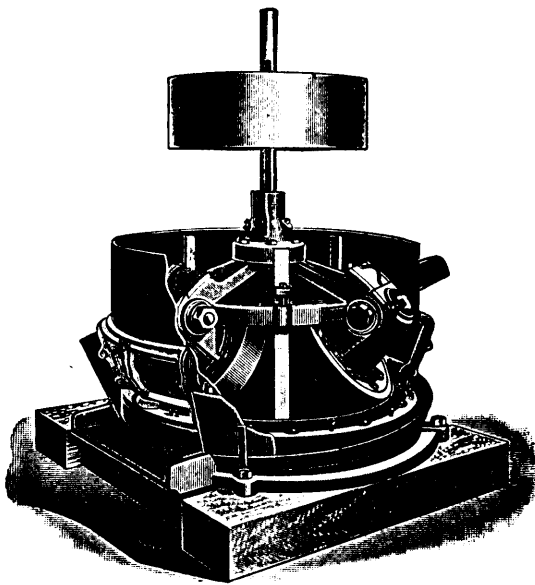
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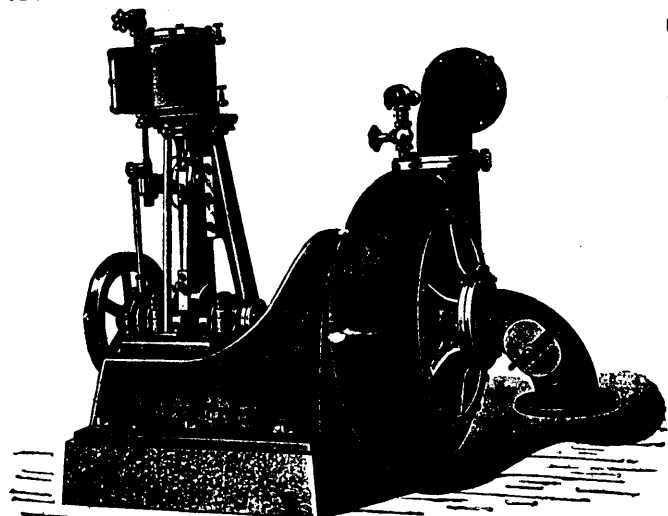


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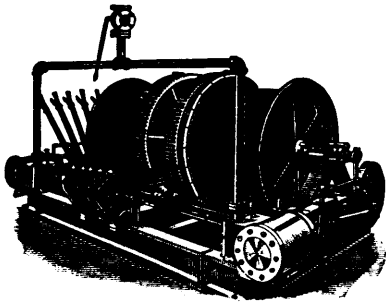
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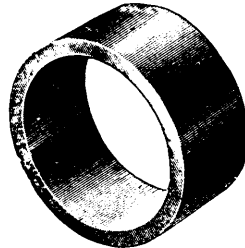
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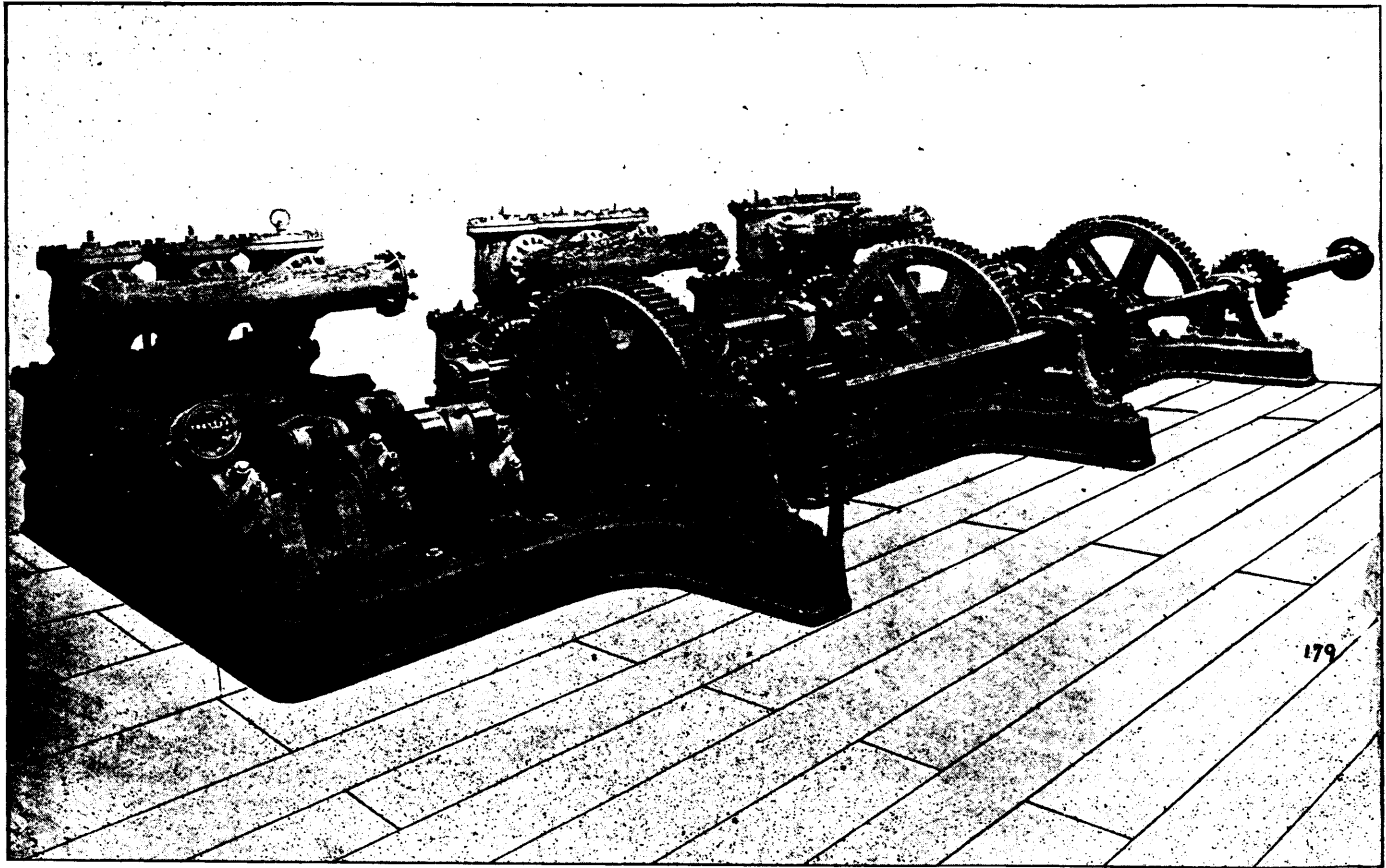
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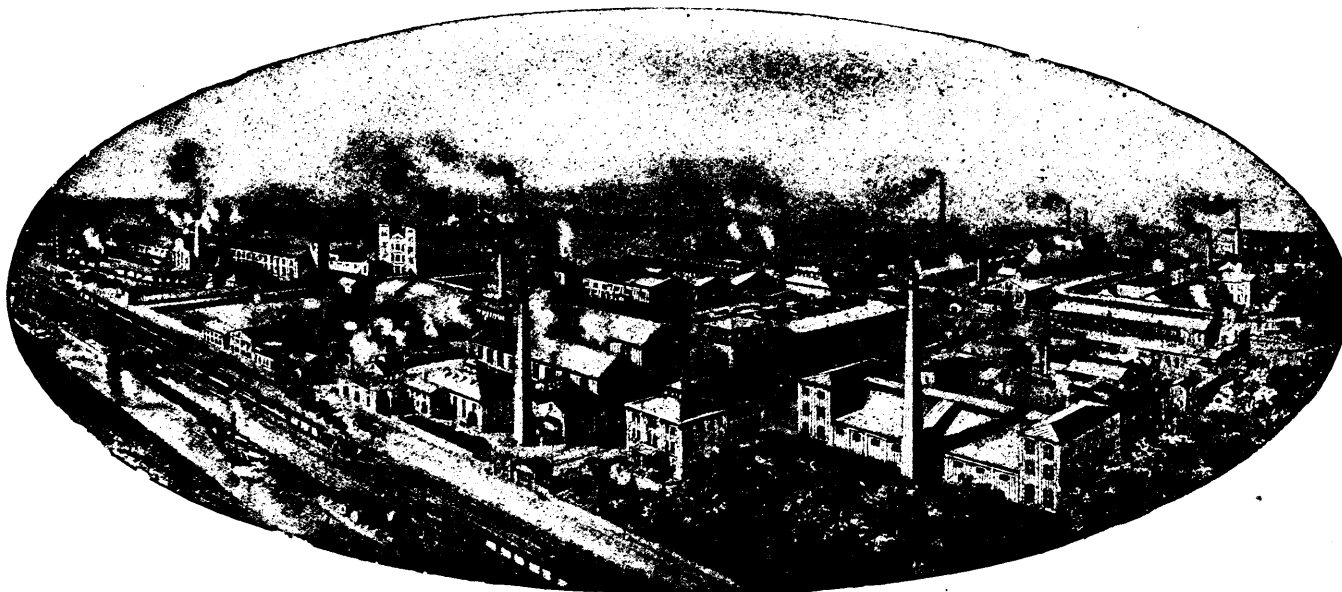
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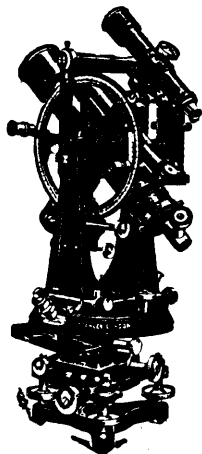
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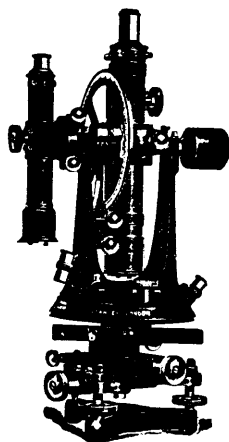
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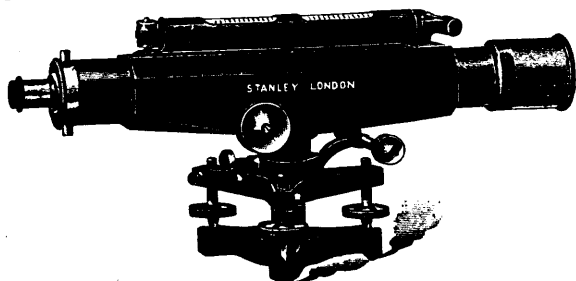
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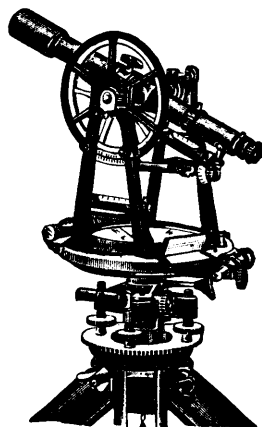
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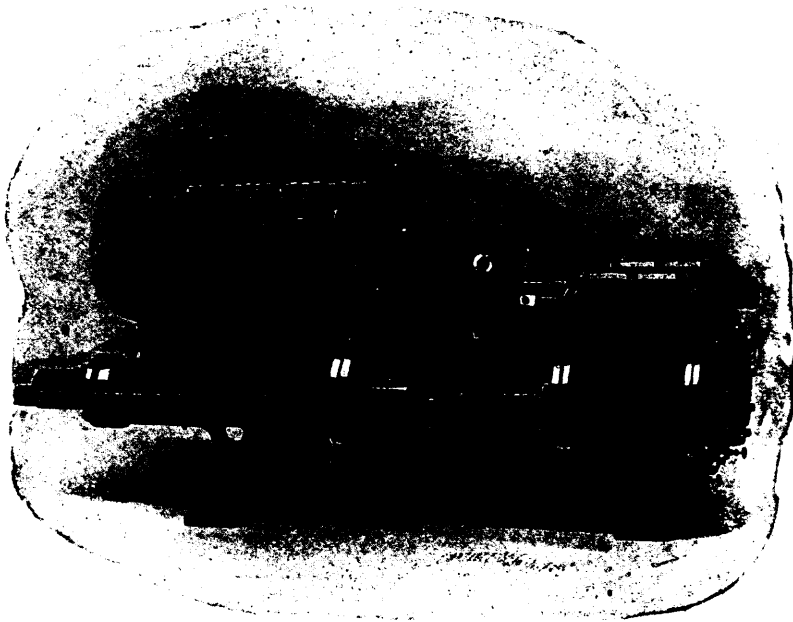
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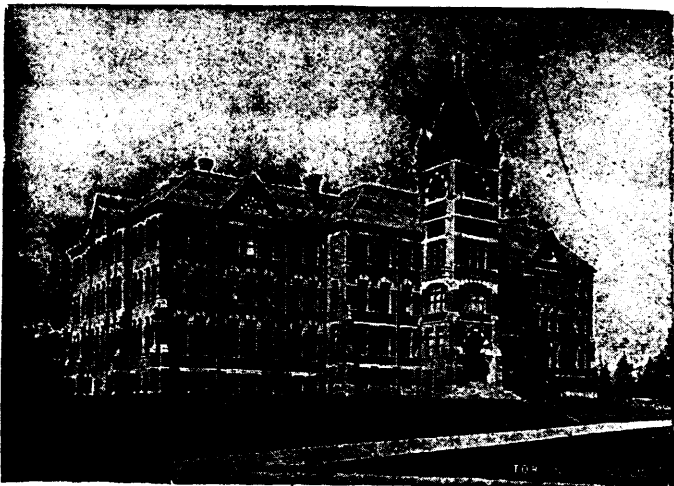
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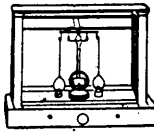
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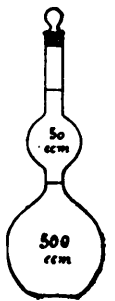
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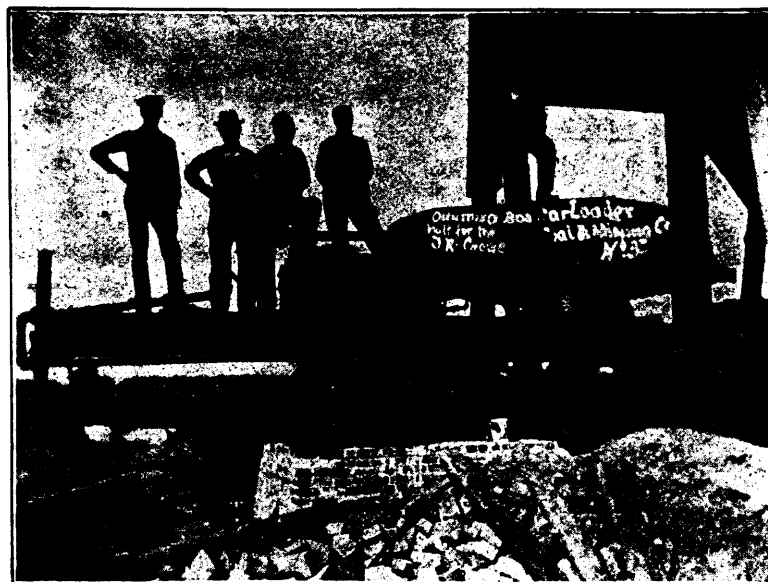
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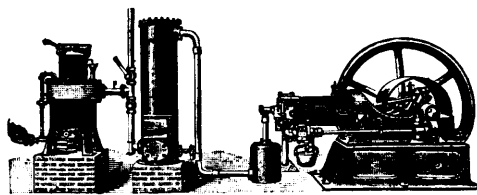
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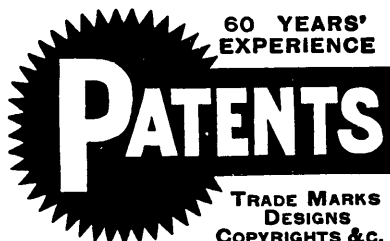
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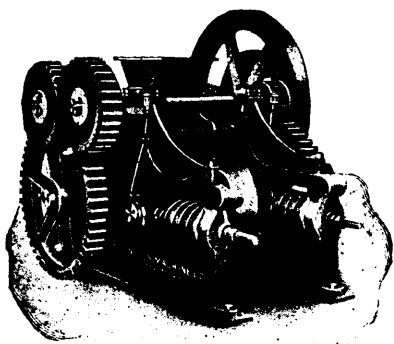
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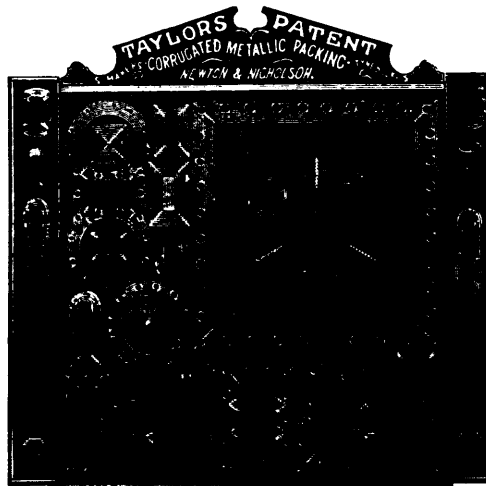
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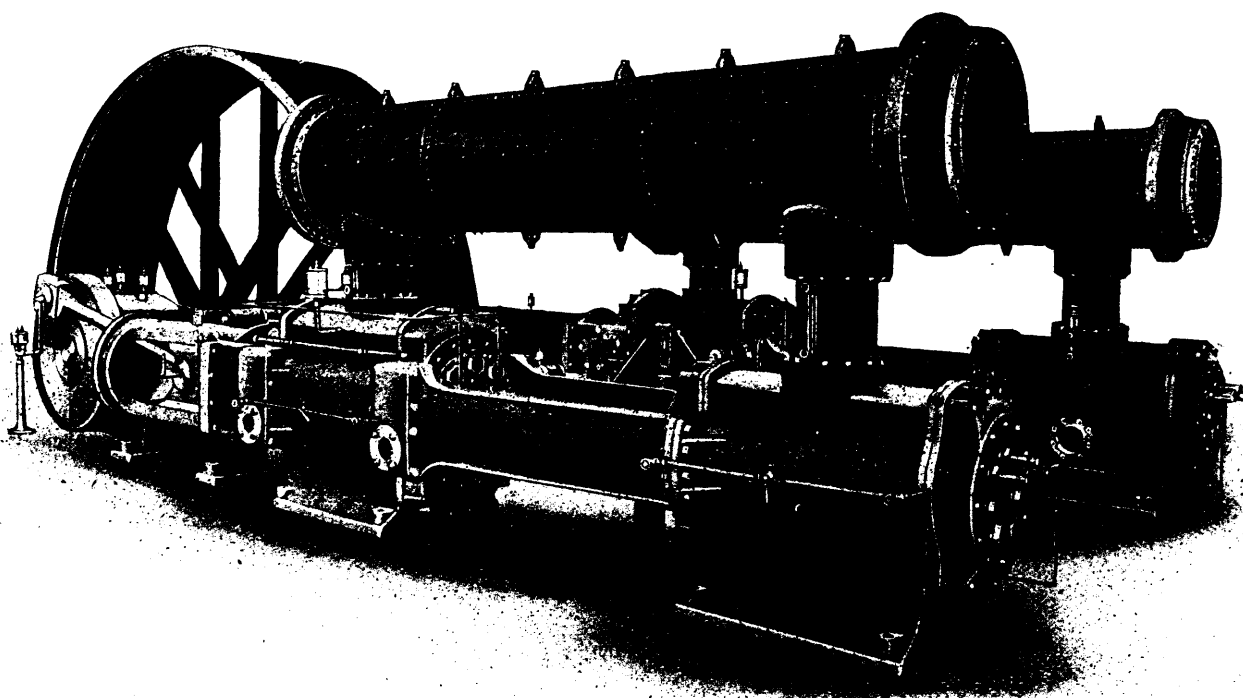
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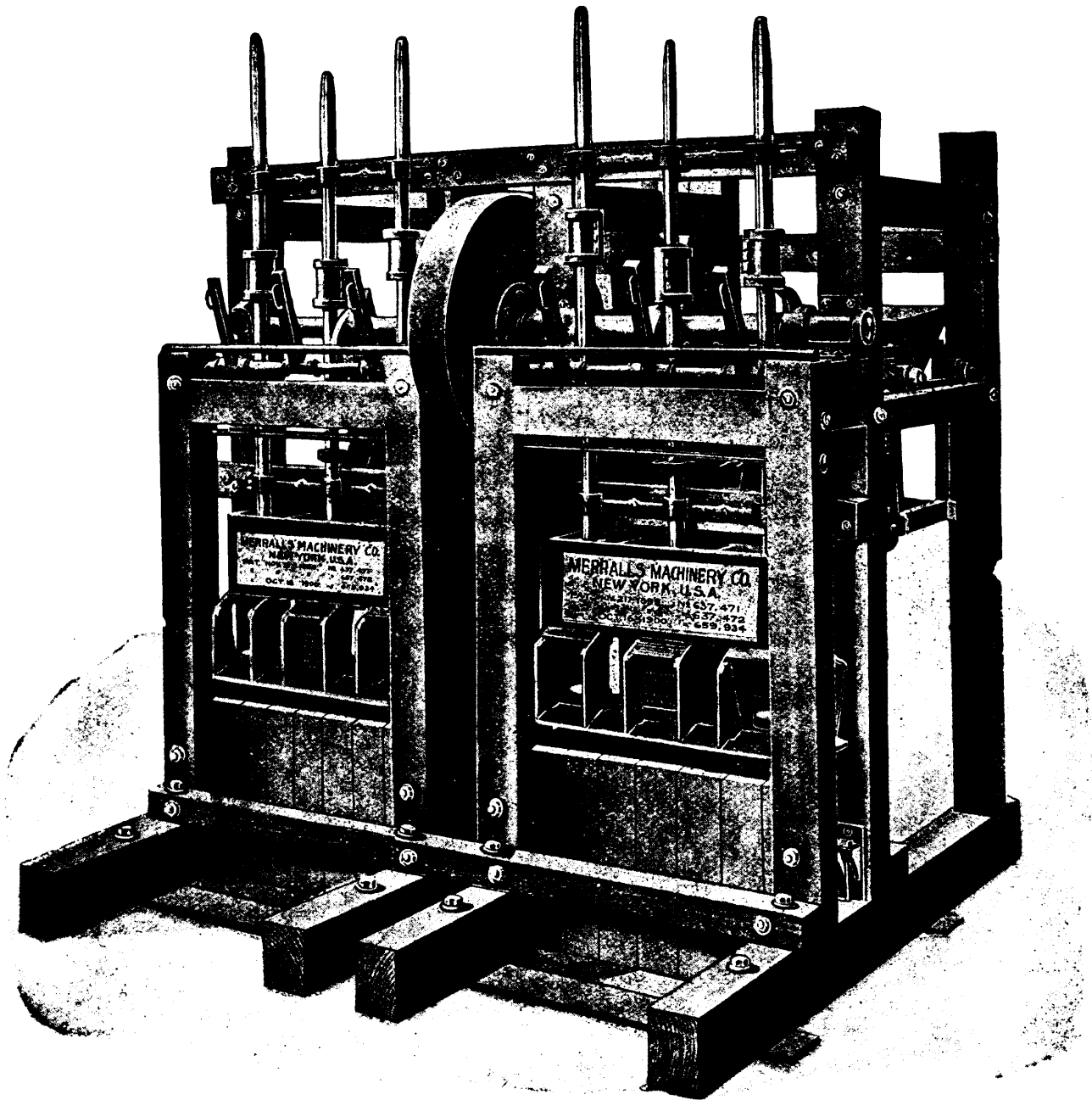
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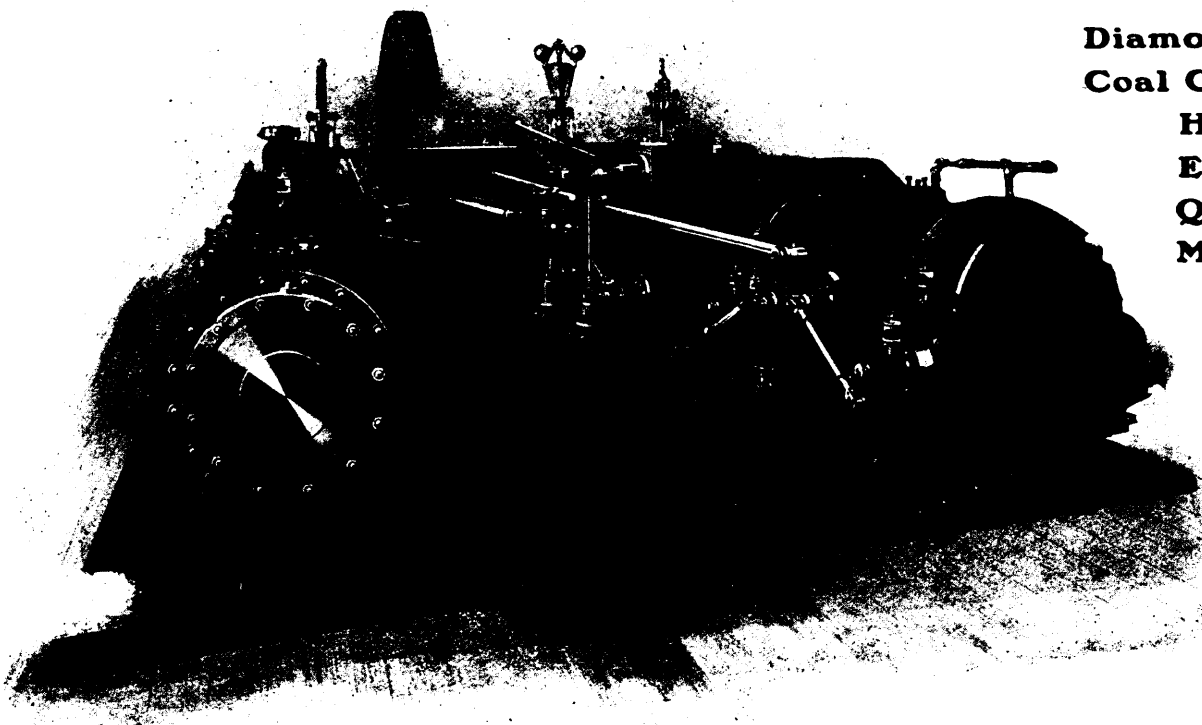
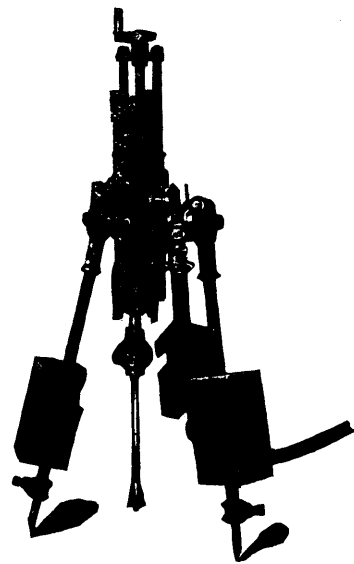
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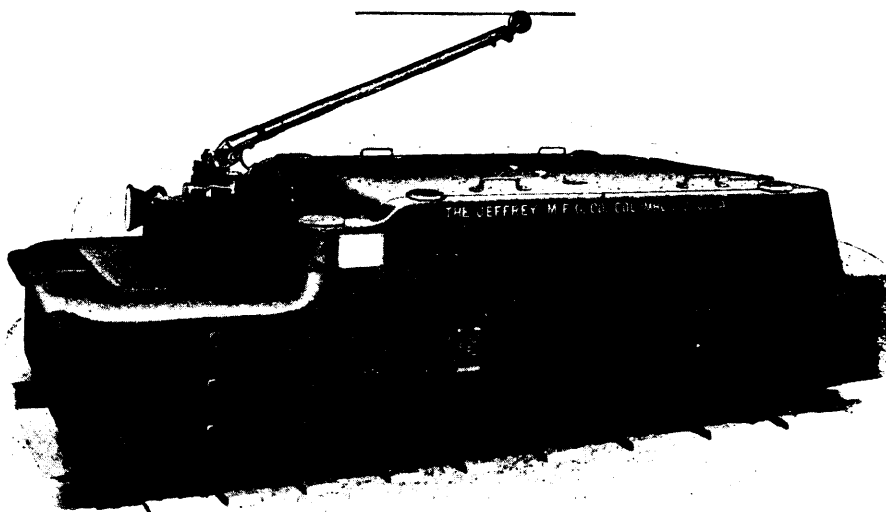
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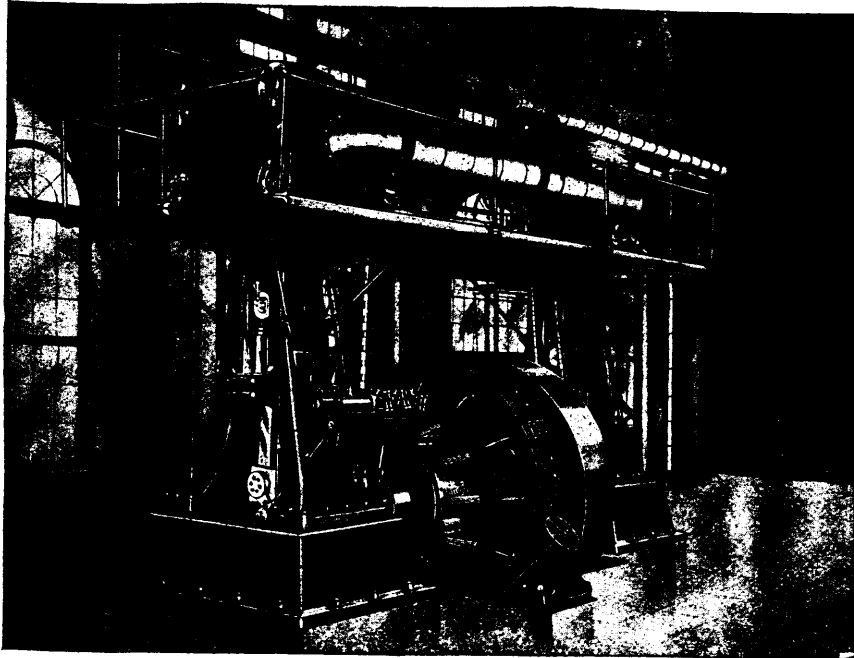
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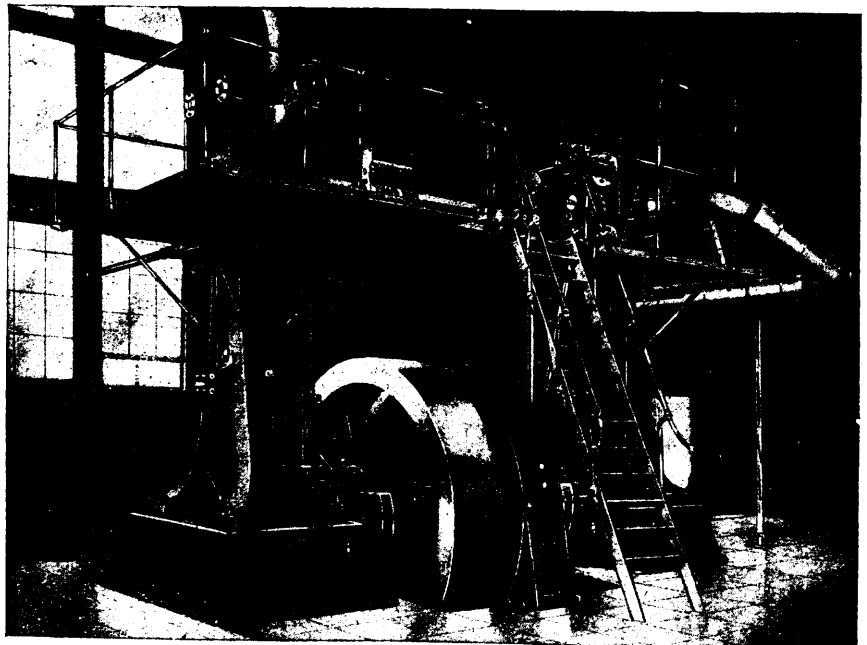
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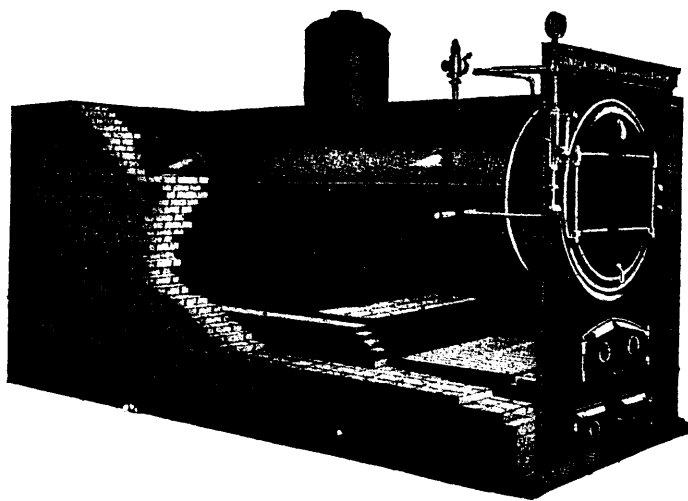
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### THE BRITISH COLUMBIA MINES' REPORT.

The annual report of the Minister of Mines, just issued, reviewing mining operations in 1904 in British Columbia, is, without doubt, the most interesting and, we think, valuable, of the series published by the Department, and we have much pleasure in congratulating the Provincial Mineralogist, Mr. W. Fleet Robertson, on this excellent compilation. The report contains an extraordinary amount of information, particularly in respect to matters, which, at the present time, are demanding attention, such, for example, as the true position of the lead industry in the Kootenays, the possibilities of dredging in the more northern gold fields, and the developments of zinc mining in the Slocan. These official pronouncements will naturally attract a great deal of attention, and serve an excellent purpose. As was previously known, the mineral output of the province, during the past year, showed an increase both as regards tonnage and values; in fact, but for the exceptionally good showing made in 1901, it would have constituted a record

achievement. The gross value of the 1904 output is placed at \$18,977,359, or an increase equivalent to approximately 8.5 per cent. over the 1903 returns. The satisfactory feature of this increase is that it was general, every branch of industry, with the exception only of lode gold production, having contributed to the result. It is shown, however, that the increase was not equally divided in the various districts, for while during the year there was a greatly increased activity in East Kootenay, the Boundary, the Coast and the Slocan districts, the reverse was the case in Rossland and Nelson district. The gain in placer gold output was, too, largely attributable to the excellent showing made by the Atlin mines. It is, meanwhile, significant, as indicating more directly the progress that is being made, to find that the tonnage output exceeded that of 1903 by 14 per cent. This, we take it, means that not only is mining being carried on upon a larger scale, but that the problem of successfully treating lower grade ores is beginning to prove less difficult of solution. Thus, in comparing the 1904 tonnage with that of 1902, it is found that the very extraordinary increase of approximately 46 per cent. has been made, while there has been no material addition to the number of large shipping mines. In this connection it is interesting to note that considering the province as a whole, 443 tons of ore were mined for each man employed in or about the mines. Taking the individual districts, it is shown, as affording some indication of the costs of mining in different localities, that in the Slocan district an average of 114 tons per capita was mined during the year; in the Nelson district 280 tons; in the Rossland district 400 tons, while in the Boundary, where quarrying methods are largely employed, this increases to 1,121 tons per capita.

It may here be added that the Boundary now occupies an unique position among the mineral producing areas of the province, there having been mined in that section during the year, more ore than the aggregate production of all other British Columbian mining districts. This is well set out in the following table:—

	Per cent. of tonnage.	Per cent. of values.
Boundary.. . . . .	54.9	30.0
Trail Creek.. . . . .	21.3	28.0
Coast District.. . . . .	5.6	8.8
Fort Steele, M. D. . . . .	5.2	8.6
Nelson.. . . . .	5.1	3.5
Slocan.. . . . .	4.8	9.2

Considering the mineral production in detail, the report states that placer gold to the value of \$1,115,300 or an increase of about five per cent. was made. Of this \$530,000 was produced by the Atlin mines, while the Cariboo yield was about the same as that of the preceding year. Dredging for gold has not as yet proved commercially successful, on account of mechanical difficulties, which may, however, be surmounted. The lode gold production for 1904 is given as \$4,589,608, or a decrease of about eight per cent., due, it is stated, to the diminished output of the Rossland and Nelson districts. In the Boundary district, however, the gross gold contents of the ore mined was about ten per cent. greater than in 1903, while, notwithstanding a decrease in the tonnage of gold-bearing ore from the Coast districts, an increase of about eight per cent. in gold values is recorded. As a result of the bounty offered by the Dominion Government on lead, a very largely increased production of this metal was made, the total output being 36,646,244 lbs., of which 21,071,236 lbs. were produced in East Kootenay; 10,611,227 lbs. in the Slocan, and 3,091,648 lbs. in the Ainsworth division, as compared with a total output of 18,089,283 lbs. in 1903. About 80 per cent. of the silver produced in British Columbia is obtained from silver-lead ores, and consequently an increased output in this metal was also made, about 50 per cent. of a total production of 3,222,481 ounces valued at \$1,719,516 having been derived from the Slocan district. In copper, a further advance of about four per cent. is shown, the total output for 1904 being 35,710,128 lbs., valued at \$4,578,037. The following districts contributed to this general total:

Boundary District . . . . .	22,066,407 lbs.
Rossland " . . . . .	7,119,876 "
Coast " . . . . .	5,960,593 "
Yale-Kamloops " . . . . .	328,380 "
Nelson " . . . . .	220,500 "
Various Districts . . . . .	14,372 "
	<hr/>
	35,710,128 "

The average assays of the ores of the various camps, based upon copper recovered, were as follows:—Boundary Camp, 1.38 per cent. copper.; Rossland, 1.12 per cent., and Coast District, 3.68 per cent.

While as yet the production of zinc has not assumed important proportions, the recent more favorable condition in respect to the marketing of this product, have induced mine owners in the Slocan district to give the subject serious attention. Until within the last year or so, the occurrences of zinc in association with the galena ores in this district, were regarded as a detriment, as in the marketing of the lead the smelters penalized all ores carrying any considerable quantity of zinc. Now, however, most of the concentrating mills have been equipped to enable them to separate out a "zinc concentrate" from the jigs and tables. These concentrates will average from 38 to 48 per cent. zinc, in the form of blend, but also carry as impurities from 2 to 5 per cent. lead, from 5 to 15 per cent. of iron, and from 20 to 45 oz. of silver to the ton, together with a quantity of generally silicious gangue matter. Most of the smelters purchasing zinc ores are now using the Belgian

furnace, in which the ore is mixed with coal or other reducing agents placed in a clay retort, the zinc being distilled off and caught in a condenser. Naturally, iron and lead are considered objectionable in this process, as they destroy the retorts, and in consequence add greatly to the cost thereof. Crude Slocan concentrates, therefore, have not been readily marketable on this account, and recently two "zinc enrichment" plants were established in the Kootenays, with a view to removing the impurities to a degree, at least, sufficiently to render them non-detrimental. The silver, however, still remains, being directly included in the zinc blende, and Mr. Robertson states that, so far as he was able to observe, no separation could be made, except by smelting, or by some other form of disintegrating the zinc blende. On this account, the price offered by ore buyers for the silver contents is very low, and mine operators therefore have so far found it advisable to allow as much zinc to pass into the lead concentrate as the smelters will accept without penalty, in which case, of course, the zinc is lost, but more than made up for by the better price obtained for the silver. It is stated, however, that there are two or three newer processes especially adapted to the treatment of ores of this character, and an electric process is being developed in Vancouver which may be utilized in small units, and thus help to solve the problem by the local treatment of the concentrates.

Coal mining in British Columbia is now developing rapidly, activity in the East Kootenay areas more than compensating for the loss sustained following the introduction of mineral oil in California for fuel purposes, by which the market of the Coast collieries' product became seriously restricted; thus in 1902 75 per cent. of Vancouver Island coal was marketed in California; in 1903 only about 45 per cent., while in 1904 this increased to about 53 per cent, the total output from the mines last year being 1,023,013 tons gross, or an increase of 20 per cent. over the 1903 returns. A still more satisfactory showing was made by the Crow's Nest Pass Coal Co., whose production for the year was 662,685 tons, of which 350,900 tons were used in the manufacture of coke. Most of this coke is sold to the Kootenay smelters, but the export trade from the United States, ascribable to the development of markets in Montana by the completion of the branch line of the Great Northern Railway into Morrissey, from 27,758 tons in 1903 to 97,690 tons in 1904. It was recently announced that the Canadian Pacific Railway had commenced the construction of a branch line to give access to the Nicola district. The coal fields in this section came into considerable notice last year, and much prospecting was done, the area being found to extend beyond the limits of its previously determined boundaries. As yet, of course, nothing beyond superficial development work has been carried on, but the quality of the coal, and its coking capabilities, from analyses made by the Provincial Government Assay Office, proves to be even better than was believed.

In the Provincial Mineralogist's notes on the general developments of the year, many matters of present interest are discussed. The first of these refers to the increased equipment of the smelting works operated by large companies in the

Boundary district. Several of these companies realizing that the oxidized ores, found in the upper portion of the ore bodies, were apt to be replaced at depth by sulphides, have consequently, either by purchase or by consolidation, acquired all available deposits carrying an excess of oxidized iron, thus securing for themselves an adequate supply of this material for fluxing purposes.

The improvement in metallurgical practice is attested by the fact that the average contents of the ore mined in this district during the past year was but 1.38 per cent. copper, \$1.44 in gold and 0.3 oz in silver to the ton, upon which profits were made. It is further stated that the general costs of mining and smelting have been reduced. Another note refers to the fact that prospecting has developed new coal fields in East Kootenay, up the Elk River, while in the Telkwa Valley, in the Omineca District, what promises to be important deposits of semi-anthracite coal are reported to have been found. Much has been heard during the past year of the value of the product of the Nickle Plate mine at Hedley City, in the Similkameen, where was treated in 1904 about 10,000 tons of ore. It is somewhat disappointing, therefore, to find, in view of previous greater anticipations, that the values recovered did not exceed from \$12 to \$15 a ton, though, of course, this is a very good grade of ore.

The chief features of the report, however, are the special bulletins on the Atlin, Southeast Kootenay, Nelson and Slocan districts, prepared by the Provincial Mineralogist, after visiting the respective localities.

We publish elsewhere in this issue a lengthy extract contained in the report on the district first mentioned, as it appears to us to contain especially valuable information in respect to hydraulic mining conditions there. But another reference to the discovery of a curious and unusual occurrence of magnesite, found within the limits of the town of Atlin, is also worthy of note. The formation in the vicinity of the town is composed of magnesian rocks. Skirting the town site on the east is a low depression, swampy in character, in places showing "hummocks" of white magnesite, which seem to be "growing up" from the swamp level. The deposit is exposed on the surface, covering an area of several acres, and at a depth of about ten feet, to which it has been dug, continues pure and clean from all foreign matter. Mr. Robertson makes this comment:—

"This deposit was at first considered to be simply an accumulation of magnesite formed from the decomposition of the surrounding rocks and deposited by surface waters in this swamp. If such was its origin, it seems incredible that the deposit should be so free from clay and other materials, equally portable by water, and that it should be deposited in mounds above the water level. It seems probable, therefore, that the deposit is not from water, but that underlying this draw some particular stratum in the magnesium rock occurred, which, being softer, was more easily worn away, so forming the draw, and being more susceptible to the action of swamp waters carrying carbonic acid, was altered from an oxide of magnesia into the carbonate of magnesia or "magnesite," in which

operation it would be greatly increased in bulk and so rise in mounds, seeming to "grow up" from below."

This deposit of magnesite was, during the year, located as a mineral claim, and some two hundred tons sent to San Francisco to be used in the manufacture of "magnesia brick," for furnace linings. It is thought, however, that the purity of the deposit would admit of its being used for other purposes, in which case it might be marketed to better advantages.

As has already been mentioned, the Government bounty on lead exercised a decided stimulating influence on this industry, but the beneficial effect was more appreciable in the case of the Southeast Kootenay industry than elsewhere. The reason given for this is that the silver-lead mines in this section of the country are capable of producing a large tonnage of ore in which the silver values are relatively low as compared with the lead contents, while the reverse is the case in the Slocan mines. The St. Eugene mine is taken as an example. Here it requires some five tons of ore to make one ton of concentrate; a ton of concentrates contains about 33 oz. of silver and 1,300 lbs. of lead, the approximate gross value, of which would be:—Silver, \$16.50 and lead, \$19.50. The bounty on a ton of these concentrates would be equivalent to \$9.75 or nearly \$2.00 per ton on the ore itself, the gross value of which, exclusive of the bounty, would be only about \$7.20.

In the Slocan, however, the condition of mining is reported to be better than is implied by the increased output. Some years ago all visible ore was extracted as quickly as possible, in fact, the mines were gutted, and, in many cases, development was allowed to take care of itself. The mines, of course, lent themselves readily to this practice, as in many cases shipping ore was encountered at the surface, and could be followed down or into the hill. As Mr. Robertson states, the inevitable day of reckoning came, and it is only now that development is receiving the attention necessary to admit of the district maintaining anything like a uniform production. The report also includes, in addition to the customary excellent half-tone reproductions from photographs, a number of inserts giving the flow sheets drawn by the Provincial Mineralogist, showing in detail the operation of the principal concentrators and mills in the Slocan and East Kootenay.

#### MINERAL DEVELOPMENT IN NEWFOUNDLAND.

The Geological Survey of Newfoundland has issued its seventh annual report, compiled by Mr. Jas. P. Howley, F.G.S., on the mineral statistics of the Island. This report records another satisfactory increase in output; though there has been a slight falling off, both in the quantity and value of certain commodities, namely:—barite, slate, granite, building stone, etc. The total value of the raw materials of Newfoundland's last year's production is valued at \$1,353,953.00, or an increase of \$84,148.00 over the 1903 output. During the past four years, in fact, mining development in Newfoundland has made slow but steady progress, for example: in 1900 the total value of the mineral production was valued at \$792,099.00; in 1901 it reached \$1,202,272.00; in 1902, \$1,217,686.00; in 1903,

\$1,269,805.00, and, as already stated, in 1904, \$1,353,953.00, or an average annual increase of \$140,463.50. The greatest percentage of increase was in 1901, when an increase of 51.78 per cent. was shown, while the percentage last year was 6.62 per cent. On the total output the proportionate earning power of men employed in the industry is given as \$570.08. Mr. Howley, in his report, expresses the opinion that these latter figures show as great an actual earning power *per capita* as that of any mining country in the world. It may be here explained that the high percentage of increase in 1901, above noted, was due to the depression in the mining industry of the island in 1900, when some of the most important properties were closed down, and the percentage of increase in 1904 is a far better indication of industrial development. The features of last year were the first shipment of talc, which industry promises important developments, while also petroleum was produced for the first time, 700 bbls. having been obtained as the result of a few months' test pumping. The first gold brick produced from Newfoundland ore was obtained from a sample lot of 23 tons, mined by the Goldenville Mining Company. This brick, however, was of very small value, still the result of the test shipment was regarded as very satisfactory.

During the year, about 2,375 persons were engaged in mining and quarrying on the island, the percentage of accidents being 1.22 per cent., while the fatalities were .16 per cent. The following table shows the mineral productions for the year:—

Name of Product.	Quantity raised.	Manufactured or used in the country.	Value of Minerals exported.	Total value of production.
			\$	\$
Barite . . .	2,000 ts.*	.....	4,750	5,000
Brick . . .	1,236,000 M.	1,236,000 M.	.....	11,432
Bldg. Stone	3,100 ts.	3,100 ts.	.....	4,650
Cobble and Spawls.	4,000 "	4,000 "	.....	2,000
Copper Ore.	107,839 "	.....	395,723	466,739
Gold.. . . .	11 ozs.	.....	.....	209
Granite. . .	1,945 ts.	1,945 ts.	.....	11,550
Iron Ore ..	589,739 "	.....	585,739	589,739
Petroleum .	700 bbls.	300 bbls.	.....	1,134
Pyrite.. . .	60,200 ts.	.....	210,700	210,700
Sand and Gravel. . .	2,320 "	2,320 ts.	.....	5,800
Slate. . . .	2,700 "	.....	37,800	37,800
Talc. . . . .	1,562 "	.....	7,000	7,000
Not Specified.	.....	.....	200	200
Total.. . . .			\$1,241,912	\$1,353,953

\*In every case the long ton of 2,240 lbs. is used.

From the above, it will be noted that the most valuable products of the Island are iron, copper, pyrite and slate. The increase in the production in iron was largely due to the larger tonnage produced by the Dominion Company, whose output was increased to the extent of 94,632 tons. The Nova Scotia Company's operation make a less satisfactory showing, owing to the fact that work is now confined chiefly to underground mining, and consequently operations are more tedious

and expensive than formerly. It is stated, however, that the ore bodies increase in thickness and quality as the underground work proceeds. The demand for the Bell Island iron continues good, a large proportion of the output being marketed at Rotterdam, while, too, a market has been opened for it in the United States, and also in Scotland. The report states further that there are prospects of the deposits on the western portion of Bell Island, in the early future, where tests are to be made this year with diamond drills. The Nova Scotia Steel Co. last summer attempted to mine the Workington deposits on the north side of Conception Bay, but failed to find a sufficient quantity of ore to warrant the continuation of work. This is much regretted, as the ore is of a very superior quality, being an ideal character of hematite.

The chief production of copper ore was made by the Union Mine at Tilt Cove, which produced 73,082 tons of cupriforous pyrites, while 165 tons were taken from Pilley's Island. A small output of 280 tons was extracted from the new copper mine at St. Julien's, N.E. coast, 80 tons of which were a high grade chalcopyrite. This property is held under option by a New York company. From the Terra Nova mine, Baie Verte, an output of 19,312 tons of cupriforous pyrites was marketed in the United States, and used in the manufacture of sulphuric acid, the copper contents being carefully extracted and saved. A large ore body at York Harbor, Bay of Islands, owned by the Humber Consolidated Mining & Mfg. Co., was actively developed during the year. This ore body is said to be 57 feet wide, and to contain an average of about 7 per cent. copper, besides appreciable gold and silver values. Some 15,000 tons of ore were raised, 8,200 tons being shipped to the United States.

In 1904 the output of pyrite far exceeded that of any previous year, 60,200 tons, valued at \$210,700 having been mined. This ore is obtained principally from Pilley's Island, Baie Verte and Roswell's Harbor, Labrador. At this latter property a considerable amount of development work has lately been performed, while also the mine has been well equipped with machinery. The deposit is reported to be a large one, and high in sulphur, while also containing a small percentage of gold.

The production of the slate quarries shows a considerable falling off, this being attributed to the destruction by fire of the plant of the Wilton Grove quarry, while nothing was done with any of the slate properties at Trinity Bay.

Incorporated in this report is also an account of exploration and boring operations in the central carboniferous basin, near Grand Lake. The first discovery of coal in this region was made by the late J. B. Jukes, M.A., F.G.S., F.C.P.S., an eminent geologist, who visited the locality so far back as 1840. In 1865 the late Alex. Murray, C.M.G., F.G.S., explored that section between Hall's Bay and Bay St. George, and observed fragments of coal strewn along the shore near the head of Grand Lake. In the following year he ascended the Main Humber River, and ascertained that the carboniferous series spread over a vast extent of the Humber Valley, but only the lower and unproductive portion was met with. The compar-

atively low angle of inclination at which the strata dipped toward the southward, indicated that higher strata bringing in possible true coal measures, should be looked for in that direction. A later investigation on the part of Mr. Howley confirmed this conclusion. Boring operations were then commenced by the Government, but only negative results were obtained until 1891-2, when a more systematic plan was adopted under the direction of the geological staff. Under the foot-hills to the south of Grand Lake, some rock exposures were discovered, and upon stripping these, good sections were exposed, consisting of true coal measures doubled up in the form of a sharp, narrow synclinal trough, holding seams of coal of various thickness. Further attempts were made to find coal near the Lake Shore on Kelvin Brook, boring being carried on there without, however, great success, but in 1895, railway construction having reached the vicinity of the Grand Lake, coal was discovered near Goose Brook. The report says: "This find was a great step in advance, and afforded a clue to the true structure of the region. We now had hold of the coal basin again in a part of the country far removed from the hill range. . . . . or just eleven miles on the strike from the further western extreme of the trough. It proved beyond question that the conclusion which had been arrived at as to the prolongation of the coal trough into the flat country was correct, and that the likelihood of the trough widening out in its western extension was very probable. Had this clue been followed up at the time we would now be in possession of much more information of this central coal basis, but the prosecution of the investigation was again deferred."

In 1898 the coal reserve was handed over to Messrs. Reid, who commenced mining operations on seams of coal at Aldery, Coal and Goose Brooks, and extracted some 8,000 tons of coal. After the reserve again reverted to the colony no further attempt was made to explore the region until last year, when the Government made an appropriation to continue the explorations with a Davis Calyx drill. Boring was commenced about half a mile east of Goose Brook, and two genuine coal seams, besides some smaller ones, were discovered. The result of the season's operation was to unmistakably indicate the existence of a larger and more promising trough of the coal measures, or rather extension of the original trough. Another important point ascertained was the fact that this portion of the coal trough is far removed from the hill range, and occupies the flat country, having, therefore, room to expand both laterally and longitudinally, over a very considerable area, nor is it so likely to be badly faulted. Mr. Howley states that he will not be surprised if, on fuller examination, this coal basis will be found to attain a thickness of measures not far short of the Sydney coal trough, which comprises between 1800 and 1900 feet; and in view of the importance of the possession of available coal on the island, and the effect it must inevitably produce on the future of the mining development of the colony, he strongly urges the Government to not only reserve this coal area, but, if possible, all the areas or prospective areas in which coal is likely to occur elsewhere in the country.

#### THE PRESENT PHASE OF THE CARIBOO HYDRAULIC.

Shareholders of the Consolidated Cariboo Hydraulic Mining Company, Ltd., of whom the majority are eastern men, are naturally much disappointed and disgusted at the present position of affairs; and the failure of this undertaking, which has always been regarded as one of the most promising in British Columbia, will, it is feared, further discourage the investment of Eastern Canadian capital in mining ventures in the western province. The worst feature of the case is the fact that the property is, undoubtedly, a valuable one, and under anything like favourable conditions is capable of yielding very handsome returns on a large capital. This, it may be said, is the opinion of every experienced engineer who has visited the ground. To what cause, then, it may be reasonably asked, can the present failure be ascribed?

While, of course, during the last few years, shortage of water, due to an abnormally scant precipitation, is very largely responsible for the relatively small recoveries made, the question, we fear, can only be really answered in one way, namely, that the directors, although repeatedly advised to do so, failed to appoint a competent person to control and regulate expenditure at the mine. Their reason for neglecting this precaution is tolerably well known to many, and there is no need here to dwell at length on the point. Meanwhile, for the last two or three years the mine has been operated at a considerable loss, and at the end of the 1903 season it became necessary for a large sum of money to be raised in order that the work might be continued. This was provided by a few of the principal shareholders who agreed to advance the company, on a short loan, the sum of \$170,000, without interest. Later at a meeting of shareholders, held on January 13th, of that year, shareholders were invited to participate *pro rata* in subscribing to bonds for \$400,000 at 50 per cent. of their face value, to pay off the liabilities and provide additional working capital. But this invitation met with practically no response, barely 60,000 bonds yielding but \$30,000 being subscribed for. Consequently, each of the shareholders concerned in the \$170,000 advance, was compelled to accept bonds for the amount of his respective advance, no interest being charged. In 1904 these few gentlemen were also called upon to guarantee bank loans for wages, plant, development, etc., pending the season's clean-up. The returns were again unsatisfactory, and guarantors were faced with a deficit of \$70,000. Under these circumstances they, very naturally, refused to do more this year unless supported by the shareholders in general, and a circular was issued to this effect, stating that unless the holders of the company's stocks were prepared to do their share towards saving the property, the trustee for the bondholders would sell the mine under the terms of the mortgage indenture securing the bondholders, none of the coupons having been met up to the time of the issuance of this circular, in March last. It was further stated that a majority, if not all, of the bondholders, who are also shareholders in the company, would join *pro rata* with the other shareholders in providing a fund sufficient to liquidate the bonds on the basis of the price at which they were sold, without interest, and by



these means pay off the present debts of the company and secure the additional water supply of 2,500 miners' inches at the mine, which, according to the manager's estimate, would cost about \$250,000, the total requirements being thus, approximately, \$520,000. If this proposal had been carried out, the shareholders would have been required to contribute an equivalent of 65c per share. The proposal, which was an eminently reasonable one, was considered at a meeting of shareholders held on the 3rd of April, but, shareholders, failing to evince any disposition towards adopting this plan for the conservation of their interests, the directors issued another circular on May 8th, stating that, under power of sale, contained in the mortgage deeds, the trustee for the bondholders would immediately exercise his right to sell the property either by public sale or by private arrangement. There the matter now stands. In a measure one feels that shareholders are deserving of sympathy in consequence of the considerable loss which some of them must sustain. A good many holders of stock have held their shares for several years trusting to the repeated assurances given them by the manager that large profits could not be long delayed. That the manager, however, was quite honest in his optimistic view of matters, goes without saying, and as he, too, is a large shareholder, his loss is not only a financial one, but he must necessarily experience keen disappointment as a professional man of, by the way, unquestionable attainments, in the non-fulfilment of his hopes. On the other hand, the few shareholders who have practically financed the undertaking from its inception, and now stand in the position of bondholders, are likely, if they decide to purchase the property among themselves, to reap a rich reward, for no one doubts that the mine is capable of being profitably operated once present disabilities are overcome.

Referring to the consolidation of mining interests at Rossland, a correspondent writes:—

"Were that amalgamation to be confined to the War Eagle, Centre Star and Trail smelter it would simply mean, of course, that the mines would gain reduction works. But, in that event, would the Trail smelter obtain from these two mines, alone, sufficient ore to keep the furnaces running. And if smelting is not done upon a large scale there can be no substantial reduction of costs. It is not that the mines considered have not sufficient ore blocked out to supply the smelter, but it is that the shafts on the War Eagle and Centre Star could not handle a much larger tonnage than they have done in the past. The shaft on either property has three compartments. One is used as a manway and for the pipes. The other two have to be used for the introduction of timber, of steel and of labour as well as for the hoisting of ore. Moreover, the hoisting engine in either case has not a much greater capacity than that at which it has been used. Hence the tonnage is not likely to be enough to fill the smelter requirements. To alter this condition of affairs the shaft would have to be enlarged and, furthermore, the engines replaced. This would mean a great expense to shareholders. But if the amalgamation is also to include the Le Roi, the Trail smelter is at once assured of an ample supply of ore; for not only has that mine a large reserve but it has a five compartment shaft which is so

arranged that a very large quantity of ore may be hoisted continuously. Moreover, as the Le Roi and the other mines considered are contiguous, some comparatively inexpensive alterations would permit of the Centre Star ore, at least, being hoisted through the Le Roi shaft. This would save money to the Gooderham properties and at the same time would ensure the Le Roi a cheaper rate of smelting. Beyond, however, the mere question of bulk, important enough, there is the other smelting problem, that of flux, which must be considered. Now the ores of the War Eagle, Centre Star and Le Roi are almost identical. Moreover, they are all siliceous ores. The Snowshoe has been mentioned as a fluxing ore, but this has been nowhere authoritatively stated. *Au contraire*, the Snowshoe is itself so siliceous an ore as to itself require flux to overcome this. Hence it would be of little avail to the smelter. The ideal amalgamation would be with properties, such as the Kootenay, the Le Roi No. 2 and the Velvet, all in Rossland camp, which contain copper and iron. The amalgamation idea has ever been a favourite with the chief owners of the War Eagle, Centre Star, at a time even when the Le Roi meant also the Le Roi No. 2 and the Kootenay. But with the utter failure of the Kirby concentrator it has seemed the only possible way out of the slough of despond into which these properties have been plunged. But concentration is not everywhere the failure in Rossland camp as it proved with the Trail plant. The Velvet certainly so far has been most successful and the Le Roi claims almost as good result with its experimental works."

The energetic character of the new Minister of the Interior, the Hon. Frank Oliver, is well known, and it may be quite certain that he will lose no time or opportunity in making the departments over which he has direction as efficient and useful as it is possible for them to be. We may, therefore, expect that the vacancy, created by the lamented death of the late Dr. G. W. Dawson, as Director of the Geological Survey, will be very shortly filled. Immediately after Dr. Dawson's death, the Canadian Mining Institute made certain recommendations to the Hon. the Minister of the Interior, in connection with the re-organization of the Survey, the department being specially urged at that time to appoint Dr. Frank D. Adams, Prof. of Geology at McGill University, Montreal, as successor to Dr. Dawson. Circumstances, since this recommendation was made, have in no sense changed; in fact, it is of the utmost importance and urgency that a director should now be appointed to re-organize the Survey and relieve the Minister (who is politically responsible) from the necessity of attending to the details of its administration. We believe we are perfectly correct in stating that the appointment of Dr. Adams to this important post would be, not only acceptable to the present staff of the Survey, but it would be extremely popular with the mining communities of Canada. It is unnecessary to refer to Dr. Adams' capabilities, for these are sufficiently well known. It may, however, be added that he possesses in an eminent degree, in addition to his executive and technical qualifications, the rarer accomplishments of tact and judgment. Consequently, he should make no unworthy successor, to even the late Dr. G. M. Dawson.

Mining men in British Columbia are complaining bitterly of the state of the mineral law regarding title to claims which are not Crown granted. Several adverse actions have been tried lately and the uncertainty with this class of claims is very great. The particular point over which trouble is arising is the practice of allowing fifteen days between the location of mineral claim and the recording thereof. This was enacted for the purpose of giving the prospector ample time to record his claim, when situated in some more or less inaccessible district. But if the claim were not recorded within the fifteen days given it apparently makes no difference to the fact that no other claim may be located over the same, or portion of the same, ground during that period. It is, however, quite possible in the heavily timbered mountains in the Kootenay for a locator to fail to discover that a prior location has been made. Hence, as in a case recently tried in the Kootenay, a miner may locate and carry on his assessment work for five years and then apply for a Crown grant only to be adversely on the ground that within 15 days antecedent to the day on which he first located there was subsisting a mineral claim which had never been recorded but which had been located. The adverse party "jumps" the claim and then produces some prospector who is willing to swear that he located a claim which he never recorded within 15 days prior to the time of location of the man who is applying for a certificate of improvements. This difficulty might be readily overcome if the law were interpreted or altered so as to read that a claim not recorded within 15 days of its location could not invalidate the location of any other claim made and recorded within that period. As it is, mining men say that it is impossible to effect sales with the mining law in its present state of uncertainty as regards title to non-Crown granted properties.

It is not the fault of the present editor that Mr. J. E. Hardman's valuable paper, "On the Examination and Valuation of Mines," read before the Canadian Society of Civil Engineers so long ago as November, 1903, was not reprinted in the REVIEW ere this; and we cannot avoid expressing the view that our predecessor in ignoring the contribution of so well-known a Canadian mining engineer on a subject of such general interest, acted in a culpable manner. However, to follow out the adage of "Better late than never," we commence in this issue the publication of the paper in serial form—shall we say with the commendable intention of rescuing it from the oblivion with which it is threatened, (from, of course, only the point of view of mining men) if it is allowed to remain hidden away among the Transactions of the Canadian Society of Civil Engineers? But, seriously, it is a matter of regret that the paper was not reprinted by the technical press at an earlier date, for it was written just about the time, or rather strictly speaking before, a very interesting discussion on the proper interpretation of such phrases as "ore in sight," and other matters incidental to the examination and valuation of mines, provoked by Mr. T. A. Rickard, appeared in the columns of the *Engineering and Mining Journal*, and the time was then exceptionally opportune for Mr. Hardman's views to re-

ceive a wider publicity. Nevertheless, the subject is one which can stand much and frequent discussion, and in this case the matter is dealt with in a particularly able and common-sense manner.

Prior to the last elections in Ontario, the Hon. Mr. Whitney undertook to create a Department of Mines in that Province, and to appoint a man from Northern Ontario, familiar with the conditions existing there, to fill this important cabinet position. It proved, however, difficult to disassociate governmental business appertaining to mining lands and affairs from other matters coming within the province of the Department of Crown Lands. In consequence, therefore, the new portfolio of Lands and Mines was created, and Mr. F. Cochrane, who has for many years resided in New Ontario, and is, therefore, thoroughly conversant with the timbering, mining and other interests, and also has a special knowledge of affairs connected with the settlement of new districts, was recently offered the administration of this department. Mr. Cochrane accepted the office, and was duly elected by his constituency. The new Minister is known to be a man of excellent business judgment, possessing too, in an eminent degree the qualities of fairmindedness and firmness of purpose. He may, therefore, be depended upon to do all that is possible for the advancement of the interests of the northern sections of the province, in which mining developments will, no doubt prove an important factor.

Mr. J. Obalski, who is one of Canada's representatives at "L'Exposition Universelle et Internationale," at Liege, sends us an interesting account of the Canadian exhibits. Mr. Obalski states that: "The Canadian Pavilion is attracting much attention, the mineral exhibit being considered especially good. The collection is essentially an industrial one, demonstrating, as was the case at St. Louis, our resources in raw material. We show asbestos, mica, nickel, corundum, gold, silver and cobalt ores, while the British Columbian display is one of the principal features of the exhibit. The Canadian Pavilion was officially opened on the third of June, the opening being well attended by Ministers and other high officials."

It is, perhaps, none the less gratifying that the Dominion should be well represented at this important exposition in respect to her mineral wealth, when it is learned that no other country has, seemingly, devoted the same attention towards getting together representative mineral collections. In another direction, however, we do not make so good a showing, as no arrangements have been made for the representation of Canada officially at the International Congress of Mining and Metallurgy, which is to meet at the end of the present month.

One notes with satisfaction the steady growth and progress of mining developments in Ontario. That province, like British Columbia, has suffered at the hands of the unscrupulous promoter, but fortunately to a lesser degree. There has never been as extensive a mining "boom" in Ontario as was the

case in "B. C.", and there is much to be thankful for in that. On the other hand, while British Columbia claims, with reason, in point of tonnage yield and values to be the mineral province of the Dominion, Ontario may well argue, that judged from the standard which is, after all, to the capitalist, the more convincing one, that of dividend-earning capabilities, she still has relatively the advantage of her western competitor. In addition to these established and profit-earning mines, properties, in some cases, of exceptional promise are now opened

ville, Que., which has lately made some important additions to its plant. The Company's quarries and fibreizing plant are situated about three miles southeast of Danville, with which point communication is established by the Asbestos & Danville Railway. The quarries were first opened in 1879 and are situated on a ridge of serpentine rock covering an area of nearly 100 acres. The asbestos is found in veins from one-eighth inch to two or three inches, which occur throughout the whole mass of serpentine. The fibre in each vein is absolutely pure, and its quality very fine and uniform. The



THE MILL BUILDINGS AT THE ASBESTOS AND ASBESTIC COMPANY'S PROPERTY, DANVILLE, QUE.

up in new districts, and it is no longer so difficult to find either Canadian or American capital for the development of them. It is probable that some important developments will take place this year in the Temiskaming region of Ontario, as well as the adjacent territory extending into the Province of Quebec.

#### ASBESTOS MINING AT QUEBEC.

Among our illustrations this month are reproductions from three recent photographs of the works and plant of the Asbestos and Asbestic Company, Ltd., operating at Dan-

ville, Que., which has lately made some important additions to its plant. The longest veins, however, are "cobbed" or hand-picked, the balance of the rock containing the shorter veins being conveyed to the crushers, from which it passes to the separating and fibreizing machinery, the finely ground rebase being shipped for wall-plastering purposes. The fibreizing plant consists of two separate mills, the new and larger mills having been completed in 1902, and this contains all the latest and improved machinery for fibreizing asbestos. The quarry is fully equipped with a Rand air compressor, cableway hoists, rock drills, etc. Last year the company employed a force of about 300 men, and produced a considerable quantity of asbestos and asbestic, which was shipped. The equipment of the mine was increased by the addition of three derricks.

**"RARE MINERALS" IN CANADA.**

(Specially contributed.)

It is reported of good authority that the Maisonneuve Mica Mine in the Township of Maisonneuve, county of Berthier, has been sold to Paris capitalists, and that operations have commenced on that property with a view to search for, and mine the rarer minerals containing amongst others, as established by previous thorough investigations, the new mineral radium. This property is situated about 40 miles from St. Emily Station, on the C. P. R., and has been worked in former years for white mica, which is said to be of excellent quality. This mineral occurs in a remarkable powerful vein

frequently appearing to penetrate each other with straight radiating cleavage faces for a considerable length. The white muscovite mica occurs in this vein partly in isolated crystals distributed irregularly over the whole width, and partly in accumulations near the contact with the adjacent formation. Most of the crystals obtained from the mine deliver fine sheets cutting from 2 x 3 up to 3 x 7 inches and some crystals in situ measured 18 inches square. This pegmatite vein is distinguished by the occurrence of foreign minerals. Tourmaline, beryl and garnets and the rare mineral Samarskite or urano-tantalite occur somewhat abundantly in the excavation made in the vein. An analysis of Samarskite found on this property,



VIEW SHOWING A SECTION OF THE ASBESTOS AND ASBESTIC COMPANY'S QUARRIES. (See page 126.)

of pegmatite near a creek, varies from 30 to 50 feet in thickness, and is abundantly charged with muscovite mica crystals, many of which yield sheets of merchantable size and quality. The vein, which runs east and west, cuts the gneiss formation under an angle of 40 degrees, the dip being perpendicular, and is exposed by stripping for a distance of 300 feet. While the rock on either side, and in contact with it and throughout the country generally, is a comparatively fine grained aggregate of quartz, feldspar and hornblende with scaly portions of mica arranged in parallel layers, and no constituent predominating in any layer to the exclusion of the others, the vein matrix, on the other hand, consists of large and coarse crystalline masses of pure quartz, and flesh-coloured, or orthoclase feldspar, confusedly aggregated together, but perfectly distinct from, and

according to Dr. Hoffman (Report Geological Survey, 1881-82), gave

Oxide of uranium.. . . . .	10.75 per cent.
Oxide of yttrium.. . . . .	14.34 per cent.
Oxide of cerium and thorium.. . . . .	4.78 per cent.

Samples of these rarer minerals obtained from this property were also recently forwarded to Paris and an analysis revealed the existence of radium. Operations have now begun on the property with a view to principally search for and mine the rarer minerals and according to advices received, it is likely that the property may prove a valuable source for radium.

In this connection it may be mentioned that nearly all pegmatite dikes in the Laurentian formation of Canada contain rare minerals in a more or less degree, and it appears as if here offers itself an extensive field for study and research work. Mr. Obalski in a paper read before the Canadian Mining Institute at the Toronto meeting in March, 1904, pointed out that he had found a mineral which he identified as cleveite and which, on further investigation, showed to contain 70.71 per cent. uranium oxide, while its radio activity was pronounced to be very strong. Prof. Rutherford, of McGill University, made an analysis of this sample and discovered that it contained one-tenth of a milligram of radium. This makes it

been analyzed by the United States Geological Survey and contained the following:

Oxide of uranium.. . . . .	37.7 per cent.
Oxide of yttrium.. . . . .	2.57 per cent.
Oxide of cerium and thorium.. . . . .	6.81 per cent.

Whether this mineral contains radium has not been determined yet, but as the composition is similar to that found in Charlevoix and since the uranium earths are recognized as bearing generally radium, there is a strong possibility that such might be the case.



ANOTHER VIEW OF THE QUARRIES. (See page 126.)

comparable with the best pitchblende so far tested for the production of radium. The pegmatite dike from which this mineral was taken is about 18 miles back from Murray Bay in the County of Charlevoix on the north shore of the St. Lawrence River.

The Villeneuve mine, at one time famous for its production of an excellent quality of white transparent mica, and situated in the north of Buckingham in the County of Ottawa is another example for the occurrence of rare minerals. The mica occurs here in a dike of pegmatite composed largely of clean white feldspar and quartz, in a width of about 150 feet, cutting nearly along the strike of a reddish and grey quartzose gneiss formation. A sample of uranite taken from this mine has

The distribution of pegmatite dikes in Canada is very large and if investigations in the direction as above indicated were made, there is no question that many a deposit now lying dormant, may be found to contain these rarer minerals in quantities to warrant their exploitation. The largest pegmatite dikes so far discovered are those in the Saguenay district, which is situated at the lower St. Lawrence River below Quebec. Besides these there are a number of pegmatite veins in the north of Ottawa, in the vicinity of Mattawa, at several places in Ontario and also in British Columbia.

On the left side of the Saguenay River a number of coarse pegmatite dikes occur, cutting a dioritic gneiss. This region is not surveyed or explored, but since 1891 constant discover-

ies have been made, some of them proving to be of very large extent, especially those found in the township of Bergesennes, Tadoussac and Escoumains.

In the Bergeronne district we have the McGie mine, situated at a distance of 12 miles from Lake des Escoumains. This vein according to Mr. Obalski's examination runs N.E. for a length of a  $\frac{1}{4}$  of a mile, cutting the dioritic gneiss strata. The width is from 15 to 25 feet in the southern part, where the same has been worked for a length of over 140 feet for mica.

In the northern extension the pegmatite dike measures 75 feet in width.

Tourmaline, and garnet, beryl, and also muscovite mica has been found in small quantities.

Another property of importance is the Beaver Lake prop-

far no investigations have been made as to their contents in the rarer minerals.

In the country north of Ottawa in the townships of Wakefield, Templeton and Low, a large number of pegmatite dikes have been found and some of them worked for muscovite mica, but no information is available—excepting the Ville-neuve mine as regards their carrying rare minerals.

In the township of Aylwin,  $\frac{1}{2}$  mile north of Venosta station, a vein of pegmatite cuts through a greyish garnetiferous gneiss.

In the Parry Sound district, in the township of Proudfoot, a coarse and fine grained gneiss occurs, containing ciotite and muscovite mica. Various masses of fine grained diorite penetrate the gneiss and a great number of pegmatite dikes.



THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE READING ROOM.

erty, known as the Hall Mica Mines. It is situated at the head of the little Bergeronnes River, in close proximity to Sable Lake, about 11 miles from the St. Lawrence River. The width of the pegmatite dike is reported to be between 200 and 300 feet, with a vertical dip and a course north-east.

Besides the above described occurrences there are a great number of smaller discoveries. Several pegmatite dikes have been reported in the country north from the McGie mine, at the heads of the river Beaulieu and Bas de Soie.

Along the banks of the Canard River, near the St. Lawrence, we can notice a large number of pegmatite veins, but so

In British Columbia, some large pegmatite dikes have been opened up for mica in the vicinity of Tete Jaune Cache, about 150 miles northwest of Donald on the C. P. R. According to Mr. McEvoy, the pegmatite veins cut the country rock, which consists in that locality of garnetiferous mica schists with some blackish mica schists and light colored gneisses that resemble foliated granitoid rock, the garnet mica schists being the predominating rock. The pegmatite vein has a width of 18 feet, is copiously charged with mica crystals but no investigations have yet been made as regards the occurrence of rare minerals.

### THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE.

Reference was made in our issue of last month to the removal of the Canadian Mining Institute's Library to the building of the Canadian Society of Civil Engineers, No. 877 Dorchester Street, Montreal. In order to give those members of the Institute who are also readers of the REVIEW the opportunity of forming an idea of the new quarters, a set of photographs has been specially taken for reproduction in this issue, showing views of the reading and smoking rooms, the lecture hall and the secretary's office.

All of these conditions are necessary to success, though the importance of any one condition diminishes in proportion to the excellence of the other conditions. The point might be similarly illustrated regarding both individual placer mining and dredging. Locations are supposedly made only when there is at least a present prospect of their being commercially workable, not only as to the sufficient presence of gold, but as to the surrounding conditions. Since "conditions" change as the country opens up, as labor and supplies can be had cheaper, and as cost-saving devices are introduced and improved, we may look in the future to possible further exten-



THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE SECRETARY'S OFFICE AND LIBRARY.

### HYDRAULIC MINING CONDITIONS IN THE ATLIN DISTRICT OF B.C.

(Extract from a report by the Provincial Mineralogist.)

Before a deposit can be said to be gold-bearing commercially, the conditions surrounding such deposit must be taken into account. In hydraulic mining, for example, the conditions are:—

- 1st. The quantity of gold per cubic yard in the dirt required to be moved, and the form in which it occurs.
- 2nd. The quantity and availability of water, etc.
- 3rd. The character of the deposit and its amenability to the hydraulic stream, the grade of the bedrock, the quantity of boulders, etc.
- 4th. The possibility of a dump for tailings.

sion of the goldfield than the locations at present recorded would seem to indicate.

The lapse of four years which had taken place since the writer's previous visit to the camp rendered to him noticeable the changes which had taken place in that time, possibly more so than they would be to residents, to whom such things have been a gradual transition. Probably the most encouraging fact noted of the camp is the maintenance during these years of the output, which still continues to be made from the same creeks and from within the same area as in 1900. Then, the gold was taken almost entirely from the beds of the modern creeks, and as their extent was limited, their exhaustion seemed to be within a measurable limit of time. Now, these creek beds have ceased to be an important factor in the pro-

duction, except where worked by a company. Such concerted effort seems to have rendered workable further and deeper reaches of the creek bottoms than was formerly anticipated, and this promises to continue, through the introduction of mechanical power for handling the dirt or overburden.

Then, the benches and the "old yellow deposit," though they were known to be gold-bearing and their importance was recognized, were still undetermined quantities. The benches have been worked back by hand for a certain distance from the creek, and as this distance, with the increasing overburden, became too great, hydraulic methods were introduced,

Then, a placer claim was workable only when, during the short summer season, it would supply the miner with his necessities for the whole year. Now, these "drifting propositions" provide winter work for men, enabling them to work in summer placer claims yielding a smaller return than was formerly necessary.

And the end is not yet, as far as this "old channel" is concerned, for its limits have not as yet been defined. That it is much greater than was formerly even suspected is certain,—and it is almost certain that for years to come it will continue to be mined and to produce gold.



THE NEW QUARTERS OF THE CANADIAN MINING INSTITUTE—THE SMOKING ROOM.

which, having emerged from the experimental stage, now give definite promise of success.

The "old yellow deposit" had been definitely determined in only a few places, and only near the "outcrops," so to speak, although the writer considered it safe at that time to say that "indications are that it extends for some distance into the "bench claims," and these indications have been proved correct by numerous drifts from the creek valleys and, in its deeper portions, by shafts with drifts therefrom.

From the nature of drift mining, it does not here promise large enterprise or great individual profit, the gold therein being very uniformly distributed, and in amount only such as to pay good wages for the labor expended. This means for the camp a long, steady existence, since the greater part of the "old channel" is under so great an overburden as to be workable only by drifting.

Where the deposit occurs along the valley of the present stream, as on lower Pine and Spruce creeks, and where it has



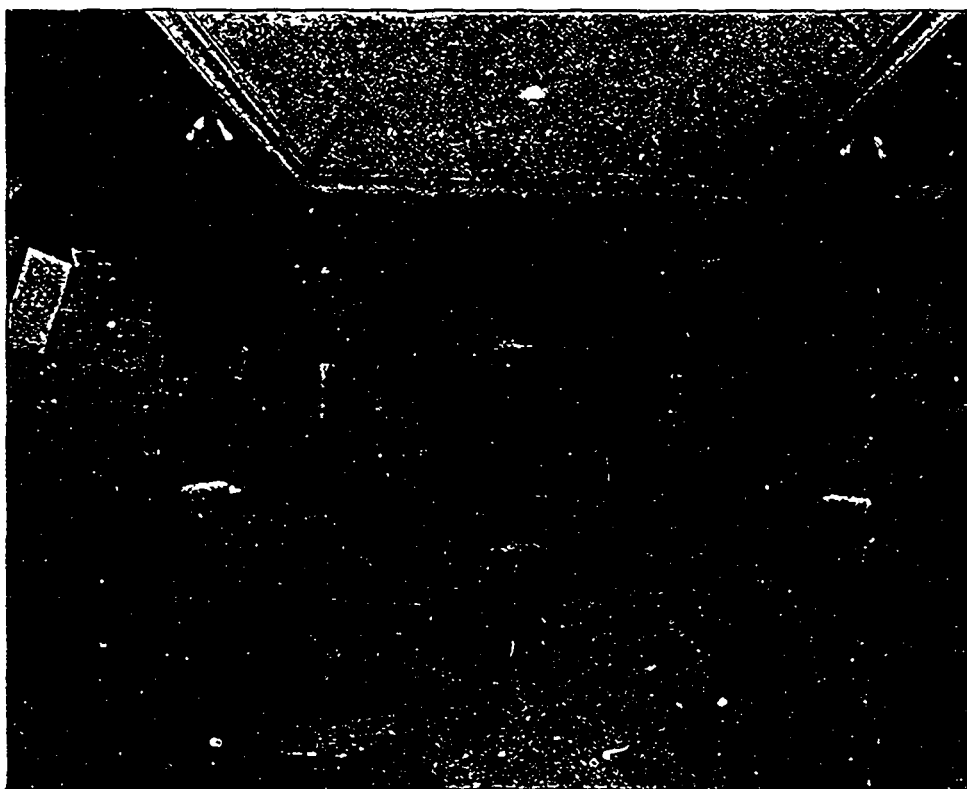
been cut by these streams, it is being attacked from the valley by hydraulic methods.

Since the previous visit of the writer, the development of the camp has rendered clear many points which were previously little more than indications, and as such were given in the Report of 1900. The conclusions then arrived at have been almost exactly borne out by the subsequent work; the area of the field remains the same; the evidence is strengthened that Pine and Spruce creeks at one time joined about Etephendyke and then debouched to the north, towards Trond gulch, emptying into a lake which then covered all the flats at the Half-way house, and that the present course of these below this point is of more recent cutting. The "old yellow channel" has developed along the lines then indicated, but to an extent not then hoped for.

In 1900 the Provincial Mineralogist attempted to ascertain the direction of flow of this yellow dirt, by taking levels at

rounded or flat water-worn form and faces of the gravel, and, above all, by the "chingling" of the flatter stones in the deposit, while the gold is usually on bedrock or in some defined stratum.

All of such evidence of flow is lacking in the old "yellow deposit of Atlin, and while some of the boulders are large and rounded, many are angular, the flat ones often standing on edge, as though so dropped into mud in still water. The greater part of the deposit consists of granite fragments, now almost decomposed, with resultant clay (kaolin) and grains of silica. While the gold here is found for the most part near bedrock, though not necessarily on it, it occurs some height above—more or less throughout the deposit. The characteristics of the deposit did not seem to admit of its having been caused directly from glaciers. The evidence is such as to force the conviction that this deposit was not formed in rapidly running water, but that it was dropped in compara-



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various points, and while these levels were not conclusive, they indicated a flow, which subsequent work has confirmed, giving a grade to the deposit conforming in direction to the flow of Pine and Spruce creeks, but it is so slight (being between 1 and 2 per cent.) that it is difficult to believe that the heavy material in the deposit would be carried by a current produced by such a grade; and further, the workings of the hydraulic pits, etc., notably that of the North Columbia Co., on Pine creek, expose a face in which the heavy boulders and angular fragments are so deposited together as to render it extremely improbable that this deposit is an "old channel," in the usual meaning of that term: viz., the bed of an ancient stream.

In Cariboo, and elsewhere in British Columbia, where the placer deposits occur, the "old channels" contain in themselves the evidence of the direction of their flow; and this is shown by the more or less uniform size of their constituents, by the

tively still water on a bottom (bedrock) such as that of a lake or sea, with a slope, but not a channel. As to exactly how the dirt was deposited, there is room for various theories, but the most probable seems to be that glaciers, carrying in their bases the dirt, slid into a sea or lake and, driven by wind or current into this bay, there melted, the dirt dropping to the bottom, gradually forming the deposit in question.

This is further borne out by the fact, reported by the Superintendents, that in the Deeks pit, on Pine creek, during the hydraulic working, a layer of seashells was found in and near the top of the yellow dirt. This layer was very local, and did not extend to the adjoining pits, and was, unfortunately, all washed away before the Provincial Mineralogist visited the camp.

It is not very clear where these glaciers were formed as certainly no quartz has been found in the vicinity which would justify the belief that it is the *madre de oro*.

## ON THE EXAMINATION AND VALUATION OF MINES.\*

By JOHN E. HARDMAN, S.B., MA.E., etc.

The writer has been asked to contribute to the proceedings of this new section of the Society a paper which embodies the approved practice for the examination and valuation of mining properties, and which shall have, if possible, special reference to the difficulties, or advantages, which Canadian deposits present.

In attempting to comply with this request, he desires to disclaim, at the outset, any originality for what follows; the methods in use are common to all engineers of good standing, and afford little chance for original treatment excepting in minor details, which always present themselves with each new deposit examined. Nor, in his experience, can he state that the deposits of this country present such variations from deposits in other countries as to entitle them to separate treatment. No two ore deposits are exactly alike, and no one hard and fast scheme of treatment is applicable to all. Mineral deposits may be likened to patients in a hospital ward; all of these patients may be troubled with the same disease, but the individual temperament and peculiarities of each one require variations of the standard treatment of such disease. So, also, in the case of mineral deposits, each deposit requires variations in the particular treatment employed for its examination. By reason of this variation, perhaps because of it, examining engineers may differ in their opinions and estimates; but the practical experience, varied knowledge, natural caution, power of discrimination, and of divination—in short, the personal equation—of the engineer are what give value to his report, and differentiate it from the majority of similar reports. Any man may learn to correctly sample an ore deposit or to assay such samples, but few men are given the combined natural capacity, varied experience and sound judgment which render their opinions on mineral deposits of exceptional commercial value.

Ten or fifteen years ago there was little, if any, literature on the matter of mine examinations, and the principle of valuation was applied (with few exceptions) to deposits of coal or iron, and then, chiefly, to properties in England. The work of Hoskold† for a long time stood alone in literature as an attempt to treat the subject of valuation in a scientific manner. But within the last five or six years the proceedings of scientific societies, and the columns of the technical press, have contained a multitude of both carefully and carelessly written articles, which have exhibited the views and methods of mining engineers upon the subjects of sampling and measurement, and of examination generally, and which, by the very interesting and educating discussions that have been aroused, have fairly covered the ground and given a solid basis on which a permanent growth may be expected. The writer wishes to acknowledge here his indebtedness to all this literature.‡

No attempt will be made in the following paper to give any rigid scheme for the guidance of engineers engaged in mining practice, since the writer knows too well the futility of such rigidity. No set of rules can be made to cover the proper examination and valuation of *all* mines, for nature has

never made two deposits precisely in the same mould, or under the same geological or geognostical conditions. The following outlines of what are considered necessary and essential points, are only presented as approximating the best practice of the present day.

## Definitions.

As this paper is intended to deal with mines only, it is proper and necessary to furnish a clear definition of what is meant by the word "mine." The origin of a mineral, the uses to which it may be put, or the manner of working it, are not of definite value; for many valuable deposits of iron, mica, asbestos, coal, copper and other minerals are worked by open cuts, or by quarrying. It is especially important, here in Canada, that distinction also be made between "mines" and "prospects," for "so long as unexplored bodies of mineral are termed mines, just so long will discredit attach to the mining business." The difference between a mine and a prospect is the difference between what is *known* and what is *surmised*, or unknown.

As used in this paper, the word "mine" means that portion of a commercially valuable mineral deposit which has been opened, explored and blocked out by underground workings, such as shafts or inclines, tunnels, drifts, raises, winzes and the like; if a deposit of valuable mineral has not been thus opened and blocked out, it is a "prospect" and no scientific valuation of it is possible.

Most of the mineral deposits now working have certain portions which have been blocked out, and other portions which have not, and therefore under the definition given, are a combination of a mine and a prospect. Out of this combination has arisen the need of further definitions applicable to those portions which have been partially, but not wholly, blocked out. For many years the phrase, "ore in sight," was used indiscriminately, both by good and poor engineers, to designate those portions of a deposit which were either fully or partially blocked out, or both. But, about 1900, Mr. J. D. Kendall\* called attention to the very lax character of the phrase, and its abuse. After a full discussion by the Institution of Mining and Metallurgy, and portions of the technical press, the phrase has been substituted by the following terms:

"Positive Ore," by which is meant only such ore as is contained in those portions of the deposit which have been opened in such a manner as to permit measurement and sampling to take place around the entire perimeter of the block.

By "Probable Ore" is meant such portions of the deposit as have been partially blocked out so as to permit of measurement and sampling on *not less* than two adjacent sides.

There is still a disagreement, or hesitancy, as to the adoption of the third term proposed, "Possible Ore," which has been suggested by some engineers as applicable and permissible to ore exposed on one side only—when, from the history of the deposit, and from such credible evidence as is obtainable, there is a very strong presumption that the ore will extend and exist beyond the proved portions of the deposit.

## Prospects.

In all countries the engineer may find, on his arrival at his destination, that what has been represented as a *mine* cannot be so classified, and that he has to deal with a *prospect* only. Manifestly, in such a case, no attempt at valuation would be of any worth, the engineer at best can only endeavor to ascertain what measure of probability the prospect has of eventu-

\* A paper read before the Canadian Society of Civil Engineers, November, 1903.

† "The Engineer's Valuing Assistant." H. L. Hoskold, London, 1877.

‡ See "Discussions on Sampling," "Mine Examinations," and kindred papers in the *Engineering and Mining Journal*, 1900-1903; Transactions Institution of Mining and Metallurgy, Vols. III-X; etc., etc. See Bibliography at end of this paper.

\* Institution of Mining and Metallurgy, Vol. X, p. 143, *et seq.*

ally becoming a mine. His report should clearly state this limitation, and should present all the facts which he is able to ascertain, but may contain the opinion which he personally deduces from these facts. Herein again comes in the value of the "personal equation" of the examining engineer; and an experienced man frequently "divines" the possibilities of a "prospect," where the tyro or prospector would not.

No more puzzling or indeterminate work can be given to the ordinary engineer than a commission to examine a prospect in an entirely new field. That engineers themselves differ in such cases is well known, one need only remember the disfavor with which the South African fields were regarded in the Eighties by many of the profession, and contrast it with the sentiment of to-day. Perhaps, likewise, the pyrrhotite deposits of Southern Kootenay, through concentration methods, will eventually redeem themselves, since their prospects to-day are certainly brighter than ever before. On the other hand (and much more frequently) a short, even cursory, examination will convince the engineer that the prospect has no possible hope of ever being more than a prospect. To take one illustration from the writer's own practice: Some Boston clients in search of pyrite suitable for acid-burning heard of supposedly large deposits of the mineral in Ontario, and were advised that some 35,000 tons were ready for shipment; the deposit was stated to be 30 feet in thickness and to average 48 per cent. of sulphur.

The writer was sent up to verify these statements and value the property. The first glance on my arrival showed that there were not even 1,000 tons of excavated material; half an hour told me that there were not 100 tons of saleable material in the whole amount excavated, and one short day's work in examining the excavations and looking into the character and geology of the deposit, showed the unreliability of the information, and the improbability of ever finding a sufficiently large body of mineral to render the property of commercial value.

This example has been mentioned purely as an illustration of the many vexing commissions coming to the engineer through good clients who have no means of knowing that the information on which they are acting is absolutely unreliable.

Canada is comparatively young in the mining world, but she has learned rapidly, and one of the facts she has obtained at high cost is, that it is cheaper to have a reliable professional opinion than to buy from boomsters.

#### Examination.

An examination of a mine is usually undertaken for one of two specific purposes, either to inform the owners on some point or points upon which information (other than that supplied by the manager) is desired; or more commonly, to enable an engineer to value it, either for the seller or a possible purchaser; this valuation may include both the *actual* present value, and the *probable* future value.

The examination for information of the owners is usually directed to some specific point or points, such as the continuation of ore bodies, recovery of faulted or dislocated ore shoots, efficiency of present processes, economy of operation, etc., and, as a rule, is offered to engineers who are specialists in the particular line, or points, upon which the information is sought. The vaster number of examinations are required by possible purchasers who wish to obtain a reliable and unprejudiced opinion as to the present value of the mine, and its appurtenances, and as to the continuance of such value.

An examination of a mine comprises a careful and systematic inquiry into the nature and character of the ore de-

posit, including both the geology of the deposit itself and that of the surrounding district; it involves a study of the method which may already have been adopted for the extraction and marketing of the ore, and the critical consideration of whether such methods are the best and most economical; it requires the determination, by the most accurate methods applicable, of the extent and value of the ore which is exposed and measurable in the workings, and a close, conservative approximation of the amount and value of such ore as is not *measurable*, but is *reasonably probable*; it necessitates an appraisal, on a business basis of the existing facilities and appliances for extracting the payable ore, as well as a reliable estimate of the amount of money needed to secure an increase of output, an improvement of the product, and a diminution of the cost of extraction. In short, such an examination comprises an inquiry into all subjects that have a bearing upon the correct solution of, or answer to, the following questions:

(1) What will be the cost of extracting and marketing this ore?

(2) What is the average value of the ore in this mine?

(3) What is the tonnage, or amount, of payable ore actually measurable in this mine? And what additional amount, not measurable, is reasonably probable?

When the above questions have been answered, one can proceed to the determination of the second portion of the enquiry, which relates to the valuation, and which involves correct answers to these additional questions:

(4) What amount of money is needed as working capital for this property?

(5) What is a fair purchase price for this property?

(6) Can the sum of money needed for working capital and to purchase be returned to my client unimpaired, together with an adequate interest per annum for its use?

(7) How long, approximately, will it take to return the whole of the original investment?

These are the questions to be answered, as accurately as possible, before the engineer can adequately give the opinion asked for. Data have to be accumulated, and hence the necessity for a careful, comprehensive and unbiassed examination preceding any attempt at valuation. That such data be accurate, and verified by the examining engineer, is an unquestioned necessity.

A close and careful examination is needed in order to answer satisfactorily the first three questions propounded. The writer is inclined, in his own practice, to consider, at the very beginning of the examination, the character and geology of the immediate surrounding country, since a good grasp of that subject may rapidly elucidate many of the problems met with in the underground examination. An example by Mr. T. A. Rickard\* may be quoted here to emphasize the value of a knowledge of the geological features in guiding an engineer on the points of permanency and distribution.

A mine in the mountains of San Juan County, Col., was opened by adit levels, from which stopes were raised and the ore obtained therefrom was found to vary considerably in value, and not to lie in the lines of well-defined pay shoots. A geological examination showed that the country rock consisted of superimposed layers of volcanic breccia and tuffs dipping at a low angle from the horizontal. The veins cut through these layers in an approximately vertical direction, and varied in richness according to the particular rock layer enclosing them. They were found to be enriched where they passed through the fine-grained tuffs, and to be of lower grade

\* Mineral Industry, 1902.

in passing through the coarser breccias, and the coincidence of high values with tuff intersections was clearly proved.

The engineer will also do well, in districts where other mines are opened and working, to familiarize himself (when permitted) with the geology of their deposits, and with any peculiarities which they may exhibit; drawing therefrom his conclusions as to the influences which may affect the deposit which he has under examination. The experiences of deeper mines in the same district, as to a change of mineral or vein-filling, are of value and frequently significant; likewise the continuity, or interruption of pay shoots may be duplicated in the deposit under examination. Herein, at the very outset, comes in the greatest factor in the work of examination, namely, the value of a large and varied experience for the examining engineer, for the lack of which no formulae, nor set rules, nor reading, can compensate.

In this first work the engineer will be greatly aided by having good topographical or geological maps of the region. The avidity with which the quadrangle maps of the United States Geological Survey are now sought for points a moral, and gives an excellent example to our Geological Survey at Ottawa. Failing the possession of good maps, the engineer may sometimes be forced into the making of one himself of sufficient accuracy to enable him to lay down his data and draw his conclusions.

To study the methods adopted for the extraction of the ore, the engineer requires to examine into the openings made in the deposit, whether from shaft or incline, sunk off, or on, the vein; and into the matter of levels, their distance apart; the making of raises and winzes; and the vital point of ore reserves, wholly or partially blocked out. He must examine the equipment for extracting the ore from the mine after it has been won, involving the points of tramming, hoisting, picking or sorting, concentrating, etc., etc. These various points open out into the economy or extravagance of the means used, which will require him to note the power, efficiency and economy of the plant; the efficiency and capacity of the hoisting engine, the air compressor and pumping machinery; the cost and quality of fuel, and the possibility of utilizing water power, or installing (or purchasing) electric power. Consideration of these points will perhaps open to criticism the present arrangement of the surface plant as necessitating unnecessary handling, or a larger force of labor than otherwise. Perhaps the quality of the labor may attract especial attention as being below or above the average to which the examiner is accustomed.

These points, if answered adversely, may necessitate estimates by the engineer, of the cost of improving the plant, of obtaining a better supply of labor, or perhaps of building an entirely new plant capable of greatly reducing present costs. To these points will also apply the opinions the engineer will form of the cost of sorting, of the effective or non-effective methods of concentration, to which he is guided by the quality of the products obtained. Study of the rejected portions of the rock broken will perhaps enable him to detect losses and suggest remedies.

For the marketing of the product, he must see the shipping books, sampling works' certificates, assayers' records; must know transportation, smelting or milling charges, and figure whether best results are obtained by present practice.

He notes the accumulation of secondary products, or "middlings," and the capacity and ability of the plant to re-absorb and re-treat these "middlings"; he samples the products coming from the machines from a concentrating point of view, and

forms his opinions of the efficiency or non-efficiency of the methods and apparatus used.

Underground he has determined the probable percentage of the pay ore lost on the scaffold, and the approximate percentage of waste rock sent up as "ore"; on the surface he determines the additional loss of ore over the dumps as waste, and in the waste from the sorting floor or shed, unless perhaps the latter may be sent to the concentrator.

By the time the examiner has all the facts relating to the above points and their ramifications, he should be in a good position to answer the questions as to the *cost of extracting and marketing ore* from the mine, and to offer an opinion as to the probable reduction of such cost under circumstances which are feasible.

The occasions upon which the engineer will be called to examine a "going concern," with a long and reliable set of account books behind it to refer to, are few, *very few*, in comparison with the numerous times he will be requested to form an opinion upon properties which have either no record at all, or such a one as is certainly not to be trusted nor quoted. In the few instances in which there is a record of cost of extraction and marketing the ore, it is always advisable to obtain the average of this record, and to compare it with the figures which the engineer has arrived at independently of any such record.

He is now called upon to assume the determination of the average value of the ore, and afterwards (if the value is in excess of the costs) to obtain the total tonnage of positive, and of probable, ore; or, in the lingo of the mine, he is "up against sampling and measuring." He now needs an accurate copy, or original drawing, of the mine workings, both as a plan and as a longitudinal section on the plane of the vein.

### Sampling.

To sample a mine's ore reserves is always both tedious and expensive to one's client, yet the determination of the average value of the ore can be obtained in no other way. Occasionally the records of a mine have been so fully and honestly kept that the *past* average value may be gotten from such records, but there is no possible assurance that the *future* average value will be similar or equal, unless a correct sampling is undertaken.

The expense of such sampling is dependent upon many factors—the hardness of the veinstone, the regularity or irregularity of the distribution of values, the doubt or certainty as to the honesty or trickiness of the vendor, the willingness, or otherwise, of one's clients to bear the expense, and similar factors—necessitating a larger or smaller force of reliable and trained assistants, and a longer or shorter time. In one case\* the extent of the workings and difficulty of access made the cost of examination aggregate \$22,500.00; sums varying from \$5,000 to \$15,000 are frequent items for the sampling of extensive and valuable deposits; the writer has been informed on reliable authority that the cost of sampling some of the large nickeliferous pyrrhotite deposits of Ontario has reached the figure of \$60,000. By reason of the heavy cost a thorough sampling is not to be undertaken lightly; the circumstances must justify it.

The difficulties attending the impartial and correct sampling of ore bodies become well known to engineers in active practice, and should receive more attention in the technical schools which are fitting young men to be mining engineers. The amount of incorrect sampling and calculation which the

\* Silver Peak Mine, Nevada.

writer has personally witnessed, is his reason for suggesting that the subject may profitably be treated in the curriculum of our mining schools. During the past few years a number of valuable papers on the subject have appeared, to which he cannot refer in detail, but which are to be found in the transactions of the various mining and metallurgical societies, and the volumes of the technical weekly and monthly papers.

It is advisable for the examiner to make his first trip through the mine workings in company with the superintendent or foreman, when special points will attract his attention, and explanations be suggested. He may have his attention drawn to the size and dip, or character and extent, of the pay shoots, and may note dislocations or interruptions, and will be able to observe that certain facts seem to control the value of the ore. A few samples taken here and there and assayed on his return to the surface will throw light upon much that he has observed, and may determine whether a thorough sampling is necessary or unnecessary.

At any rate, this preliminary examination will enable the engineer to formulate his scheme for sampling, if one is necessary. Since sampling is a laborious task, it is well not to pursue it for a longer time than eight hours in any one day with any one crew. It is usually done by men working in pairs, who are employed solely by the engineer, and whom he has proved and found trustworthy. If the character of the ore and the circumstances of the case render one sure that the miners are not, and will not be, in collusion with the vendor, each pair may consist of a miner and an assistant, which allows the miner to do the muscular work to which he is habituated, and leaves the assistant free to collect the chippings and to keep his eyes open to watch for fairness.

The sampling of veins may be carried out by any one of three systems, which are subject to infinite variations, due to each examiner's experience or idiosyncrasies, and due also to the varied character of mineral deposits.

The first system aims at securing a correct average through the taking of a great number of small samples. Since the underlying principle of sampling is to obtain a correct general average of the value of the piece of ground under test, it is evident that the larger the number of samples cut the closer will be the approximation to the real value, provided the samples are taken at equi-distant points, and provided also that each sample cut represents a *true cross section* of the vein or deposit.

As to the intervals between consecutive samples, these depend upon the regular or irregular distribution of values, and upon the regularity in width of the ore body. If the distribution is irregular, inclined to segregate in spots or bunches, and the width suddenly pinches or expands, closer intervals are required than when the width is practically constant and the distribution of values regular. In some of the gold quartz veins of Ontario and Nova Scotia the interval should not exceed three feet, while at the Dufferin Mine ten feet intervals would not be too great. In some of the silver-copper veins of British Columbia twenty feet intervals would be permissible,\* whereas many of the pyrrhotite deposits of that province would not allow greater intervals than five to ten feet.†

Among the veins in Clear Creek County, Colorado, ten feet intervals are quite short enough, and with many of the amygdaloid belts of Michigan twenty to twenty-five feet would be permissible.

The sample (by this system) is sometimes cut by a small hand pick or geologist's hammer, but is better taken with a moil and single-hand hammer. The objection to the pick is that the point, unconsciously perhaps to the operator, will get out an undue proportion of the softer portions of the vein, while the poll of the hammer equally tends to find the harder portions. It is better, in almost every case, to use the moil and hammer, and to cut a continuous groove across the section of the vein at right angles to its strike. The width and depth of this groove will vary according to the size of the sample desired, which in its turn depends upon the character and nature of the ore, the hardness of the vein-stone, its richness, and upon the conveniences at hand for treating large samples. In ordinary cases, and for veins not exceeding ten feet in width, a groove from three to four inches wide, and from a half to one inch in depth is quite sufficient.

It will be found in most cases that samples taken at ten to twenty feet intervals, with channels of the size above mentioned, are sufficient. If the results of the assays show wide discrepancies between two successive samples, new samples may be cut half-way between the divergent samples. The mention of this re-sampling brings up a not infrequent case in the sampling of mines carrying precious metals, and one on which I have found quite a divergency of views; the hypothesis may be stated as follows:—

Ten samples have been taken at ten feet intervals along an ore shoot showing in the roof of a level. Beginning at the first cut, the value of the samples have been:—

No. 1	\$ 7.60
No. 2	8.20
No. 3	8.10
No. 4	7.80
No. 5	120.20
No. 6	16.00
No. 7	0.40
No. 8	7.10
No. 9	6.00
No. 10	8.20

The arithmetical mean of these figures is \$19.56, but No. 5 sample is so divergent from the approximate regularity of the values of the other samples that it must be verified or discarded. If a new sample be taken from the No. 5 groove, and again a value of about \$120 a ton is obtained, the fact does not tell the engineer whether there is a gradation from \$7.80, ten feet to the left up to \$120, nor whether there is a similar gradation to the right, towards No. 6, and if the new sample affirms the high assay, there are few engineers who would care to take the average of the ten samples at \$19.56, the arithmetical mean of all the assays, or who would use the value of \$120.20 in the so-called "foot-ounce" calculation. Some engineers would throw out the high sample altogether and take the mean of the remaining nine samples, or \$8.38.

Re-sampling may prove the value given to be accidental or erroneous, in which case there remains the possibility that this one sample has been salted. Good practice now would require that samples should be cut half-way between No. 5 and No 6, and half-way between No. 4 and No. 5; if the new samples (No. 4a and No. 5a) confirm the original high value of No. 5, their mean may be substituted for the original value in calculating foot-ounce values, or, if they do *not* confirm the original high value, their mean also may be substituted. The practice to be followed in each case will be governed by the

\* e.g. The Silver King Mine, Nelson, B.C.

† e.g. Le Roi and Deer Park Mines.

conditions presenting themselves, and by the personal knowledge of the engineer, but it is well to emphasize the special precaution advisable in repeating any one sample, and the preference for cutting samples on both sides rather than for repeating the original cut.\*

(To be continued.)

**A MARKET FOR CANADIAN LEAD IN JAPAN.**

The Canadian Government's commercial representative in Japan writes as follows:—

Having received an inquiry recently as to the probable prospect in Japan for the exportation of lead ores from British Columbia, I have made investigations on this subject. My information is to the effect that it will be difficult to do this unless the ore is sufficiently low in price to leave a margin of profit after paying freight and other charges. The fact is that the three or four principal Japanese firms who are doing the smelting and refining of lead are mine owners themselves, and have their plants at the mines, which, as a rule, are inconveniently situated as regards transportation by water.

The only refinery that is situated at a convenient seaport is one at Osaka, owned by the Mitsu Bishi Kaisha. The refinery has, however, been established for the refining of copper produced at the company's mines. That of lead is done only as subsidiary work. As will be gathered from the figures following, there has been a gradual falling off in the production of lead in Japan in recent years. This is not owing to the scarcity of lead to be mined, but because of the less remunerative nature of mining on account of the depreciation in value of silver and lead, and also the comparatively low price of imported lead, which chiefly comes from Australia. In consequence of this, some of the lead mines have suspended working while others are being worked only irregularly.

The mining people here seem inclined to the belief that the importation of lead ores to be smelted and refined in Japan will not pay. The following Japanese firms, who are engaged in coal, copper and lead mining, have their own smelting and refining works:

Takata Shokai, Yaesucho, Tokyo; Mitsu Bishi Goshi Kaisha, Yaesucho, Tokyo; Mitsui Bussan Kaisha, Kayabucho, Tokyo; Sumitomo & Co., Tokyo.

**PRICES OF VARIOUS METALS.**

The following were the standard prices of the various metals in the Yokohama market during December, 1904:

Zinc sheet .....	per 133 lbs.	\$ 5 70
“ for roofing .....	“	5 00
Brass plate .....	“	24 00
Lead (Australian) .....	“	4 50
Tin .....	“	42 00
Copper plate .....	“	29 00
Spelter (best) .....	“	8 25
“ (medium) .....	“	6 50
Tea lead .....	“	6 40
Sheet lead .....	“	4 75
Paints, white zinc 4 tins, each containing 25 lbs.....		9 40
Paints, white lead 4 tins, each containing 25 lbs.....		6 25
Paints, red lead 4 tins, each containing 25 lbs.....		6 00

\* For a comprehensive discussion of sampling, with mathematical demonstration, reference is made to Mr. Rickard's article, op. cit. pp. 723-728.

**IMPORT DUTIES ON METALS.**

The import duty on metals is as follows:—

Zinc, block, ingot and slab..	per 133 lbs.	\$ 0 28
“ sheet .....	“	0 70
Brass plate.....	“	3 40
Lead, pig, ingot and slab.....	“	0 21
“ sheet .....	“	0 49
“ pipes and tubes .....	“	0 55
Tin, block, ingot and slab .....	“	1 68
“ plate and sheet .....	“	10 p.c.
Yellow metal, sheet.....	“	2 00
Copper, plate and sheet .....	“	3 60
White zinc .....	“	1 00
Lead paints .....	“	1 00

The duties mentioned above include the increases to be made on and after July 1, 1905, as war taxes. Zinc sheet No. 2 and tin lead are free from duty.

**LEAD AND ZINC.**

The import of lead and zinc during four years ended 1903 was as follows:—

Lead, block, ingot and slab.

1900 .....	\$463,576
1901 .....	438,114
1902 .....	255,356
1903 .....	313,047

Zinc, block, ingot and slab.

1900 .....	\$343,040
1901 .....	115,279
1902 .....	127,500
1903 .....	200,984

Zinc plate No. 2.

1900 .....	\$298,404
1901 .....	254,752
1902 .....	390,934
1903 .....	354,859

Lead is chiefly imported from Australia and the United States, and zinc and zinc plate from Germany, Belgium and Great Britain.

**OUTBURSTS OF GAS AND COAL AT THE MORRISSEY COLLIERIES, BRITISH COLUMBIA.\***

By JAMES ASHWORTH.

Introduction.—Whilst the writer was in British Columbia a few months ago, Mr. R. G. Drinnan, the general superintendent of the collieries of the Crow's Nest Pass Coal Company, Limited, favoured him with the particulars of unusually large outbursts of gas and small coal, in the No. 1 mine at Morrissey. The mine is situated about ½ mile east of the terminus of the Morrissey branch line of railway, and about 4,000 feet above sea level (about north latitude 49 deg. 15 ft., and west longitude 114 deg. 56 ft.)

All the seams of coal worked at these collieries crop out at the surface; and at the No. 1 mine, the seam is a very soft, non-bituminous coal of irregular thickness, varying from 14 to 40 feet. The seam, dipping north-eastward at an angle of about 25 degrees, has a strong roof and floor. It probably cor-

\* Trans. Inst. M. and M.

responds with No. 61 seam, marked on No. 1 section of the Crow's Nest Pass coal field made by Mr. J. McEvoy.\*

Three levels have been driven straight into the mountain-side, two of these serving as intake-airways, and the middle one as the return-airway to the fan. The lower level, the main haulage-road, entered about 20 feet above Morrissey creek and extended westwards for a distance of about 2,200 feet. It was cut in the top part of the seam, and had a rock-roof and a coal-floor. The ventilation of the mine was maintained by a fan, producing at the time of the outbursts about 60,000 cubic feet of air per minute, at a water-gauge of 0.75 inch. Three shifts of colliers were employed, and, although little or no gas was found in the mine, all the underground employees used Wolf safety lamps.

Outbursts.—(1).—On August 6th, 1903, about 2.30 p.m., and whilst work was proceeding as usual, the coal at the face of the main level commenced to emit sounds as if the mine would close up. It was deemed advisable to withdraw the men; but, before they were all out of the mine, an outburst of gas and coal occurred, which very quickly filled the whole mine with gas. So great was the force exerted by the pent-up and escaping gas, that small coal and dust were blown out of the mine, across the creek, and the ventilation was reversed. It was noticed that the water-gauge in the fan engine-house remained unaltered. No entrance could be effected into the mine, until four days after the outburst, although the fan was kept running at its highest speed. About 1,456 tons of small coal were loaded out of the main level, and 174 tons out of the parallel level before the faces were reached. For a distance of 150 feet outbye from the face, the main level was completely filled with dust and small coal and not a setting of timber remained standing in that length. About half of the coal-pillar, on the higher side of the level, was removed for a distance of 100 feet outbye from the face (Fig. 2, Plate III.): D being the portion of the pillar that was blown off, and E a cavity, 8 to 10 ft. wide and 110 ft. long, that was blown out at the same time.

(2).—After this outburst, the greatest precautions were taken to guard against a possible recurrence, but, despite these, another outburst took place on October 14th, 1903; and although it displaced only about eight hundred tons of coal, and the gas was smaller in volume, yet it was more disastrous, because four men were smothered by the fine dust and gas. It was evident from the position in which the bodies were found, two hours after the outburst, that they had some premonition of danger, and had moved away from their working places. The quick recovery of the bodies was due to the reversal of the fan, which, as is usual in this district, could be quickly converted from an exhausting to a blowing fan by mechanical arrangements placed within the engine-house of the fan. This provision for changing the direction of the ventilating current may seem a little strange, but it is sometimes resorted to in the winter months, to assist in clearing away accumulations of ice from the main intake-airways.

Several outbursts of gas of small volume had, previous to that of August, 1903, occurred in the winning headings, but none had occurred in any other part of the mine.

The inspector of mines, in his annual report for 1903, wrote in reference to this mine, which he inspected every month:—"Notwithstanding the repeated outbursts of gas I am bound to say that this mine could scarcely be put in better order. . . . . They are working, in the first place, about ten feet of

the top. Ventilation is very good here; there are three connections with the outside, and they are making another near the face, where most of the men work, so that in case of an accident or outburst of gas the men in the upper workings will be almost outside. . . . . After one of these blowers has come away, it is quite a time before gas can be found in the mine."

(3).—An important precaution, which the management adopted, was to reduce the number of shifts worked to one in every 24 hours, so as to allow for gas-drainage, and for the following 13 months this appeared to have operated successfully; but, immediately after these notes were drafted, even this provision was found to be ineffective, and on November 18th, 1904, about 11.50 a.m., another huge outburst occurred, causing the deaths of 4 Englishmen, 10 foreigners and 2 mules.

The overman of the mine had just returned to the surface, after inspecting every working-place in the mine, and had found everything in its usual condition and not a trace of gas showing anywhere.

Only one man escaped from the mine: he was working at A, about four hundred feet inbye on the main level, when suddenly his lamp flared up and was extinguished, but this did not seem to have alarmed him, as he heard no unusual noise; he, however, felt as if something was catching his breath, and walked out of the mine to get his lamp relighted. Not until he saw a cloud of dust issue from the tunnel-mouth did he seem to have realized that anything was wrong. The dust found in the mine was as fine as flour, and that blown out of the mine with the gas was so fine that the men who saw it reported it as smoke.

For thirty-five minutes after the outburst occurred, it was impossible to approach any of the three entrances to the mine, although the fan was speeded to its utmost capacity; but after this interval the fan commenced to gain the ascendancy, and the rescue-party were able to move slowly along the main tunnel. The first body recovered, that of a brattice-man, was found about five hundred feet from the entrance. This man was on his way into the mine, and had put down his lamp upright on the floor, a little farther inbye. It is supposed, therefore, that after his lamp was extinguished by the gas, he had put it down and attempted to escape. No. 2 was a miner, who was on his way out of the mine before the outburst occurred, he had, in fact, just finished a cut-through at the level-face near Brindach's place. Nos. 3 and 4 were drivers with a mule, and they did not appear to have made any effort to escape, as the body of the mule was between them and heading into the mine. No. 5 was another driver, who appeared to have suspected that something was wrong, and had left his mule near where No. 12 body was found. Nos. 6, 7, 8, 9, 10, 11 and 12 appeared to have left their working places all together, and made an ineffectual attempt to escape. Inbye from No. 12 body, the level was practically filled up with dust, there being only an open space of 6 to 8 inches near the roof. All these men were carrying their lamps, but from the position of some of them it was assumed that they were walking in the dark, and had all come from working places near the face of the upper level. No. 14 was the only man who was fully dressed, and had his lunch bucket with him. No. 13 was the body of Greenman, who was working in the main level, and it was his duty, if anything went wrong, to see that all men were out, and then to close the safety-doors, B and C, situated near No. 7 body. These safety-doors were hung on strong frames, and were held open by strings, so that, in case of danger, the last man could close them behind him, and thus prevent gas and dust from overtaking him before he reached the outside of the mine.

It is quite clear that the first warnings of an outburst were not so definite in character as on previous occasions, and that

\* "Summary Report on the Operations of the Geological Survey for the Year 1900," by Dr. G. M. Dawson. *Annual Report of the Geological Survey of Canada*, 1900, vol. xiii., section A, pages 84 and 95; "Summary Report on the Operations of the Geological Survey for the Year 1901," by Dr. G. M. Dawson, *Ibid.*, 1901, vol. xiv., section A, Nos. 759 and 767, maps.—Trans. Institution of Mining Engineers.

they were not sufficient, at first, to alarm the men seriously, several of whom had been present when previous outbursts had occurred, and who were always on the outlook for signs of unusual pressure on the coal. This outburst also differed from previous ones in the total absence of violence along the roads. A safety lamp would fill with flame, twenty-four hours after the outburst, when held on the top of the fan-chimney, and a week afterwards there was a distinct cap on the lamp-flame in the return-airway.

The volume of air passing along the main level, as measured a few days before the outburst, was 57,000 cubic feet per minute, and the self-recording water-gauge, on the fan, showed absolutely no change during, before or after the outburst.

The mine had been shut-down for several months, and only a few places in the level-faces were being worked; and, for a month prior to the outburst, not a single report of gas had been made by the fireman.

The management estimate that this outburst displaced 3,500 tons of coal, 800 tons being removed to recover No. 14 body, which was found with fully three feet of dust under it, and it is supposed, therefore, that the man was wading through this depth of dust when he fell. One man, who was overtaken, was found in the attitude of running, upright on his feet, head leaning forward and hat on, and this fact, of itself, shows that there was no violence.

It is pretty clear from the foregoing particulars, that the men working at and near the face of the top level, received some warning before any check to the air-current could demonstrate to those on the road that an outburst was in progress, because they had run from 600 to 700 feet; whereas No. 5 had only run 500 feet, and No. 13, the same distance. Neither No. 1 nor the man who escaped appeared to have taken warning from the check to the air-current, as had No. 1 done so, he ought to have escaped alive.

The check to the ventilation must, however, have been very severe, and its extent may be realized by noting that both of the intake air-currents were pushed towards the entrances of the mine, without the self-registering water-gauge in the engine-house of the fan showing any signs of increased pressure; and, therefore, it is fair to assume that the volume of gas given off must have exceeded 57,000 cubic feet per minute. Again, it may be noted that the volume of gas given off did not exhibit any signs of great violence, such as might have been expected if it had been suddenly released from a huge cavity. Nevertheless, it was enormous in volume, and continued at high pressure for thirty-five minutes, and at a diminishing pressure for a considerable time afterwards. It may, therefore, be reasonably supposed that from 2,000,000 to 3,000,000 cubic feet of gas, at atmospheric pressure, were set free by the outburst in thirty-five minutes. Mr. James McEvoy, who does not accept the cavity-theory, estimated the volume of gas at 5,000,000 cubic feet.

Remarks.—It does not seem reasonable to the writer to imagine that this tremendous volume of gas could be pent-up in a cavity in the coal-seam, and, taking into account the great quantities of dust, which have been a feature of all the outbursts in this mine, he has considered several probable solutions of the problem. In doing so, he has noticed that petroleum and natural gas are found in these Cretaceous measures; and also that on the south-eastern side of this coal field seepages of petroleum have been found, and petroleum has already been and is still being sought in the Flathead district of south-eastern Kootenay.

The presence of petroleum in this district opens up the interesting geological problem of its source. Geologists state

that there are no rocks in the district likely to contain stores of petroleum, but prospectors allege that there is visible evidence of its presence in several places. The late directors of the Geological Survey of Canada, Dr. G. M. Dawson and Dr. A. R. C. Selwyn, personally examined the district and identified the rocks as belonging to the Cambrian age, in which oil has never been found, as they are too close-grained and compact to be capable of absorbing oil. Dr. Dawson calls it "a somewhat anomalous occurrence of petroleum;" and if, as he suggests, these older rocks have been, by a gigantic overthrust, slipped eastwards over the Cretaceous formation, then the overthrust fault must extend from ten to twelve miles eastwards. Mr. W. F. Robertson, the Provincial Mineralogist for British Columbia, states that seepages of oil occur in three or more places; that there might be a body of oil underground, but that this is problematical; and that, although some oil was found in a bore-hole at a depth of 1,120 feet there was no flow, and he is not sanguine that even at a depth of 3,000 feet a profitable flow of oil will be obtained.

The writer has referred to the oil controversy, because he thinks that the outbursts of gas referred to as having occurred at Morrissey may, and probably have, some connection with petroleum. The samples of oil obtained by Mr. W. F. Robertson, and reported on by the Provincial Assayer, proved that the oils were of exceptionally low specific gravity: one sample consisted almost entirely of the lighter constituents of petroleum. It appears possible, and also probable, to the writer, that these frequent outbursts of gas may be attributable to the volatilization of light oil or spirit, which has been absorbed in patches of the soft coal, and, on being released by the removal or thinning of the surrounding coal, becomes volatilized with accompanying violence. As layer after layer of saturated coal is blown off, the dust is carried away by the gas, and the outburst continues until the oil-saturated mass is blown off and the oil or spirit volatilized. Under these conditions, the outburst would exert its greatest effect at the outset, and then gradually die away, as in the instances at Morrissey. If gas only were confined in a pocket, the writer does not see how so large a body of coal could be displaced; whereas, if a volume of oil were disseminated throughout a very soft portion of a coal-seam, which would, therefore, have the same absorbent qualities as a sponge, when the first burst occurred, the spongy coal would be carried away by the volatilization of the oil, and, as this proceeded, dust and gas would be continuously blown off, until the oil-saturated mass was exhausted. This supposition would allow of a very large volume of gas at high pressure being given off through a long period of time, and thus account for, what is at present, the mystery of the Morrissey outbursts. So problematical does the possibility of working the mine with any reasonable sense of security appear to the owners, that the writer understands that they have closed the mine.

In conclusion, the writer hopes that the subject may provoke discussion and suggestions from members, who may think that the mode of working, and the precautions taken to guard against such outbursts, can be so effectively improved, that the further working of the mine may be rendered reasonably safe.

#### THE BRITISH COLUMBIA LEAD SITUATION.

To the Editor:

Sir:—In your April number, under the caption of "The Lead Situation in British Columbia," you say:—



1. "British Columbia mining has had enough to stagger under during the last three years, owing to the apathy of the investing public, and the bad odor into which the whole province got through the selfish misrepresentations and actions of the boomers who flourished from 1896 to 1901."

2. "The REVIEW is also insistent on taking the ground that any industry dependent for its existence upon the supply of Government aid, either in the shape of bounties or duties, had better be left to die a natural death inasmuch as its prolonged existence is at the expense of the rest of the community, and inasmuch also as no amount of artificial feeding can make the infant strong and lusty."

3. "British Columbia must work out its own salvation in the matter of its mines," etc.

If I may be permitted, I will make reply to this unjust arraignment of the mining industry, and this province, my warrant being nine years' residence in Rosslund, and twenty-two years in the province.

Loyalty like charity begins at home. Were it not that so large a proportion of our population, have as yet only brought their physical beings here, having left their hearts and their loyalty in the provinces or countries from whence they came, you would have been deluged with refutations of this vicious, and misleading attack, which savors of knocking a man down from behind, and kicking him for falling.

Re paragraph "1." If after the word "boomers" you had added "who flocked there in large numbers from all over the Dominion and the United States" and flourished, etc., you would have made a fair statement of fact.

Re paragraph "2." Take away your bounties and duties from all the other industries and put them on a parity with us, and let them live a natural life, or as you put it, die a natural death with us, and we are satisfied, but don't exact tribute from us for the protection of all the other industries, and leave us without, and then flout us with being dependent on them. Give us an opportunity for a natural life, and we will willingly take our chances of a natural death.

Now, as to "artificial feeding." You should have said artificial choking, followed by artificial death, for no jury of fair-minded men, holding an inquest on the mining industry, could ever bring in a verdict of death from natural causes. For evidence of choking I beg to refer you to a Canadian Tariff Book, "Duties of Customs," chap. 16, page 9, section 14, and following sections.

Section 14—Meats fresh, not elsewhere specified. . . . .	.03	per lb.
" 15—Canned meats, poultry, game, extracts of meats, fluid beef and soups. . . . .	25 p.c. ad. val.	
" 16—Mutton and lamb, fresh. . . . .	35	" " "
" 17—Poultry and game. . . . .	20	" " "
" 18—Lard, lard compound, cotton-lene, etc. . . . .	.02	per lb.
" 23—Soap, common laundry. . . . .	.01	" "
" 24—Soap, Castile, mottled or white. . . . .	.02	" "
" 25—Soap, not elsewhere specified. . . . .	35 p.c. ad. val.	
" 26—Pearline and other soap powders. . . . .	30	" " "
" 30—Eggs. . . . .	.03	per doz.
" 31—Butter. . . . .	.04	" lb.
" 32—Cheese. . . . .	.03	" "
" 33—Condensed milk, including weight of package. . . . .	.03¼	" "

Section 34—Condensed coffee, milk foods and all similar preparations. . . . .	30 p.c. ad. val.
" 35—Apples, including duty on the barrel . . . . .	.40 per bbl.
" 39—Potatoes. . . . .	.15 " bush.
" 42—Hay. . . . .	\$2.00 " ton.
" 43—Vegetables, not otherwise provided for . . . . .	25 p.c. ad. val.
" 49—Oats. . . . .	.10 per bush.
" 50—Oatmeal. . . . .	25 p.c. ad. val.
" 53—Rice and sago flour, and sago and tapioca. . . . .	25 " " "
" 55—Wheat. . . . .	.12 per bush.
" 64—Sweet potatoes and yams. . . . .	.10 " "
" 65—Tomatoes, fresh. . . . .	.20 " "
" 394—Clothing, general. . . . .	35 p.c. ad. val.
" 219—Boots and shoes, h. e. s. . . . .	25 " " "
" 407—Caps, hats, etc. . . . .	30 " " "

And so on, *ad infinitum*, for things we consume.

And now for some few things we use, starting with something we use in large quantities.

Section 21—Candles, n. e. s. . . . .	25 p.c. ad. val.
" 291—Shovels. . . . .	35 " " "
" 289—Picks, mattocks and tools of all kinds. . . . .	30 " " "
" 229—Bar iron or steel, costing less than 2½c per lb. . . . .	\$7.00 per ton.
" 236—Steel, costing more than 2½c per lb. . . . .	.05 p.c. ad. val.
" 238—Iron and steel railway bars. . . . .	30 " " "
" 243—Forgings of iron or steel of whatever shape or size. . . . .	30 " " "
" 248—Cast iron pipe of every description. . . . .	8.00 per ton.
" 252—Wrought iron or steel tubing, plain or galvanized threaded or coupled, or not 2½ inches or less in diameter. . . . .	35 p.c. ad. val.
" 253—Other iron or steel pipe or tubing, n. e. s. . . . .	30 " " "
" 254—Iron or steel fittings for iron or steel pipe of every description. . . . .	30 " " "
" 269—Wire rope and wire cable, n. e. s. . . . .	25 " " "
" 315—Steam engines, boilers, ore crushers, rock crushers, stamp mills, cornish and belted rolls, rock drills, air compressors, pumps, and all machinery composed wholly or in part of iron or steel, n. o. p. . . . .	25 " " "
" 412—Blasting and mining powder. . . . .	.02 per lb.
" 414—Nitro glycerine, giant powder and other explosives. . . . .	.03 " "

and so on *ad infinitum*, for things we use.

The above are a few of the imposts which comprise the artificial choking to death of the mining industry. In strong contrast to these duties on what we consume and use in winning our product permit me to refer you to sections 492 and

556, covering all our mine products, and you will find they are absolutely free from protection of any kind.

Re paragraph "3." You say "British Columbia must work out its own salvation in the matter of its mines," etc. Cavalier advise I must say. The B. C. mining industry is in the position of a man who has had his arms and legs tied and been thrown into the sea, and then you come along and call out to him, to save himself the best he can.

It is just as well to start out from a good foundation, and ascertain our true relationship to the Dominion, and the latter's relation to the mining industry, and understand our position. British Columbia joined the Dominion, July 20th, 1871.

The policy of a protective tariff was not adopted until 1879, such being the case, it was impossible for us when we joined to have foreseen, or discussed the effect of such a policy on the destiny of this province, or to have made provision for a contingency of this kind.

Lode mining was not an industry either in this province or in the Dominion when the protective tariff policy was adopted, hence the effect of a tariff in relation to it could not be provided against, and our mining industry has never been put on a parity with the other industries because it was born too late to get its share of the spoils.

Evidence of choking and tariff drain. Now, as to the tribute exacted from us by the working of the tariff, due, in some measure, to the isolation of the industry and its environment, and its great distance from the manufacturing and supply centres of our country, 2,200 miles from Toronto and 2,400 from Montreal, so that when we are not paying a tariff of 25 per cent. and upwards, we are paying a protection price, and a long haul freight bill.

In the year ending June 30th, 1903, the Province of British Columbia paid to the Dominion Government, \$2,417,117.84 in customs duties alone, and in other revenue \$528,213.59, making the payment for the year (excluding internal revenue) \$2,945,331.46. Vide Tables of Trade and Navigation Returns for 1903, page 75.

The province's own revenue for the same year amounted to only \$2,044,630, so that the Dominion Government exacted from the province \$900,701 more than the province exacted for her own uses.

The Dominion exaction amounted to \$14.40 per head per annum, based on an estimated population of 204,463.

The Provincial exaction amounted to \$10 per head per annum on the same population. (Vide Dominion Year Book, 1903, page 560.)

Based on accurate Census returns for 1901, which gives a population of 178,657 persons to the Province of British Columbia, the amount per head contributed to the Dominion Government in that year was \$14.16 on the total revenue of \$2,530,366. (Vide Census Report No. 1, and Tables of Trade and Navigation for 1901, page 36.)

Rossland, with a population in 1901 of 6,159, plus the sub ports of Trail and Paterson, with an estimated population of 1,200, making a total of 7,359, contributed a revenue to the Dominion Government of \$134,444.87, or \$18.96 per head. (Vide Census Report No. 1, and Tables of Trade and Navigation for 1901, page 36.)

The above comparisons serve to show that Rossland, a purely Gold Copper Mining Camp, contributed over 33 per head more to the Dominion Government than the average of the whole province.

The following comparisons will serve to show that the Province of British Columbia contributed 240 per cent. more than the average of all the other six provinces.

Province.	Population.	Census Year, 1901.	
		Revenue paid to Dom. Gov't.	Amount per Head.
British Columbia. . .	178,657	\$ 2,530,366.20	\$14.16
Quebec. . . . .	1,648,898	10,692,014.99	6.48
Ontario. . . . .	2,182,947	10,929,053.17	5.00
Nova Scotia. . . . .	459,574	2,096,739.25	4.56
Manitoba. . . . .	255,211	1,018,880.67	3.99
New Brunswick. . . .	331,120	1,152,327.31	3.48
Prince Edw'd. Isl'd.	103,259	148,438.16	1.43

Vide Census Returns, vol. 1, year 1901, pages 2, 3, 4, 5, as to population; Tables of Trade and Navigation as to revenue, year 1901, pages 23 to 39 inclusive.

The above comparison shows the Province of British Columbia paid the Dominion Government \$10 2-6ths of a cent per head per annum more than the average paid by the other six provinces, or

\$ 7.68	per head per annum more than	Quebec.
9.16	"	Ontario.
9.60	"	Nova Scotia.
10.17	"	Manitoba.
10.68	"	New Brunswick.
12.73	"	Prince Edward Island.

According to Census returns in 1901, we represented slightly less than 3 1-3 per cent. of the entire population of the Dominion, and yet we contributed over 8 1/2 per cent. of the revenue, excluding internal revenue, and independent of the indirect revenue paid at other ports, but repaid by the consumers at the mines. In other words, while we form only one-thirtieth part of the population we contributed slightly less than one-eleventh of the revenue.

The foregoing clearly shows how burdensome a protective tariff is on a country trading in raw products, and how extremely exacting it is on the mining industry.

The prime difficulty with British Columbia is that its destiny is controlled by two forces, the Dominion and Provincial Governments. The former have adopted a tariff policy which has the effect of sapping the life blood out of the chief industries of this section of the Dominion, imposing a burden intolerable, a barrier to progress insuperable, operating as a wet blanket on all the efforts of the Provincial Government to develop the resources of the country.

Admitting that it may be adapted to the agricultural and manufacturing Eastern Provinces, it is most detrimental to a country winning raw products, and especially minerals.

It is admitted that the aforesaid policy is justifiable as a measure of self-protection and self-preservation.

It is also acknowledged that it is impossible to devise a uniform tariff equitable to all, but it is not impossible to equalize by compensatory refunds or subsidies.

While our subsidy of eighty cents per capita from the Dominion Government is on a parity with that of the other provinces, our contribution in customs revenue alone is in the disparity of \$14.16 for this province as against an average of \$4.15 for the other six provinces. Many may suppose that we get a refund of this excess from the Dominion Government in disbursements made by them on public works. A statement prepared by the Provincial Government in an appeal for better terms from the Dominion Government, shows that since our union in thirty-two years we have contributed \$49,397,238, and have had expended by them \$32,454,382, a balance to our credit of \$16,942,856, out of which \$13,274,511 was contributed in the last ten years.

Rossland (a purely gold-copper mining section) in ten years, ending June 30th, 1904, has paid the Dominion Government in

Customs duties .....	\$893,055.58
Inland revenue .....	167,989.57
	\$1,061,045.15

Who can say that this is not too much tribute to exact from one struggling mining district. In conclusion, defending the granting of a bounty on lead and justifying a demand for a bounty on copper.

It is plain that no uniform adjustment of the tariff can ever meet the inequalities (created by the tariff) between the mining and other industries, it can only be done by a refund or drawback, for suppose a tariff were imposed on copper coming into Canada, it would only increase the cost to the consumers without benefiting the producers in the slightest degree.

We have no copper refinery in Canada, and if we had, it would simply absorb the tariff, for unless it did it couldn't live in competition with refineries in the United States having a product of 307,610 long tons to handle in 1903, against our 19,322 tons. The beneficent effect of a bounty is finely illustrated in the pamphlet just issued by the Dominion Government, entitled "Mineral Production of Canada, 1904." (Copy enclosed.)

In the Schedule, page 9, showing increase or decrease as the case may be, you find as follows:—

Lead increased in quantity	109.49,	and in value	113.05
Iron " " "	62.41	" " "	27.41
Copper " " "	.67	decreased in value	2.47

In the year ending June, 1904, lead received a bounty of \$195,284.22. Iron received a bounty of \$1,408,232.60.

Copper received nothing, has no protection, but the tariff extorted a contribution, greatly in excess of the other industries for protecting them, and helping to pay the aforesaid bounties; it is clearly an anomalous position, is it any wonder the mining industry is not prospering?

Crushed by the juggernaut of a tariff, hopeless for want of a champion, and a realization of our political importance, the mining industry is, indeed, dying an unnatural death, an example of statesmanship indifference, and neglect.

Rocked to sleep in the cradle of tariff ignorance, to the lullaby of indirect taxation, the people of this province, will one day wake up shivering, from being robbed of the clothes of protection, for their mines and timber, to which they are entitled, then there will be some attention paid to us by the Dominion Government, or secession will follow.

Yours truly,

JOHN DEAN,

Rossland, B.C.

June 3rd, 1905.

**LABOUR CONDITIONS AT THE CROW'S NEST COLLIERIES.**

An agreement has been signed between the Crow's Nest Pass Coal Company and its employees, these latter being members of the United Mine Workers of America, by which it is expected that all danger of labour disturbances at these collieries will be averted for some time to come. The agreement provides that in any case where it may appear that an employee has not been treated fairly that the company will meet a pit committee, appointed by the U. M. W. of A., but before any of the men shall submit a grievance to the pit committee he shall endeavor, by application to the pit boss, to settle the matter. The pit committee is first to meet the pit boss, or mine manager, but in case of their disagreement, the matter shall be referred to the superintendent of the company, and from him to the manager of the company, but pending these investigations, work at the mines shall be continued. The pit committee is permitted to have access to the mines, from time to time, to make examinations for the purpose of investigating any dispute between officials of the company and men employed in the mine. It is optional for the miners to work partners, but no individual miner is allowed more than one labourer to work for him. The company undertakes that an equal turn of cars is offered to each miner.

The company officially recognizes the United Mine Workers of America, and concedes the check-off system. All fixed expenses of the mine, in respect to rent, water, light, sanitation and domestic coal, remain as heretofore. Any miner failing to earn the minimum rate of \$3.00 per shift, owing to an abnormal condition of his working plans, is to be paid a sufficient amount to secure him the said minimum.

In every month, the Monday after pay day shall be a holiday. In case an employee is thrown out of employment, unless discharged, he is to be given preference over new men in other mines in the same camp operated by the company. Any employee absenting himself from work for two days, except through sickness, may be discharged. The company is to deliver all timbers as near the working face as possible, or at the mouth of the room. The company is to pay the wages of one man on the day "McGinty" is being moved. One man shall have only one place, and only one shift in such place, the single shift system being adhered to. This article, however, refers only to gangways, rooms and crosscuts. After levels are turned from slopes or inclines, to conductor car, the said gangway, or level, shall be turned over to other men. In the event of a contractor on incline or slope desiring a gangway, or level, he is to have the preference.

In an attached schedule, the Crow's Nest Pass Coal Co. agree to pay specified rates for mining and yardage to underground workers at the respective collieries.

The following schedule of wages for shift-men, agreed upon, may be useful for reference purposes:—

Blacksmith helpers (10 hours) .....	\$2.50
Mine carpenter (10 hours) .....	3.50
Mine carpenters' helpers (10 hours) .....	2.50
Power house engineers (8 hours) .....	3.00
Power house engineers (12 hours) .....	3.50
Fan men (12 hours) .....	2.50
Holst men (8 hours) .....	2.75
Box car loader engineer (10 hours) .....	3.00
Tipple engineer (10 hours) .....	3.00
Electric locomotive engineer (8 hours) .....	2.75
Electric locomotive engineer helper (8 hours) .....	2.50
Firemen (8 hours) .....	2.50
1 R.R. car handler (10 hours) .....	2.25
All other outside labourers (10 hours) .....	2.00
Fire boss .....	3.50
Shot lighters .....	3.00
Brattice men .....	3.00
Brattice men, helpers .....	2.50
Timber men .....	3.00
Timber men, helpers .....	2.50
Driver boss .....	3.00
Drivers .....	2.50
Tracklayers .....	3.00
Tracklayers' helpers .....	2.50
Miners, in wet places .....	3.50
Motormen .....	2.75
Motormen helpers .....	2.50
Holst men .....	2.75
Rope riders .....	2.50
Couplers .....	2.50
Pushers .....	2.50
Labourers .....	2.50
Timber handless .....	2.75
Switch boys .....	\$1.25 to 1.50
Door boys .....	1.00
Pumpmen .....	2.50

**Shift-men above ground:—**

Head dumper (10 hours) .....	2.50
Slate pickers (10 hours) .....	2.00
Slate pickers, boys (10 hours) .....	1.25
Car oler (10 hours) .....	2.00
Car ollers, boys (10 hours) .....	1.50
Tally boy (10 hours) .....	1.25
Teamsters (10 hours) .....	2.50
Blacksmith (10 hours) .....	3.50

**Coke oven employees are to be paid as follows:—**

Levelling and drawing (6½ ton charge per oven) .....	\$1.00
Levelling and drawing (5 ton charge per oven) .....	.80
Loading (when 200 tons or less a month loaded) per ton .....	.16
Loading (when over 200 tons a month loaded) per ton .....	.17

All charges to be large or small at discretion of coke superintendent.

Locomotive engineer (10 hours) .....	3.00
Larry men (10 hours) .....	2.00
Plasterers (10 hours) .....	2.00
Carters and cleaners (10 hours) .....	2.00

**GOVERNMENT EXPLORATIONS IN ONTARIO.**

The Ontario Bureau of Mines proposes to carry on active and systematic explorations during the present season in sections of New Ontario, and parties have been sent out as follows:—

(1) Into the Michipicoten mining division, to complete the investigation of the iron ranges, the party to be in charge of Dr. A. P. Coleman, who has already worked over part of the field.

(2) Into the region west and northwest of Lake Abitibi, under the direction of Mr. H. L. Kerr, Geologist of the University of Toronto.

(3) Into the district near Cnapleau Station, on the Canadian Pacific Railway.

(4) Into the Loon Lake iron region, in and near the township of McGregor, east of Port Arthur, where Mr. L. P. Silver will examine and report upon the iron ore deposits, zinc ores and other minerals of the locality.

(5) Prof. W. G. Miller will meanwhile continue the examination of the rich silver-cobalt area on the T. & N. O. Railway, which has attracted so much attention, and will also institute a thorough inquiry into the clay and shale resources of the province, being assisted in the latter work by Mr. M. B. Baker, of Queen's University, Kingston, and also by Mr. E. T. Corkill, Inspector of Mines. In addition, the Bureau has made special provision for procuring particulars regarding the important development now going on in the petroleum and natural gas areas in southwestern Ontario.

## THE EDUCATION OF MINING ENGINEERS IN THE UNITED STATES AND NEW ZEALAND.

Prof. Howard Eckseidt, of Lehigh University, South Bethlehem, Pa., recently contributed an interesting paper on the subject of "Mining Education in the United States." In the course of his remarks he stated that forty, and even a less number of years ago, the general public opinion was against engineering education, and even to-day one occasionally meets a manager or superintendent who boasts that no college men are to be found in his employ; but, happily, this state of affairs is now passing away. The length of the course of study in most of the mining schools is about four years, though, in some cases, a five years' course is still maintained. There is, however, a strong tendency towards shortening the length of the college year, at many schools at present the terms being limited to thirty-two weeks. The present average age at which mining students enter colleges is about 18½ years.

In respect to instruction in mathematics, the present tendency is to do away in a large measure with the old method of teaching from text books, with their series of rules and abstract problems, and to substitute practical problems in everyday engineering. The importance of physics has not been realized by some engineers, but the recent advances in electrical research have brought this subject into greater prominence. The study of physics involves a considerable amount of laboratory work, but there exists a tendency to carry such work too far when the student begins to do it mechanically, or does it simply with a view of completing the work required. A course in specifications, estimates and contracts is included in the courses of construction, although some engineering schools omit the study of the English language from their curriculum. Prof. Eckseidt very sensibly remarks that one of the first requirements of an engineer is his ability to express himself well and grammatically, and he therefore deprecates the fact that this subject is ignored in the way it is. The courses, of course, include a thorough instruction in chemistry, surveying in all its branches, geology, crystallography, mineralogy and metallurgy.

Prof. Jas. Park, director of the Otago University School of Mines, New Zealand, remarks that the course of study prescribed in a mining school, while in every case based on first principles, commonly reflects the dominant mining industry in the place or district. In New Zealand, technical education in connection with mining is provided as follows:—

(1) By schools of mines situated in the chief mining centres; and (2) by a University Mining School, carried on as a faculty of Otago University, one of the affiliated colleges of the University of New Zealand. The goldfield mining schools provide for the instruction of underground mine managers, battery managers, and assayers, the university mining school for the training of mining engineers, mining geologists, mine and battery managers, mine surveyors, and metallurgical chemists.

There are six primary mining schools. Four are situated in the Auckland goldfields, at Thames, Waihi, Karangahake, and Coromandel; and two on the west coast of South Island, at Reefton and Westport, councils elected by the local subscribers. The classes for the convenience of the students (chiefly miners and battery workmen) are mostly conducted during the evening.

The Otago University Mining School occupies a position in relation to mining almost identical with that of the mining academies of Germany. It grants associate diplomas in mining, metallurgy, and geology, and prepares students for the B.Sc. degrees in mining and metallurgy. All the subjects of instruction for the associate diploma are taught up to the B.Sc. standard. The associate course nominally covers three years, but in fact never takes less than four. The session consists of two terms of three months each, with a recess of three weeks between the terms. The long summer vacation of five months is occupied by students in practical mining, metallurgical, geological, or engineering work.

The dominant industry in New Zealand and the Commonwealth of Australia is gold-mining, and as nine-tenths of our graduates engage in that pursuit, the course of study is drawn up so as to encourage specialization in that direction. In all the associate courses, the first two years are devoted to pure mathematics, applied mathematics, physics, mechanics, general geology, mineralogy, petrography, and geometrical drawing. The third and fourth years are spent in advanced laboratory work and lectures, field practice in land, mine and engineering surveying, mechanical drawing, with special reference to mining plant and appliances, etc. The metallurgical course deals prominently with the mechanical recovery of gold from gravels by hydraulic mining, elevating and dredging; the crushing, pulverizing, and concentration of ores; the treatment of gold ores and silver ores by amalgamation, chlorination, cyaniding, etc.; and with the construction, erection and working of the machines, plant and appliances used in these processes. Colonial experience has shown that an exact knowledge of land, mine and engineering surveying is one of the most necessary and most valuable qualifications of a mining graduate; and for this reason candidates for the associate diploma in each division of the mining school are required to take a two years' course in surveying.

Students who have passed the class examinations in all the branches of study prescribed for any division are entitled, without further examination, to the diploma of that division.

## THE USE OF COAL FOR METALLURGICAL PURPOSES.

Mr. J. Stevens Jeans, who for twenty-seven years was Secretary of the British Iron Trade Association, and for seventeen years Secretary of the Iron and Steel Institute, recently gave evidence before the Royal Commission on Coal Supplies in Great Britain, on the use of coal for metallurgical purposes. The evidence, in many respects makes interesting reading. He said:

The economy in the consumption of fuel was one of the greatest importance to the iron industry, which was vitally affected by the supply and cost of suitable fuel. The iron trade in its collective capacity had for many years past been the largest individual source of coal consumption in Great Britain. At the time when the report of the Argyll Coal Commission was made, in 1871, the total annual output of British coal was computed at 117,000,000 tons. Of that output, not less than 32,000,000 tons were consumed in the iron and steel industries, being 30 per cent. of the total output. Since then the relative consumption of

coal in the iron trade had fallen off, partly in consequence of the vast increase of the relative importance of coal exports, and partly because steel had very largely taken the place of wrought iron, with a much reduced consumption of coal per unit of output. The average consumption of coal per ton of finished iron in the palmy days of the finished iron industry was about 3 tons (it was taken by the Argyll Commission at 3 tons 7 cwt.), whereas the average consumption of coal in the steel industry per ton of ingots was not more than, say, 12 cwt., with some addition to the consumption for finished materials. Probably an average of 15 cwt. would represent the coal consumption per ton of plates or rails throughout.

The best record for any single year had been two tons of coal per ton of pig iron produced for the country as a whole. Since 1873, which was memorable as the year of the great coal famine (when the cost of fuel reached a level not attained before or since), the average consumption of coal in the pig iron industry per ton of pig had been reduced by just about half a ton, which meant about 4,000,000 tons a year on our total iron output. Theoretically, this consumption should be still materially reduced, not only by bringing to a lower level the absolute quantity of coal used to smelt a ton of pig iron, but also by getting a greater useful effect out of the coal used through the blast-furnace gases, in raising heat for other purposes, and thus displacing fuel that would otherwise be needed for power requirements. Much has been done in the iron trade of late years to bring about economy of fuel, and there were very few iron or steel works that had not made experiments of their own, designed to reduce the fuel bill. There were those who did not think that in daily practice much increase of economy was possible in either pig iron or steelmaking, but this was a problem to which no one could provide a reliable solution in the light of past experience, except upon the ground that the possible margin of economy had been greatly reduced.

## THE ONTARIO SCHOOL OF PRACTICAL SCIENCE.

A new building has recently been erected for these schools, where, in future, instruction in chemistry and mining will be given. On the lower floor are situated the electro-chemical laboratories, which are thoroughly well equipped with electric furnaces and other appliances, in addition to general laboratories. Space is also set aside here for a museum, while there is also an excellent lecture room. In the upper floors are the Mineralogical and Geological Departments. The Mining Department is now being equipped with machinery for experimental work, including a 15 h.p. motor, a 5 stamp battery Challenge ore feeder, amalgamating plates, and a Welsley concentrator. There is also a Hadfield gyrating crusher and a set of Hamilton rolls 16 x 12 inches.

## THE MARKET FOR PORTLAND CEMENT.

An increase of twenty-eight per cent. is shown in the sale of Portland Cement in Canada, as compared with last year's returns. On the other hand, a decided decrease in the use of natural cement is reported. In 1904, Canada imported three-quarters of a million barrels of Portland cement, and these imports are certain to steadily grow less with the development of the local industry. The Dominion has large resources of raw material for the manufacture of cement well accessible to the markets, and within the last year two important works at least have been established.

## THE HUNTINGTON-HEBERLEIN PROCESS.

Experiments are now being made with the Heberlein process in connection with the smelting of galena ores, at the Sullivan smelter, Marysville, B.C. The following note, therefore, on the process, which was published in the Engineering and Mining Journal, of June 15th, will be of local interest:—

In the Huntington-Heberlein process, galena is mixed with quicklime, the whole raised to a temperature of 700 deg. C. (1300 deg. F.) and air is blown in, whereby the lead sulphide is changed to the oxide and is fused by the heat of the reaction. In the similar Carmichael-Bradford process, the lead sulphide is mixed with calcined gypsum, and the blowing-in of air is performed at a somewhat lower temperature (500 deg. C.), the result being practically identical with that of the Huntington-Heberlein process, though the intermediate reactions, of course, may be slightly different.

## ELECTRIC FURNACE CONSTRUCTION.

An interesting example of the introduction of electro-chemical methods into old industries is offered in the manufacture of pure artificial corundum. The Norton Emery Wheel Co., an old-established firm, with its main works at Worcester, Mass., purchased, several years ago, the patent of C. B. Jacobs for fusing bauxite in an electric furnace, thereby producing a pure artificial corundum. The fused charge is allowed to cool slowly, when it acquires the hardness of corundum and the toughness of emery, and is suitable for wheels, stones, and all the various uses of an abrasive. The process is worked in a plant of the Norton Emery Wheel Co., at Niagara Falls. A rather extended and interesting exhibit at the St. Louis Exposition showed that the process is in a state of very healthy development.

A patent granted on November 22nd, to A. C. Higgins, general manager of the Norton Emery Wheel Co., is evidently intended for the special purpose of making artificial corundum, or "alundum"; but is of more general interest since it shows how, by judicious furnace design, any special refractory lining with its troubles may be avoided. His furnace consists essentially of an iron shell forming the outside of the crucible with suitable means for applying water on the outside of the shell to all its parts in a continuously flowing stream or blanket, and conducting it away at the base. The portion of the charge in immediate contact with the cool shell solidifies and thus forms a lining for the rest of the molten mass. The lining consists, therefore, of solid alundum. Similar linings have been used with success in other electric furnace industries.—Elec. World.

### THE BOUNTY ON LEAD ORES.

The following figures are supplied by Mr. G. O. Buchanan, dispenser of the Government Bounty on lead, at a meeting last month to the Nelson Board of Trade:—

Beginning with the present fiscal year, dating from July 1, 1904, the Canadian smelting works received in July, 2,103,255 pounds of lead; in August, 1,446,139; September, 2,287,164; October, 1,391,382; November, 947,168; December, 1,488,330; January, 1,295,399; February, 938,301; March, 514,104; April, 173,948; total for the ten months of the present fiscal year being 12,206,490 pounds of lead. It will be observed that the receipt of lead for the past three months has dwindled considerably, which fact has been due to the Hall Mines smelter getting, under a mutual agreement with Trail, the bulk of the ore offering.

In the same period the figures for the Hall Mines smelter were as follows:—July, 1,065,494; August, 2,117,313; September, 977,605; October, 1,221,501; November, 1,048,262; December, 1,407,927; January, 1,726,154; February, 2,255,077; March, 777,409; April, 1,784,985; the total for the ten months being 14,381,727 pounds, or slightly more than the Trail works.

In addition there has been the lead smelted by the new stacks at Marysville and to the Sullivan is credited for February of this year, 852,871 pounds, for March, 1,717,829 pounds, and for April an additional 455,631 pounds. The total for the Sullivan is therefore, 2,526,331 pounds and for the three smelters for the ten months of this fiscal year, 29,113,248 pounds or 14,556 tons.

But this is not the total of the lead so far produced, for to these figures must be added the ore exported, coming altogether from the St. Eugene. In July last were exported 2,386,591 pounds, in August, 1,342,435, in September, none; October, 220,113; November, 1,032,968; December, 1,655,063; January, 1,405,362; February, 1,097,069; March, 3,959,231; April, 3,073,337, totalling 15,982,169 pounds for the ten months, or 7,991 tons. This makes the total tonnage of lead raised for the period under consideration 22,547. It will be noticed that the St. Eugene is sending out very large shipments of lead for the past two months. For the whole fiscal year only 11,000 tons may be exported and claim the bounty of 50 cents per hundred and the St. Eugene therefore has to ship over six million pounds in two months if that mine would reap the full advantage of the export bounty.

The bounty paid on this ore is approximately, for the home smelted product, \$208,000, of which the St. Eugene has earned \$103,000 and all the other mines combined \$105,000. The approximate return is only given as for some of this ore claims have not as yet been presented by the shippers and the bounty will then have to be calculated according to the varying London price, for as lead reaches over £12 10s on the London market so a diminished rate is given here.

In addition there is the bounty paid on exported lead by the St. Eugene which amounts to another \$75,000 approximately.

During the first fiscal year of the bounty the St. Eugene earned \$45,634 on both classes of ore and all the other mines combined \$149,579, the latter figure including the earnings of the Highland mine at Ainsworth which received from the government \$37,088.

The total bounty earned to date by all mines is, therefore \$195,214 for the first fiscal year and \$284,244 (approximate) for ten months of the second, or a total of \$419,467 to date, of which the St. Eugene has taken \$244,922 (approximate).

For the first fiscal year there were shipped 13,397 tons, and during ten months of the second 22,547 tons, showing that a material impetus has been given to the industry. Out of this total output during the first year were exported 1,133 tons, and during the ten months of the present fiscal year 7,991 tons, or about 25 per cent. of the total amount produced.

### THE MONTREAL & BOSTON CONSOLIDATED.

The properties of this concern were recently reported on by Mr. M. M. Johnston, as follows:—

The property consists of one smelting plant, situated at Boundary Falls, and fourteen mineral claims and fractions of other claims in various parts of the Boundary district. This plant has two furnaces, 40 by 176, with a daily capacity of 300 tons. Three directly connected Connersville blowers, one 7 by 12 steam locomotive, slag cars, sampling mill with crushers and rolls, assay office and laboratory complete the outfit. Steam is the motive power. The mineral claims are as follows: The Phoenix camp, containing the Dominion group, is composed of the following claims: The Brooklyn, 18 acres; the Idaho, 37 acres; the Stemwinder, 12 acres; the Standard, 8 acres; Montezuma, 42 acres; Rawhide, 31 acres. The Wellington camp contains the Athelstan, containing 17 acres, and the Jack Pot fraction of 17 acres. The Summit camp contains a three-fourths interest in the Mountain Rose, containing 17 acres, and a half of the Lancashire Lass, containing 44 acres. The Deadwood camp contains the Sunset of 19 acres, the C. C. D. of 43 acres, the Crown Silver of 18 acres, and the Morrison of 30 acres. This totals 363 acres. The cost of freighting the ore from the Phoenix and Summit camps via the Canadian Pacific Railroad is 30 cents a ton, and from the Deadwood camp 17 cents a ton. The Athelstan is not connected with the railway.

An analysis of the properties follow: The Brooklyn lode has been developed to a depth of 350 feet and has 3,500 feet of underground workings; the average sample taken from this mine represents the group. Copper, 1.43%; gold, \$1.32; silver, 25 cents per ton. There is 260,000 tons of ore available for the smelter, which at current prices has a gross value of \$5.86 per ton. The diamond drill indicates that there is an equal amount of ore below the developed ground. The Stemwinder is developed to a depth of 125 feet, but sufficient work has not been done to indicate the tonnage. Samples show copper, 1.40%, gold \$1.00, silver 25 cents. The

Idaho shows surface indications of the same body that is being successfully worked in the Granby. The Rawhide has 600 feet of underground workings at a depth of 180 feet. Average assays show copper 1.4%, gold 90 cents, silver 25 cents. Available tonnage 230,000 tons, prospective tonnage, 1,000,000 tons. Mountain Rose, the vein has been explored for 125 feet; ore contains 40 to 50% iron, 20% sulphur, and about \$1 in copper, gold and silver. It is valuable only as a flux. The Lancashire Lass has a shaft of 50 feet deep and is stripped for a distance of 500 feet and is of the same quality as above and has from 2,000 to 3,000 tons on dump. The Athelstan is merely a prospect. The outcrop shows a large body of oxidized ore, containing gold, silver and a little copper; 4,060 tons of this ore has been shipped to the smelter and the returns show an average of \$7.67 in gold. Indications are that there is sulphide ore below the oxide, containing copper values. The Sunset has a shaft 200 feet deep, no drifting below 100 feet. The ores assay copper .6%, gold .80%, silver 20 cents, iron 34%, Silica 23%, and lime 11%.

In conclusion, Mr. Johnston says: "The equipment at the mine is not of the proper type or of sufficient power for economical work. The prospects of obtaining a large tonnage, particularly on the Rawhide and Dominion groups, seems most certain. In order to put the mine on a production of 1,500 tons a day and keep the cost of production down to a point that would make the operation profitable, there should be an expenditure of \$250,000 for additional furnace, converting plant, electric power equipment, compressor and mine development. I am satisfied that it can be done at a profit of \$1.25 per ton, based on the selling price of copper at 12½ cents a pound."

### BRITISH COLUMBIA SMELTING PROMOTIONS.

In connection with the establishment of a zinc smelter at Frank, the following report, contained in a recent issue of the British Columbia Review, of London, may be of interest:—

"In the Chancery Division this week, Mr. Justice Swinfen Eady had before him the case of the Metallurgical Company, when counsel asked, on behalf of the plaintiffs, for an injunction restraining the defendant from disposing of a number of shares in the Royal Smelting Company and the Canadian Metals Company. The defendant was the agent and trustee of the plaintiffs. He went to Canada in order to establish for the plaintiffs a zinc-smelting process. He came back from Canada and introduced the plaintiffs to a number of gentlemen there, and a joint venture was entered into to carry out a joint smelting process. The defendant brought back with him an agreement, under which it was proposed the plaintiffs were to act, and they consented to it, and, in order to raise further capital, entered into negotiations with a gentleman in Paris, who ultimately found the necessary capital. It appeared from the affidavits that the defendant, Mr. Fernau, was the agent and trustee for the plaintiffs in respect of any shares that he had or would obtain in either of the companies mentioned. He had made an offer to the plaintiffs of £6,000 worth of shares in a certain company, but as he had previously made an offer of £12,000, the plaintiffs could not accept it, and had brought this action, in consequence, for an injunction.

"Counsel for the defendant said he was willing to agree not to part with any shares he might receive from the Royal Smelting and Refining Company, of Canada. With regard to the Canadian Metals Company, the defendant's case was that, in fact, he was not the agent of the plaintiffs, but was prepared not to do anything with any profit he might make. Really, with regard to both companies, the defendant submitted that this action was premature, as no shares had yet come to Mr. Fernau in respect of either matter; while, if an injunction were granted, it would probably spoil the "deal," which formed the subject of the agreement.

"His Lordship said he would grant the plaintiffs an injunction until the first motion day next sittings, which would give the defendant an opportunity of stating the facts fully."

### PROSPECTIVE SALE OF THE CONSOLIDATED CARIBOO HYDRAULIC.

Since sending the article, appearing on page 123 of this issue, to press, we learn, on the best authority, that the directors of the Consolidated Cariboo Hydraulic Mining Company have given an option on their property to Mr. John Hays Hammond, who is believed to represent the Messrs. Googenheim, and other New York investors and Mr. Hoffman, Mr. Hammond's particular expert, has been at Cariboo, in company with the manager, Mr. Hobson, during the past month, making an examination on behalf of his principal. During this examination, a run of twenty days with the monitor was made, resulting in a clean-up of \$20,000. An extension of thirty days has been given to the optionees, in order to enable Mr. Hoffman to make in addition an examination of the Horsefly property. The Review is further informed by one of the officials of the company that a proposal is being entertained by the bondholders, by which, in the event of a sale of the property being made, the holders of the common shares will be enabled to rank proportionately with the bondholders in any division of the proceeds which may be realized from the transfer of the property, and it is understood that a satisfactory provision will be made, by which existing shareholders, upon contributing a pro rata amount towards the retirement of the bonds, will be placed upon this profit-sharing basis.

### THE MANUFACTURE OF STEEL RAILS AT SYDNEY.

The Dominion Iron & Steel Co., of Sydney, has notified the Trade and Commerce Department of its intention to commence immediately the manufacture of steel rails. The company recently received an order for 250 tons of steel rails for the Intercolonial Railway. The Nova Scotia Steel & Coal Co., New Glasgow, N.S., has also informed the Department that the manufacture of steel ingots will be commenced early in July.

## IRON MINING IN NOVA SCOTIA.

The Halifax Chronicle recently published a leading article on the above subject, to which attention is called to the fact that while the Province's iron and steel industries are thriving, the iron lands of the Province are less productive than they were ten years ago. Our contemporary goes on to state that the production of pig iron, however, has greatly increased of late years in Nova Scotia, but the output of the iron mines has declined from 83,792 tons in 1895, to 50,000 tons in 1904. This decline in iron ore production is attributed to the Government aid afforded to the iron and steel industries, which has resulted in the importations of foreign ores. We quote from the Chronicle as follows:—

These conditions ought not to continue; no stable, national industry can be built up on this insecure basis. Every effort should therefore be made to make our iron lands productive.

The State protected development of our coal fields, has proved a complete success, having made us independent of foreign coal and incidentally shown how rich we are in that precious mineral.

We urge a policy towards the iron lands of Nova Scotia calculated to make us also independent of foreign ores. As long as our iron masters import foreign ores to so great an extent as at present, the Nova Scotian iron mine must languish. The importation of foreign ore should, therefore, be discouraged in every possible legitimate manner.

The Government should, we think, revise the fiscal system so as to make our iron industries stimulate native iron mines, as the factories of Eastern Canada stimulate the coal mines. Either great consumers of iron ore should be subsidized in such a manner that their operations must stimulate the development of iron mines in the country which furnishes the subsidies to them, or the Federal Government should directly subsidize the ore-miner in proportion to his output.

In a subsequent article the Chronicle remarks that the demand for iron ore is now larger than ever before in our history and is sufficient to support iron mining here. But foreign ore is allowed to pour into the Province; indeed, during the past four years more has been imported than our own mines have put out during the past thirty years! These imports of iron ore come in free and interfere with the development of our iron mines to a serious extent; hence the stagnation of the important primary industry of iron mining in this Province.

The local iron and steel maker, when in similar straits, urged that he could not get established. Fiscal protection and bounties were, therefore, granted to help the iron and steel industries, but the iron mine, although quite as essential to the Province, is not directly assisted. The iron and steel companies monopolize the protection and bounties, and, being large importers of foreign iron ore, are powerful competitors with our iron mines. This seems unfair to the iron mines of the Province, particularly as the coal mines, their co-producers of raw material, have long been directly helped by a tax on foreign coal. The result is that the local iron and steel industries, subsidized by the Nation, thrive on foreign ores and our iron mines stagnate.

As the bounties are running off and will presently expire, the funds hitherto devoted to the local iron industries could doubtless be used to stimulate the production of cheap native ores for them; in other words, bounties might be paid directly to the ore miner to encourage the ore mining industry. Should the local iron and steel manufacturers ask for the renewal or extension of the bounties, their neglect of the local iron fields should be inquired into and the consumption of greater quantities of Nova Scotian ore might be made a condition of their renewal, or extension. The encouragement of iron mining in this Province does not present any difficulties that we can discover and in any re-adjustment of the fiscal system, we hope that the welfare of our iron mining industry will be promoted.

## YUKON MINING RETURNS.

The United States Consul at Victoria, B.C., reports as follows:—

The gold output for last year decreased \$1,329,825 in value from that of the preceding year, the output for the year ended June 30, 1903, upon which royalty was paid, being \$12,110,723, against \$10,780,892 in 1904. The dryness of the season is given as one reason for the falling off. Generally, it may be said that for mining in a small way Dawson and its vicinity is no longer a profitable location, but large operations are successful and increasing. Nearly all the large companies in the Yukon are controlled by American capital. The financial statement of the Canadian offices at Dawson show decreased receipts of \$3,860 for quartz records; \$1,868 for recording registered documents, certificates of partnership and of work; \$5,600 in payments in lieu of assessment work, and of \$924 in crown grants, while there was an increase of \$311 in receipts from acreage of land covered by mineral claims. The receipts by the government from the district for the past three years illustrate the boom of 1901-2, the great decrease in 1902-3, and the further falling off in 1903-4. It is believed these figures will be still further reduced in 1905.

## BRITISH COLUMBIA.

(From a Special Correspondent.)

Mining in the Kootenay is, from one cause or another, in a somewhat disturbed condition at the present moment. The gold-copper situation in Rossland is tied up to a great extent with the amalgamation scheme which is being mooted with regard to the Trill smelter and the Gooderham properties, together with the Le Roi mine. For if these mines are amalgamated with the smelter, there will be an effort to do without concentration for the time being, and see whether the handling of a large tonnage will not bring down the cost of reduction to that point where concentration is no longer necessary from an economi-

cal standpoint. Hence there is no serious effort being made by the mines concerned to proceed with concentration problems. It is true that the Le Roi has about completed its concentrator, but when it is considered that the Le Roi is capable of producing at least from 1,000 to 2,000 tons daily of concentrating ore, and the concentrator is an experimental plant of only seventy-five tons capacity, it is apparent that the absolute necessity of concentration is at present by no means fully admitted. As to the concentrator at Trill, nothing more has been heard of that of late.

The Jumbo mine is again being well spoken of, but until facilities for transportation are introduced, shipping in large quantities can hardly be started.

The Boundary is doing far more steady work, and much interest is being taken in that section, especially by American mining men. The Granby is still improving its plant, and although the temporary shut-down of the Montreal & Boston has militated somewhat against this district, yet the starting up of other properties has more than offset this.

The silver-lead situation is to a large extent controlled first by the trouble as to the bounty on export lead, and also as to the saving of the zinc contents of the ore. At Kaslo, however, a large zinc separator has been erected, and is now in working order, and at Rosebery another is fast nearing completion. At Frank, a zinc smelter is not only projected but is in course of construction, and within this season ought to be completed. At present, lead miners, penalized for their zinc contents, when the said zinc contents are possibly a source of profit, are unwilling to mine until this problem is satisfactorily worked out. Hence the large difference between promise and fulfillment in the production of the lead mining section for the last fiscal year.

The starting up of the Sullivan smelter with a capacity which is to be increased up to 8,000 tons of lead annually, will make a large difference in the mining situation in this province; but as this institution, which is owned largely by Spokane people, is still in its infant stages, operation having been started very late in May, upon this it is as yet far too early to dilate.

In the Nelson district, mining is very quiet, although it is to be noted that the Reliance Mining Company have installed a mill on the Hendry plan, which should be in operation some time during the month of June. The Juno has started work, using the Athabasca mill, and there is some hope entertained that the Silver King, whose lead was at one time thought to have hopelessly faulted, may yet recover its lode, and work something upon the lines which gave the capital of the Kootenay its start years ago.

In the Ymir district, it is announced that the chief mine, the Ymir, is about to start development upon a larger scale than has yet been attempted. The Hunter V., an anomalous property, from a mineralogical point of view, has been doing very well of late, although its ore is extremely low-grade.

In the Windermere division, the Paradise mine, the mainstay of that district, is shut down temporarily, and its opening and the method of work which will be inaugurated thereon will depend largely upon the building of the Kootenay Central Railroad this year. In East Kootenay, the St. Eugene is making big profits, owing in no small measure to the exceptional rates offered by the German lead stacks. The coal company of the Crow's Nest has just entered upon a further two years' agreement with its employees, after long continued and difficult negotiations. This will ensure ample opportunity to proceed with the development of the mines, and with the new smelters coming into existence and the increased output of the others consequent upon the cessation of the bounty on export ore, a larger market is opening for them in the provincial field. In this district also, developments may be shortly looked forward to in the beginnings of development of the coal and oil lands in the Flathead Valley.

In the Similkameen, the Nickel Plate is doing well, but almost every other property is tied up for the want of railway facilities. As it seems probable that both the C. P. R. and the Great Northern will presently be running trains through this fertile country, there is little doubt that the mines of the Similkameen will assume a larger importance in the near future than ever they have occupied in the past.

On the Fraser River the lowness of the water has revived the hopes of dredging, and one or two companies have been spending considerable sums of money in perfecting their plants in readiness.

The Cariboo country is just beginning its season with apparently a good water supply for hydraulic mining.

On the coast, interest is again revived in the Britannia mine, which seems to have at last some prospect of being worked. Otherwise, there is little to report there on the mining doings of the past month.

## MINING NOTES.

## ONTARIO.

Application has been made at Osgoode Hall, Toronto, during the month, by Mrs. Selby, the holder of 154 shares, for the winding up of the Twentieth Century Mining Co. This company was organized in 1902, with Canadian offices in Toronto, the capital being \$2,000,000. The petition states that the company was incorporated in 1901, owning mining lands in Manitou, and copper mines in Arizona. After working for two seasons, gold to the value of \$40,000 was won. It then became necessary to install a plant, but this was not done, and operations were suspended. Since that time money has been expended in maintaining expensive offices and purchasing additional mining property which has not been worked. Statutes have also been entered by American shareholders, who wish their shares cancelled and demand the return of their investments. The fear of the Canadian is that unless the concern is wound up in this country, shareholders in the United States will have an advantage over Canadian shareholders.

Dr. A. P. Coleman, writing to the Ontario Bureau of Mines from the Michipicoten district, reports that a promising iron property is being developed by Mr. Edgar Brown, of Sault Ste. Marie on Lake Anjigomi, where there is a fine showing of magnetite. In this district also the high falls of the Michipicoten River, where there is a fall of 128 feet, are being developed, with a view of supplying power to the Helen, and other properties in the neighborhood. At the Helen mine, meanwhile, over 100 tons of ore are being taken out daily. It has been ascertained that 180

feet below the old Boyer Lake level, the ore is as good as ever, and a shaft is being sunk to a depth of 120 feet, giving access to a fine body of ore, 400 feet below the original deposit.

Several new discoveries of rich ore are reported from the Temiskaming District, a promising vein of silver having been found at the Earle mine, while ore assaying \$2,600 to the ton is reported to have been found on a claim owned by Mr. T. Chester. On this property five leads have been exposed. Near Haileybury a new lead has been discovered on Timmins & Dunlop's claim, at a distance of about three hundred yards from the original discovery. A local paper states that specimens of native silver on this lead have been sacked, the estimate value of which is about \$6,000.

The erection of a steel plant at Morrisburg, Ontario, is shortly to be commenced, and it is thought that by October operations will be started at eight mills, the raw material being drawn from Sydney. Another steel works is also to be established at Hamilton, by the Union Drawn Steel Co., of Beaver Falls, Pa. This company has secured a considerable site, upon which buildings are now being erected, which should be ready for use by the first of July.

In the Coppercliff section much activity is anticipated during the present summer. At the No. 2 mine of the Canadian Copper Company a large quantity of ore is being extracted, with two shifts working. The company are about to enlarge the smelter and establish a new laboratory, and a sub-station for electric power. Mr. G. F. Beardsley, an expert metallurgist, is meanwhile in charge of construction operations.

Contracts have been let for the continuation of development work of the Gold Rock Mining & Milling Company's property at Goldrock. After the property has been sufficiently developed, it is proposed to erect a mill to treat the ore. The Gold Standard Mining Company's mine is also being actively developed.

New York capital has recently become interested in the iron and other deposits of the Mimitaki district, where some exploration work is to be undertaken. The Wabigoon Star states that Mr. H. Dalston, the local representative of the Minnehaha Mining & Smelting Co., has received advices from the Buffalo office to the effect that arrangements have been completed for the commencement of development operations.

Application has been made to the Courts for the winding up of the following companies:—Twentieth Century Co., Volcanic Reef Company and the Laurentian Mining Company, the petitions in each case being granted.

During May six new wells were drilled in the Leamington oil district, and shipments were made during the month of 118 tanks, averaging 160 bbls. each. Oil production from this district is steadily increasing.

It is reported that a large deposit of iron ore has been found between Keewatin and Ontario, north of Kenora.

#### MANITOBA.

What is supposed to be a rich discovery of iron ore has been made at Riding Mountain, Manitoba, and is causing much local excitement. A sample forwarded to Montreal has proved most valuable, if in sufficient quantity. The surface veins indicate a large bed of ore.

#### ALBERTA.

The Egg Lake Oil Co., which is prosecuting development work near Edmonton, after boring to a depth of 213 feet passed through four layers of oil sand of eight and twelve feet in thickness, respectively. The company has erected two derricks, and also installed pumping machinery. The oil is lifted by a suction pump from the bottom of the well, the product being a fine fuel oil. The Canadian-American and Edmonton Oil Companies are also about to commence development operations.

The zinc smelter at Frank is now nearing completion. It is proposed to complete half the plant by the autumn, which will be operated before winter, the total cost being \$350,000.

#### BRITISH COLUMBIA.

**The Coast.**—The statement is made that some rich ore has been encountered in the shaft at the Lenora mine, Mount Sicker. In this district the Vancouver Island Mining and Development Co. has taken up an option on twenty-six claims known as the Westholme group, which have been under a course of development during the past eighteen months, shafts having been sunk to depths of 500 and 600 feet, with series of crosscuts. This group of claims is adjacent to the Tyee Mine.

**Atlin.**—The season at Atlin commenced earlier this year than last, piling on Pine Creek having been started some forty days sooner than was the case in 1904. Meanwhile all is in readiness for the commencement of dredging operations, and the hydraulic companies are now all working.

At Spruce and Pine Creeks the miners have been busy cleaning up winter dumps, and returns are said to be better than was anticipated, especially in the case of the Spruce Creek clean-ups. New areas are being prospected in the Dixie Valley, where ground has recently been bonded to California investors, who have already commenced development work. Mr. Henry Maluing, manager of the Societe Minerie de la Colombe Britannique, has, with associates, recently acquired the Gold Group of mineral claims known as the Beavis properties.

**Similkameen.**—The Sunset mine on Copper Mountain, which is now controlled by the British Columbia Copper Co., is to be thoroughly explored before the bond matures. Some fine ore has already been taken from the shaft, which is now down some 200 feet.

A bond for \$125,000.00 has been acquired on the Fairy Queen group of claims in the Hedley Camp.

**Lilloett.**—During the process of cleaning-up on the Iowa Company's dredge, a quantity of heavy sand, of a grey color, having also a metallic lustre, was found. A sample of this was sent to Ottawa for examination, and proved to be iron-nickel, oil 47 %, platinum 43 %, and other substances 10 %, including gold and oxide of iron.

As the water in the Fraser River is lower this year than it has been for many years past, it is thought that possibly by August or September bars and gravel beds, which heretofore have not been exposed, may be mined for placer gold, and local prospectors have high hopes of reaping a rich harvest in consequence.

**Kamloops.**—Commenting on the reports of the Kamloops Mines, Limited, the British Columbia Review, of London, makes the following statement:—

"Despite some encouraging remarks regarding recent developments at the mine, there was a feeling of disappointment that the chairman was not in a position to give the shareholders some definite prospects as to when the dividend-paying stage was likely to be reached. Now that the whole of the machinery has been thoroughly overhauled, and various additions and improvements made, it is expected that it will be possible to treat 160 tons a day. Developments at the mine are reported to be highly satisfactory, there being—it is said—in February last, \$900,000 worth of high-grade ore, and sufficient low-grade developed to keep the mill going for three years at the rate of 160 tons per day. What with liabilities, cost of developments, and the amount to be paid for the putting up of a smelting plant, we fancy there will be but little of the money provided by the reconstruction left, so that unless the management pursue a more energetic and up-to-date policy, there seems every probability that the shareholders will again have to find further capital. We have always held the opinion that the company possesses mining claims of great potential value, which, with good and economical management, should quickly reach the dividend-paying stage. In the hands of the original proprietors—The B. C. Exploring Syndicate—the Iron Mask was apparently developed with ability and economy, and great things were expected when it was re-organized under the new title. The new interests appear, however, to have been no more successful in the management of this property than in their Ashanti ventures, and the anticipations formed by their consulting engineer do not seem to us to have been better served when they were interested would seem to us to have been better served when they were entirely in the hands of their local manager."

**Lardeau.**—Work is about to be again resumed at the Oyster-Criterion mine at Camborne, under the direction of Mr. A. H. Gracey, manager of the Eva gold mines. The Eva mines are meanwhile being steadily worked, and it is contemplated to increase the number of stamps at the mill, and also to install a compressor.

The mill at the Silver Cup mine has now been in steady operation for over a year past, about 100 tons of ore being daily treated. This is regarded as an excellent showing, in view of the fact that when the machinery was first erected some engineers questioned whether it was suitable for the treatment of the ores from this mine.

During the winter, development work was continued at the Triune, and stoking operations are now in progress. Active operations have also commenced at the Mammoth, which is regarded as a property of considerable progress.

**Slocan.**—Work is shortly to be resumed on the Surprise mine at Mc-Guigan. It is proposed to drift a long tunnel from the south side of the hill to tap the lead at a depth of 700 feet below the present workings. Some 500 feet will be necessary to be driven before the vein is encountered, but a depth of 1,000 feet will thus be obtained on the ore body.

**Rossland.**—The Rossland Miner states that Mr. P. T. Craven has set up a slime table, recently patented, for saving fine values, in the gulch below the Josie Mill. Since the appliance has been in operation it has treated about fifty tons of tailings a day successfully. The present work, however, is purely experimental in character.

During the past month operations have been resumed at some of the smaller properties of the camp. Leases have been taken on the R. E. Lee and the Lily May, which are being actively worked. The Golden Rule and Cascade Bonanza group are also being operated.

A find of high-grade ore is reported to have been made in the tunnel being driven on Le Roi No. 2. The manager regards the discovery as an important one.

Connection at the 600 feet level has been made between War Eagle and Centre Star mines, thus affording important ventilation. The connecting crosscut runs for a distance of 1,000 feet between the two main shafts.

The Holmestake mine in this district was recently leased to Mr. Claude Palmer, by the Holmestake Mining Co.

A despatch from Rossland states that the winze from the ninth level of the Centre Star has reached a depth of 150 feet, or about 1,400 feet from the collar of the shaft. Sinking is being carried on on the middle ledge of the Centre Star, and ore of payable grade has been encountered from the ninth and below the ninth level. As yet, however, the ore body, which has every appearance of being of considerable magnitude, has not been drifted upon or crosscut. Good ore is also reported to have been found from the 1,550 foot level of the War Eagle.

**Boundary District.**—The Granby Company has recently bonded the Gold Rock group of three claims in the neighborhood of Phoenix. The property is largely owned by Montreal investors, who some five years ago expended a considerable sum in its development.

**Nelson.**—The Eureka, Goldleaf, Champion and Alhambra claims, located some seven miles south of Nelson, on Eagle Creek, were recently sold for \$40,000 to the local syndicate. As yet, however, little development work has been done, though the purchasers propose to commence operations immediately.

As bearing on the leading article published in the Mining Review last month, commenting on the requisition sent by the Associated Lead Mines of British Columbia to the Hon. Mr. Fielding, it is interesting to note that at a recent meeting a number of managers of important mines addressed the Nelson Board of Trade, strongly opposing any further payment of bounty on exported lead, on the grounds that such a course would be injurious to the general prosperity of mining, smelting and business interests in the Kootenays.

Another sale of mining property is reported from Nelson, the Queen Victoria, near Beasley Siding, being one of the first locations in the Nelson district, having been recently acquired at a substantial figure. There is said to be on this property a large showing of copper.

The lead returns from the Hall Mines smelter for May show a marked decrease, due largely to light shipments from the St. Eugene, the ore from which (for May and June) is nearly all being sent to Antwerp.

The returns are as follows:—

Mine.	lbs. ore.	lbs. lead.
Alice .....	120,571	81,630
Arlington .....	43,374	1,952
Charleston .....	40,802	8,446
Dundee .....	41,280	2,518
Emily Edith .....	42,568	22,646
Hewitt .....	27,348	1,996
Home Run .....	16,033	1,195
Horseshoe .....	13,186	2,227
Ivanhoe .....	128,117	81,059
Last Chance .....	114,986	42,907
Lorna Doone .....	10,962	1,129
Lucky Boy .....	15,691	2,780
Majestic .....	41,070	28,010
Neepawa .....	185,612	11,478
Noonday .....	35,513	10,378
No. 1 .....	36,726	1,285
Ore Hill .....	3,141	509
Payne .....	154,815	34,647
Reco .....	36,739	10,936
Ruth .....	37,536	8,633
St. Eugene .....	266,341	170,558
Silver Cup .....	200,282	33,958
Skylark .....	37,315	1,231
Standard .....	56,402	20,587
Whitewater .....	118,434	50,809
Wilcox .....	93,558	984
Ymir .....	234,550	29,756
<b>Total .....</b>	<b>2,149,952</b>	<b>664,706</b>

Supplementary for April, Reco, 367 lbs. of lead.

The Hunter V. Mine, owned by the B. C. Standard Mining Company, has been closed down for an indefinite period.

Mr. M. Davys, who had leased a number of properties, including the Silver King, Poorman and Granite, in the Nelson district, and the Hewitt and Emily Edith at Silverton, has decided to discontinue his mining operations, in consequence of the acquittal of a union miner, named Roberts, who was charged with shooting at him with murderous intent. Mr. Davys states that he will not resume work at these properties unless he can secure non-union labour in future.

Much activity is reported in the vicinity of Erie. The Arlington mine continues to make steady production development, work being also in progress. The Canadian King and Keystone being operated under lease are also shipping high-grade ore, while development work is being conducted by the Copper Farm M. & D. Co., and two claims have recently been opened up at Green City, upon which promising ore deposits have been exposed.

The assay office and plan of the Reliance Gold Mining Co. was damaged by fire during the month to the extent of \$2,000. The loss was covered by insurance, but the incident is none the less a regrettable one, as it will cause a delay in the operation of the plant, which had been put in good working order.

East Kootenay.—Preliminary operations, by means of the Heberlein roasting process, have already commenced at the new smelter erected at Marysville, and a large quantity of ore has now been treated. It is expected that within a few weeks some 300 tons will be treated daily. The two Heberlein-Heberlein ovens are meanwhile giving good satisfaction, producing from thirty to forty-five tons a day. The ore from the Sullivan mine is first put through crushers and rolls, and thence conveyed to the automatic sampler, and finally to the ovens. The company has not yet, however, decided to adopt the Heberlein process until its success shall have been thoroughly demonstrated.

Hydraulic operations commenced last month at Perry Creek, where large expenditures have been made during the past two years in equipment.

Mr. N. M. Curran, manager of the North Star mine, who was in Montreal last month, states that arrangements have been made for the commencement of operations upon the Stem Winder, Ontario and Midnight claims, while work is also to be resumed at the North Star.

The St. Eugene will, it is said, declare another dividend of \$70,000 payable on the first of July. Since the beginning of the year the St. Eugene has made profits as follows:—

January .....	\$43,000
February .....	42,000
March .....	70,000
April .....	60,000
May .....	70,000

Slocan District.—The Kootenay Ore Company's zinc plant, situated at Kaslo Bay, is now said to be in steady operation, with a capacity of about 60 tons daily.

In the Alnsworth division, the Highlander Company has purchased the property owned by the Black Diamond Tunnel Company, numbering 12, and adjoining the Highland mine to the west. The Highland tunnel has already been extended some 800 feet into the Black Diamond ground. Work at the mine is to be recommenced shortly.

Milling operations at the Jackson property are now in progress, with two shafts working. The Slocan Star mine is now shipping about 40 tons of silver-zinc ore daily to the United States Zinc Company, Pueblo, Cal. The grade of the ore gives about 40 % zinc, with good silver values.

Mr Norman Carmichael, manager of the Highland mine, at Alnsworth, recently returned from Europe, having obtained the approval of the directors to his plan of developing the property, and the work is to be proceeded with at once.

Good progress is being made in the driving of the 4,300 foot tunnel at the Rambler-Cariboo, more than half the distance having now been driven. The tunnel, it is estimated, will cost \$60,000, and \$15,000 additional for equipment. It will, however, enable the mine to be worked much more advantageously.

The machinery for the new zinc enriching plant at Rosebery has now arrived, and it is expected that the mill be in operation by the end of August next.

The Ottawa mine continues to make an excellent showing. The property is owned by Pittsburg investors, by whom it was bought for \$13,500. Net profits last year realized \$35,000, about 1,200 tons of ore being shipped. At present the mine is being opened up at the fifth level, by a tunnel, and it is proposed to now install an 8 or 10 drill compressor.

Arrangements were made last month for the shipment of the ore on the Arlington (Slocan) dump, to the Hall Mine Smelter. It has been further decided to resume work at the mine.

A considerable tonnage of zinc ore produced last year is being shipped by the Ruth Co. to the Kaslo sampler. On the success of operations in starting this parcel of ore will depend the future working of the zinc deposit in the mine.

Boundary District.—The Granby Company has secured bonds on a number of claims on Kruger Mountain, near Lake Osoyoos, upon which prospecting operations are to be commenced. It is said that these properties contain large deposits of iron ore, which will be utilized for fluxing purposes.

Ore shipments from Boundary mines during the month of May aggregated 80,044 tons, being practically the same as the output for April. At the present rate of production the district should be capable of producing this year a million tons of ore.

A new ore body is reported to have been discovered at the Mother Lode mine, owned by the B. C. Copper Co., by diamond drilling, forty-eight feet of good ore having been passed through.

Some excellent ore has been taken from the Crescent claim, in Skylark Camp, the value of the dump being estimated at \$10,000, and the value of the ore at from \$100 to \$200 per ton.

At the rich Providence mine, near Greenwood, active development work is being prosecuted with a force of forty men, drifting being carried on at the 200, 300 and 400 ft. levels.

At the Highland Queen mine, one of the oldest locations in the district, a fine ore body has been reached by tunnelling, the ore being exceedingly rich. The property was bonded in April last.

The Preston, a claim adjoining the Crescent mine, has been acquired by Chicago investors, who, it is said, propose organizing a company to develop the property.

Mr. J. P. Graves, general manager of the Granby Mines, is reported to have said that the company will shortly commence the sinking of a new three-compartment shaft, with a view to increasing the productive capacity of the mines, to from 100,000 to 150,000 tons monthly.

Another high-grade property, the Duncan, is being developed on the west fork of Kettle River, a streak of rich carbonates having been encountered, assaying in gold and silver values over \$400 to the ton. On the Rambler claim, in this locality, a rich body of ore has recently been encountered, and it is proposed ere long to commence raveling the Dry Creek and thence freighting to Midway. The cost of shipping ore to Midway is at present \$17 a ton.

The Skylark mine, in Skylark Camp, which was bonded to a local syndicate last autumn for \$30,000, has already been sufficiently profitably operated to enable the bondholders to meet all the payments from the proceeds realized. It is said that some specimens of silver telluride are being taken from this mine.

The unwatering of the Jewel mine at Long Lake Camp has been completed, and the engineers of the Le Roi No. 2 have sampled the property with a view to its purchase.

Recently the bondholders of the Twin claim, situated in the immediate vicinity of Greenwood, encountered three feet of rich galena ore in the tunnel that is now being driven.

It is reported that the British Columbia Copper Company purposes to increase its capital stock from two to four million dollars.

The new blast furnaces being installed at the Granby Mines are of a capacity of 35 per cent. greater than those at present in use. The capacity of the blower-room is also increased by the addition of a 300 h.p. blower, and a new blower of larger capacity is being placed in the converter department.

## YUKON.

Mr. K. B. McLennan, manager of the Bullion Hydraulic Company, reports that already 175,000 feet of lumber has been cut and hauled to Bullion, to be used in flume construction. The company has also all the pipes and pumping machinery on the ground, and certainly by the beginning of July active operations will be well under way. Excellent reports are also received from Burwash, Fourth of July and Arch Creeks, good pay having been discovered on Fourth of July. It is expected that a large output of gold will be made from the Klwane district this season.

The first shipment of gold from Dawson, consigned to the United States Assay Office at Seattle, is now beginning to arrive, over a million dollars' worth having already been brought down.

Rich discoveries of placer gold are reported to have been made on Hight Creek, a tributary of Mayor River, about 250 miles distant from Dawson.

## COAL MINING NOTES.

### NOVA SCOTIA.

The imports of bituminous coal from the United States during the month of April aggregated 292,928 tons, a gain of 25,742 tons over the same month of last year. For the ten months ending April 30, 1905, the bituminous exports amounted to 3,705,050 tons, a gain of 162,399 tons over the same period of 1904. The imports of coke for April, 1905, amounted to 61,906 tons, a gain of 23,144 tons over April, 1905.

The Nova Scotia Steel and Coal Company are putting in a double-decked cage at No. 1 Colliery, and are making additions to the plants at other collieries with the object of raising 650,000 tons of coal during 1905.



The Dominion Coal Company sends us the following figures giving the output of the collieries for May:—

	Tons.
Dominion No. 1.. . . . .	52,131
" No. 2.. . . . .	45,838
" No. 3.. . . . .	13,401
" No. 4.. . . . .	52,113
" No. 5.. . . . .	68,637
" No. 7.. . . . .	12,695
" No. 8.. . . . .	18,643
" No. 9.. . . . .	31,689
Total.. . . . .	294,647
Shipments.. . . . .	274,486

The April shipments of coal from Nova Scotia are as follows:—

	Tons.
Dominion Coal Co. ....	139,266
Intercolonial Coal Co. ....	14,191
Cumberland Railway & Coal Co. ....	37,890
Gowrie & Block House .....	5,013
Inverness Railway & Coal Co. ....	5,313
Acadia Coal Co. ....	13,578
N. S. Steel & Coal Co. ....	26,330

The daily shipments of coal by the Dominion Coal Co. now average 12,000 tons. It is stated that the coal this year is of a higher quality than formerly, this being due, in a great measure, to the introduction of shearing machines. The new No. 6 mine is now looking very well, the shafting having been lowered down two slopes, the company now employing about 7,500 men.

Fire bricks recently manufactured from Drummond Colliery fire clay have been tested at the Steel Works, Sydney, with, it is said, most satisfactory results. It is proposed now to erect two kilns capable each of producing 80,000 bricks per month, in order to supply the local demand. These collieries are now maintaining a coal output of about 900 tons daily.

The Acadia Coal Co., who are sinking two new shafts near Stellarton, N.S., have struck the Ford seam at a depth of 900 feet. This seam is said to be one of the largest and most valuable deposits in Nova Scotia. When the two new shafts are completed and ready to begin producing at full capacity, the company will be in a position to quadruple their present output.

A dispatch from Sydney, C.B., states that the Dominion Coal Co. is not likely to send coal to Sweden this year, as it has done for several years past. This is due to a breach in the contract between the steamship company and the Dominion Iron and Steel Co., by which the steamship company was to carry Swedish ore to Sydney as return cargoes.

The St. Lawrence Coal Co., who own considerable coal properties at North Sydney, N.S., will shortly commence operations, and install a plant with a capacity of raising 500 tons of coal a day, Charles Brandels, consulting engineer, Montreal, has been retained as chief engineer of the company.

Coal was recently struck at a depth of 890 feet in a No. 2 Allan shaft. This is recorded by the Maritime Mining Record as a matter for great congratulation.

The only company to show a large increase for the four months, as compared with the corresponding period of last year, is the Nova Scotia Steel & Coal Co.

The production of the Dominion Coal Company in May was 294,489 tons; the tonnage for the year to June 1st, is 1,034,191 tons.

The manager informs us that shipments from the Cumberland Ry. & Coal Co.'s collieries, for the month of May, aggregated 38,256 tons.

#### ONTARIO.

The contract for furnishing and erecting the coal handling machinery for the Canadian Northern docks at Port Arthur, Ont., has been let to the Mead-Morrison Mfg. Co. The docks are to be operated by the Pittsburg Coal Co., Pittsburg, Pa. The plant will consist of one patent transfer and pick-up bridge, a large storage system, two movable steel towers equipped with 16 x 24 direct acting engines and two-ton Rawson buckets.

The Canadian Coal & Ore Dock Co. will build a combined coal and ore dock at Port Arthur, Ont. The first section, to be 3,000 by 600 feet, will be completed this year. It is proposed to dredge a channel, about two hundred feet wide and 3,000 feet in length, from the harbor, which will cross the end of the dock, and to divert into it the waters of the creek and river.

It is stated that coal consumption in Ontario is increasing rapidly, in keeping with the industrial development of the province. The newspapers contain daily reports of the erection, or proposed erection of a large plant and factories, while a number of new companies are being incorporated for manufacturing purposes. Most of this activity is centered in the manufacturing localities of Toronto, Hamilton, London, Brantford and Berlin.

#### ALBERTA.

The Canadian Pacific Railway is completing extensive arrangements for supplying Winnipeg and other Manitoba points with semi-anthracite coal from Banff, Alberta. W. H. Aldridge, who is in charge of their department of mining and metallurgy has gone west to superintend operations. Development is being pushed on four large seams and the coal is being carefully screened and cleaned by emery pickers and spirals similar to those in use in Pennsylvania. The Canadian sizes will be similar to the American. It is intended to start shipments about June 1, arrangements having been made for the handling of the coal by Winnipeg

dealers. It is calculated that it can be delivered to consumers at about fifty cents per ton less than the American hard coal. The Canadian coal is a little higher in volatile matter, somewhat lower in fixed carbon, and from two to three per cent. lower in moisture. It is freer burning, but more brittle than the American and requires careful handling, but the fact that cars can come through without transfer is counted on to offset this disadvantage. An approximate comparative analysis is as follows:—

	Fixed carbon, matter.	Volatile.	Ash.	Moisture.
Canadian Anthracite.. . . . .	80.85	7.10	6.18	½-1
American Anthracite.. . . . .	82.87	3.5	6.10	2½-3½

The Breckenridge & Lund Coal Co., at Lubreck, have ordered complete machinery equipment for the mine which is now being actively developed. This shipments from the Lille collieries have during the month been largely increased.

The Western Canadian Colliers Co., operating the Lille and Bellevue mines, has arranged with the United Mine Workers of America upon a wage scale, which is to be in force for the next two years.

It is reported that fire has again broken out at the Frank mine, the attempts to smother the previous fire having been unsuccessful.

#### BRITISH COLUMBIA.

The first step toward testing the law that has caused the closing down of No. 1 mine at Nanaimo was opened at Ladysmith when, acting under authority of the coal mines regulation act amendment. Mr. Archibald Dick, inspector of coal mines, laid two informations at Ladysmith charging Harry Carroll, miner, and A. Bryden, superintendent of the Wellington Colliery Company's Extension Mines, with breaking the law which provides that men must not be underground more than eight hours. It is understood that action taken by the government to enforce the law will be made the basis of an appeal to test its constitutionality, as it has been reported that if the law was enforced Mr. Dunsmuir would appeal at once to the higher courts and carry the question to the Privy Council if necessary.

As a result largely of the recent legislation passed by the Provincial Government, making eight hours a legal day's work from bank to bank in coal mines, the Western Fuel Company's properties at Nanaimo have been closed down, the company claiming that it is impossible to work the mines at a profit under the new conditions, unless men are willing to accept a lower rate of wages. The men are represented by two labour organizations, namely: The Western Federation of Miners and the United Mine Workers of America.

Some fine specimens of semi-anthracite coal have recently been brought down from the Peace River country. These were analyzed by Mr. H. Carmichael, Provincial Assay of British Columbia, who found them to contain a very high percentage of fixed carbon, with a minimum percentage of ash. The discoverers have located some 25 square miles of coal bearing country in the Peace River.

A contract has at length been let for the construction of a branch line of the Canadian Pacific from Spencer's Bridge to the Nicola Coal fields, a distance of 45 miles. The construction of this road will result in the opening up of the valuable coal areas in the Nicola section, where, already, preliminary exploration work has been successfully carried on.

A special dispatch to the Nelson Daily News states that it is reported on excellent authority from Coleman that the coke ovens and the mines which supplies them are both closed down. The reason given is that a contract has been signed between the Crow's Nest Pass Coal Company and the Granby Mines by which the former will supply all the coke that is needed in the smelter for the next two years.

The Seattle and Washington Coal Co. have been formed in Seattle to acquire and develop about four square miles of coal lands near Coulee in the Nicola Valley.

#### MINING MEN AND AFFAIRS.

The itinerary of the American Institute of Mining Engineers, which is holding its annual meeting in Victoria, B. C., this year, is as follows:—

Leave New York, June 23, 7.55 a.m., on special train, Penn. Ry.  
 Arrive Spokane, June 26, 8.30 p.m., by Gt. Northern.  
 Leave Spokane, June 26, 9.30 p.m., by Gt. Northern.  
 Arrive Nelson, June 27, 8 a.m.  
 Leave Nelson, June 27, 11.30 p.m.  
 Arrive Rossland, June 28, 4 a.m.  
 Leave Rossland, June 28, 11.30 p.m.  
 Arrive Marcus, June 29, 2 a.m.  
 Leave Marcus, June 29, 2.15 a.m.  
 Arrive Grand Forks, June 29, 4.30 a.m.  
 Leave Grand Forks, June 29, 11.30 p.m.  
 Arrive Spokane, June 30, 7.10 a.m.  
 Leave Spokane, June 30, 7.30 a.m., by Great Northern.  
 Arrive Seattle, June 30, 8.30 p.m.  
 Leave Seattle, June 30, midnight, by steamer Princess Victoria  
 Arrive Victoria, July 1, 6 a.m.  
 Leave Victoria, July 5, noon, by Princess May, for Dawson.  
 On returning from Dawson by special steamer the party will leave Vancouver on July 23, at noon, over the C.P.R., making stops at various points in the mountains on the way back to New York.

Just as we go to press, information reaches us of the transfer of the Gooderham and Blackstock mining interests in British Columbia to a Montreal and Toronto syndicate, which has thus acquired a controlling interest in the St. Eugene, War Eagle and Centre Star mines. It is likely, we are informed, that the Trail smelter will also be purchased by the syndicate. The mines will continue to be operated under the

direction of Mr. Jas. Cronin, as general manager. This arrangement will, in no sense, interfere with the proposed amalgamation of the Le Roi, War Eagle and Centre Star mines, provided, of course, the Le Roi Company endorse the arrangement as agreed to by Mr. G. S. Waterlow, who recently visited Canada officially in connection with these negotiations.

Mr. S. C. De Witt has been appointed sales agent for Allis-Chalmers-Bullock, Limited, Montreal, for the Maritime Provinces, with headquarters at Halifax. Mr. De Witt is a graduate in electrical engineering of Lehigh University, Pennsylvania, and has had considerable experience in different lines of electrical work. For the past three years he has acted as manager of the De Witt Electric Co., Ltd., with places of business at Sydney, Glace Bay, Pictou, Truro, and Fredericton. He is a son of Dr. De Witt, the present mayor of Wolfville, N.S., and being a native of the province, and well acquainted with eastern business, will no doubt prove a valuable acquisition to the company's staff.

We quote the following from the Maritime Mining Record:—"Sydney Mines has a little man of very moderate weight, 72 years old, who for fifty-nine years has worked in the coal mines down there. He entered the pit when thirteen years old, and has worked at all branches of mining. For over twenty-seven years he mined coal. For the past thirty years he has been acting in the capacity of deputy. During 1904 he worked 366 days, thereby setting a good example to bigger men. He is still hale and hearty and can travel five hours at a stretch without resting. His long mining life has never quenched his love of talking in the good old garden tongue—the Gaelic."

It is announced that the Dominion Government have appropriated the sum of \$15,000 for the purpose of making experiments with the electric process for smelting ores and manufacturing steel at Sault Ste. Marie. The Consolidated Lake Superior Power Company have generously placed a plant and a dynamo, capable of supplying 400 h.p., at the disposal of the experimenters for four months. The tests will be made under the direction of Mr. Horault, the inventor of the process bearing that name, and ores of various character will be experimented on.

At a meeting of the Nelson University Club, last month, Mr. S. S. Fowler read an interesting paper on "The Building of the Ore Vein," in which he discussed the urgent distribution and methods of working mineral deposits. In concluding his address, Mr. Fowler stated that in spite of the fact that many phenomena in connection with rock formations still represented unsolved problems, there was no doubt that rapid progress was being made in the attainment of metallurgical knowledge.

Dr. Poole, who was for some years Inspector of Mines in Nova Scotia, but who is now a member of the staff of the Geological Survey will be occupied during the present season in surveying and mapping the coal measures of Vancouver Island. Dr. Ellis, who was engaged last year in surveying the Nicola Fields, for the Department, has meanwhile proceeded to the Queen Charlotte Islands, to certify and report on the coal measures there.

Mr. A. B. W. Hodges, general manager of the Granby Company, is to be congratulated on the success of his electrical self-charging device, recently installed at the company's smelter at Grand Forks. It is said that a saving in cost has been effected of from thirteen to fifteen cents per ton by the use of this appliance, which Mr. Hodges has patented in the United States, Mexico and Canada.

McGill University, at its recent convocation, conferred the degree of Doctor of Science on Prof. Douglas McIntosh. Dr. McIntosh graduated as Bachelor of Science from Dalhousie College in 1896, afterwards obtaining the degree of Master of Science at Cornell University. He then continued his studies in Germany, and upon returning to Canada joined the staff of McGill University.

Mr. G. A. King, superintendent of the St. Eugene concentrator at Merville, B.C., and Mr. G. Clothier, mine superintendent, have been experimenting with a view of extracting the silver from the zinc-bearing ores. It is said that these experiments have been quite successful, resulting in a saving of 75% of the silver values, while it is hoped that this be raised to 90%.

The fifteenth annual convention of the Canadian Electrical Association was held on the 21st, 22nd and 23rd June, in the rooms of the Canadian Society of Civil Engineers, 377 Dorchester Street, Montreal. Some 200 members attended the meeting, which was a most successful one, a very interesting programme having been prepared.

The Mining Congress at Liege, which is being attended by one or two Canadian engineers, including Mr. J. Obalski, Inspector of Mines for the Province of Quebec, will extend from June 25th to July 2nd. A very interesting programme of papers are being prepared, and the Congress should prove of high technical interest.

The appreciation in which Mr. J. W. Gebo, late general manager of the Frank Mines, is held by the Association of Frank was well signified the other day when he was presented with a cabinet containing 129 pieces of silver plate. Mr. Gebo is at present residing at Red Lodge, Montana.

Dr. J. Bonsall Porter left Montreal during the month on an extensive tour to Great Britain, whence, later on, he will journey to South Africa as the Canadian representative at the meeting of the Royal Association, which is to attend the opening of the railway to the Victoria Falls.

Mr. John Morris, formerly a Kootenay mine manager, was recently seriously injured by an explosion at the Lenora mine, in the Mount Sicker district, Vancouver Island, his skull being badly fractured, while other terrible injuries were inflicted.

Mr. J. F. Povah, for many years chief Accountant in the office of the Hall Mining & Smelting Co., Nelson, resigned that position to accept an appointment with the International Coal & Coke Co., at Coleman, Alberta.

The new and important portfolio of Lands and Mines in the Ontario Government has been assumed by the Hon. Frank Cochrane, of Sudbury who was recently elected by acclamation in East Nipissing.

Mr. S. C. H. Miner, who is largely interested in the Granby mines, left Montreal on the 22nd of June on his annual visit of inspection of the company's properties in the Boundary district.

Mr. A. H. Kelly, president and managing director of the Reliance Mining Co., of Nelson, B.C., has returned to his duties after a month's holiday spent at Fredericton Junction, N.B.

Mr. C. J. Coll, of the Acadia Coal Company, Stellarton N.S., has returned to Canada, after an absence of two months in England.

Mr. W. Yolen Williams, formerly superintendent of the Granby Mines, has returned to the west after spending ten months in Europe.

The ninth annual session of the School of Science for the Atlantic provinces, will be held at Yarmouth from July 11 to 28, 1905.

Mr. George Alexander, of Kaslo, has, we learn, taken over general management of the Ferguson Mines, Limited.

#### THE AMALGAMATED COPPER CO.

This company, which has been in existence for nearly six years, recently issued a First Report, showing at the end of April of the present year cash assets in hand of \$2,756,758.83, and surplus in reserve amounting to \$3,942,712.30. The capital outstanding is \$153,887,900.

#### COMPANY NOTES.

**Montreal & Boston Consolidated.**—The new directors of the Montreal & Boston Consolidated Mining & Smelting Co. has issued a circular announcing the sale of its mines and properties to the Dominion Copper Co., and that the last-named company is about to make an issue of bonds to discharge the past debts of the Montreal & Boston and to conduct developments and improvements. The circular states that the principal and most available properties of the Montreal & Boston Co. are not paid for, and that owing to the inability to market the stock, the company was threatened with the loss of these properties, on which it owes over \$320,000. An arrangement was accordingly made with the Dominion Copper Co., from which the Montreal & Boston had acquired its principal properties, only part of which were paid for, by which the Dominion company takes over all the properties and issues its stock, share for share, in exchange for Montreal & Boston stock, without assessment or payment of any kind. The Dominion company has authorized an issue of \$1,000,000 bonds, of which \$700,000 are now to be issued at 90, with a bonus of 200% of its stock. The moneys realized from the sale of these bonds are to be used to pay the balance of the unpaid purchase price on Montreal & Boston properties and for further working capital to develop the mines and complete the smelters. The right to subscribe to these bonds is reserved to Montreal & Boston stockholders, but they are under no obligation to subscribe. The bond issue has been fully underwritten.

It is understood that Mr. Samuel Newhouse and his associates (including Mr. Samuel Untermyer and others who are interested with him in the Cactus mine and were interested in the Utah Consolidated and other successful mining properties) have consented to organize the work on the Montreal & Boston properties on a business basis. Mr. M. Johnson, superintendent at the Cactus, has gone to British Columbia with a force of new men to take charge. The smelter to be completed to its full capacity of 1,500 tons per day and a converter is to be erected in connection with the smelter. The total capital of the new Dominion company will be \$3,200,000, divided into shares of a par value of \$1, which is about one-half the total par value of the old Montreal & Boston capital.

**Dominion Coal Co.**—The secretary of the Boston Stock Exchange has issued the notice that \$2,433,000 Dominion Coal Co., Ltd., first mortgage 6% bonds, due 1913, more than a majority having been deposited under the terms of the company's circular, dated April 17, 1905, have been stricken from the list.

Interim certificates issued by the New England Trust Co., of Boston, and also those issued by the Royal Trust Co., of Montreal, Canada (when stamped by the City Trust Co., of Boston, at transfer agents) for Dominion Coal Co., Ltd., first mortgage 35-year 5% sinking fund gold bonds, due 1940, of a total issue of \$7,000,000, are admitted for quotation on the unlisted sheet and will constitute a good delivery.

The Dominion Coal Co., Limited, 8% preferred stock, 30,000 shares, have also been stricken from the list.

Interim certificates of Dominion Coal Co., Limited, for 7% preferred stock, transfer agent American Loan & Trust Co., and registrar the New England Trust Co., of Boston, are admitted for quotation on the unlisted sheet, and will constitute a good delivery.

**Dominion Steel.**—It is generally believed that the preferred stock of this company will shortly be on a dividend basis. The reorganization plan is now in progress, and it is understood that the preferred shareholders will now be asked to accept the full 3½% dividend for the current half year, and instead of getting the 14% dividends in full, which is due them under the accumulation clause, agree to have the preferred put on an 8% basis, which means that they will in future get their regular dividend and have the back payments made to them at the rate of 1% a year. The steel rail mill is now running time and a director estimates that the rail mill the first year will show the company a clear profit of \$600,000.

**Tyee Copper.**—April Return.—"Smelter ran 16 days during the month, and smelted, Tyee ore, 3,224 tons; Customs ore, 157 tons—3,511 tons. Matte produced from same, 316 tons. Gross value of contents (copper, silver and gold), after deducting costs of refining and purchase of Customs ore, \$47,106." (Office note—The general manager reports that the partial cave (to which your attention was called in the circular dated the 10th March last) has been cleared and opened, and ore is now being won from the stopes which were temporarily closed, but under the conditions created by the partial cave the output of the mine will remain for the present at about 2,000 tons per month, to which it was restricted.)

**Standard Explosives Co.**—This company was recently incorporated for the manufacture of explosives, at Beaconsfield, near Montreal. At a meeting held during June, at the company's offices, Board of Trade Building, the following directors were elected:—Messrs. W. T. Rodden, J. F. Johnson, S. H. C. Miner, Jas. W. Woods, and Chas. W. Dimick. At the directors' meeting, held subsequently, Mr. W. T. Rodden was elected president and managing director, and Mr. J. F. Johnson, superintendent of the company's works, was appointed secretary-treasurer.

**Ymir.**—April Return.—"35 stamps ran 27 days and crushed 2,100 tons (2,000 lbs.) of ore, producing 450 ozs. bullion. The estimated realizable value (gross) of the product is \$5,250; 145 tons of concentrates shipped, gross estimated value, \$3,250. Cyanide plant treated 1,700 tons (2,000 lbs.) of tailings, producing bullion having estimated gross value of \$1,150; sundry revenue, \$100—\$9,750. Working expenses, \$10,640. Loss, \$890."

**Cariboo Consolidated.**—A circular, dated 13th inst., has been issued to the shareholders communicating letters and cablegrams from the resident manager. The regular pay gravel of the deep channel has been reached and good gold values have been obtained. A cable, dated May 2nd, reported pumping two million gallons per diem, which on May 5th was reduced to 900,000 gallons. The outlook is reported as "highly encouraging."

**Le Roi.**—The cable report for May states:—"Shipped from the mine to Northport during the past month, 9,220 tons of ore, containing 3,344 ozs. of gold, 3,550 ozs. of silver, and 198,100 lbs. copper; estimated profit on this ore, after deducting cost of mining, smelting, realization, and depreciation, \$10,500; expenditure on development work during the month, \$8,900; development of the mine is being pushed; have nothing special to report."

**Le Roi.**—Cable from Rosslund states:—"Shipped from the mine to Northport during the past month 9,671 tons of ore, containing 4,000 ozs. of gold, 4,100 ozs. of silver, 206,600 lbs. of copper. Estimated profit on this ore, after deducting cost of mining, smelting, realization and depreciation, \$21,000. Expenditure on development work during the month, \$5,500. Development of the mine continues to be satisfactory."

**Le Roi No. 2.**—The May report states:—"Shipped to Greenwood, 142 tons. The net receipts from Greenwood are \$19,888, being preliminary payment for 634 tons shipped, \$6,315 being deferred payment on 1,885 tons previously shipped. Shipped to Trail, 404 tons. The net receipts from Trail are \$8,364, being payment for 83 tons concentrates shipped. Total receipts from both smelters, \$34,567."

**Le Roi No. 2.**—The cable report for May states:—"Shipped to Trail 440 tons. The net receipts from Trail are \$15,807, being payment for 734 tons shipped and \$1,872, being payment for 30 tons concentrates shipped. The net receipts from Greenwood are \$6,448, being deferred payment on 1,844 tons previously shipped. Total receipts from both smelters, \$24,127."

**Le Roi No. 2.**—Mine manager's report for the month of April:—"Josie mine: Output—16 cars of ore were shipped; a total of 548 tons. Of these, 144 tons went to the B.C.C. Company at Greenwood, and 404 tons to Trail. Of the latter, 65.89 tons consisted of ore taken from the fines dump, and assayed 0.41 oz. gold, 1.3 oz. silver, and 2.3 per cent. copper."

**Cariboo Consolidated.**—The following cablegram has been received from the manager: "The water in the shaft stands at—just below the top of old workings—at an elevation of 627 ft.—have recommenced driving East crosscut; everything looks most favourable; we are now pumping 900,000 gallons of water per 24 hours."

On June 2nd, the resident engineer telegraphed: "Pleased to inform you that have already commenced to breast out in the gravel part of Block A—gravel in good condition to work—will send result as soon as possible—No. 2 east crosscut is now in 130 ft."

**Slough Creek Gravel Gold.**—The manager, writing under date May 5th, states:—"There is splendid gravel in working No. 5, but too much water to save much gold. I expect to have the gravel in the face of working No. 4 soon."

**The Fraser River Gold Dredging Company.**—The offices of this company have been transferred to No. 39 Lombard Street, E.C.

#### COMPANY MEETINGS.

**Tilt Cove Copper, Nfld.**—The report of this company for 1904 shows a credit balance of £13,405. The Cape Copper Company's Tilt Cove establishment accounts for the year show that the mines made a gross profit of £36,097, leaving, after charging the account with interest and discount payable to the Cape Copper Company, the rent (representing the interest on the company's debentures), prospecting costs, management, etc., a net profit of £29,663. The balance of profit thus remaining has been dealt with as follows:—£14,831 has been retained by the Cape Copper Company, and £14,831 has been received by this company as its moiety of profit, as provided for by the agreement between this company and the Cape Copper Company. Although a profit of £29,663 is shown on the establishment account, that result is arrived at after the absorption of £314, profits spent on plant and machinery, and additions to buildings, less £11 released from the amount retained for working capital, and the net figure—namely £303—has been added to the capital expenditure on the one side of the account, and to the reserve for depreciation on the other, as heretofore. Out of the available profit of £14,766, the committee have already declared an interim dividend of 1s. per share, and they now recommend a final dividend of 2s. per share, making a total distribution of 3s. per share, or 7½ per cent. for the year, leaving £1,416 to be carried forward.

**Vermilion Forks Mining Development Co.**—The ordinary general meeting of this company, which owns property at Princeton, in the Similkameen district, was held in London last month. The chairman stated that during the year the expenditure had only amounted to £1,436, as follows:—

Development work .....	£284
Salaries .....	493
General expenses .....	402
Government fees and legal expenses.....	113
Printing, cables, etc. ....	144

The company has proved the existence of coal by drilling on one of its leases near Princeton, but on the other lease explorations have been disappointing. The company are basing great expectations on the construction of a railway into the district. The chairman, in the course of his address, stated that £1,500 would be required to meet the necessities of the year and pay off the bank advance. The report and accounts were adopted.

**Asbestos and Asbestic Company.**—The directors' report for 1904 states that the business for the said period has resulted in a net profit of £443, as against a net loss of £1,060 for the previous nine months. The production of asbestos for the past year has been the largest on record since the formation of the company. The new mill and equipment have justified the cost of their installation, and it is proposed to still further add to the plant, to enable the company to keep pace with the increasing demand. The profit on actual trading during the past year was £9,523, as against £6,703 for the previous nine

months, showing on the average of twelve months an increase of about .600. An important item against the year's profits is the interest on loans and bonds, amounting to £2,697. General expenditure has been less both in London and Danville, and the directors have not drawn or charged any fees for the year.

**Alberta Coal Co.**—The annual general meeting of this company was held at Nelson last month, Mr. W. Blakemore, presiding. The directors reported that negotiations with the Imperial Coal Company, of Montreal, for the development of the property, had failed to materialize. The necessary payments to the Government for the protection of the Company's title, have been made. The following directors were elected for the ensuing year:—C. W. Busk, J. A. Turner, W. A. Jowett, J. Schirmear and A. O. Applequist. Mr. Byron Sharp was appointed auditor.

**Beatrice Mines.**—The annual general meeting of the Beatrice Mines, Limited, was held recently at Revelstoke, B.C. A financial statement was presented, showing the company's finances to be in a satisfactory condition. The following directors were elected:—Mr. G. S. McCarter, president; Mr. J. A. Stone, vice-president. Mr. F. Fulmer, manager; Mrs. M. Anderson and Mr. C. Holten. Mr. H. Y. Anderson was appointed secretary-treasurer. The company is now shipping ore taken out during the winter, from Camborne to the smelter.

**Tabor Coal Co.**—The first annual meeting of the Tabor Coal Mining Co. was held at Winnipeg on May 26. The following directors were elected: Messrs. J. S. Hough, D. C. Adams, J. W. Bettes, Isaac Cockburn and George Rogers, of Winnipeg; L. M. Johnston and H. E. Cherry, of Lethbridge. The directors elected Mr. J. S. Hough, president; Mr. Isaac Cockburn, vice-president; and Mr. D. E. Adams, secretary-treasurer. The company is already shipping coal, and is installing sufficient machinery to produce 1,000 tons daily.

**Rambler-Cariboo Mines, Limited.**—The annual meeting of the above company was held in Kaslo, B.C., last month, the following board of directors being re-elected; Mr. M. McClaine, Dr. J. Armstrong, Tacoma; Mr. P. W. Lawrence, Pullman; Mr. Alfred Collidge, Spokane; Mr. J. D. Chaplin, St. Catharines, Ont.; Mr. Harry Cornwell, Hartford, Conn.; Mr. B. W. McPhee, Colfax; Mr. W. E. Zwicky, Kaslo. Mr. Zwicky was also elected secretary-treasurer and general manager.

#### FOREIGN CONSUMPTION OF COPPER.

Mr. L. Vogelstein, representing in America Aaron, Hirsch & Sohn, of Halberstadt, Germany, reports to the Canadian Mining Review that the German consumption of foreign copper for the months from January to April, 1905, inclusive, was as follows:—

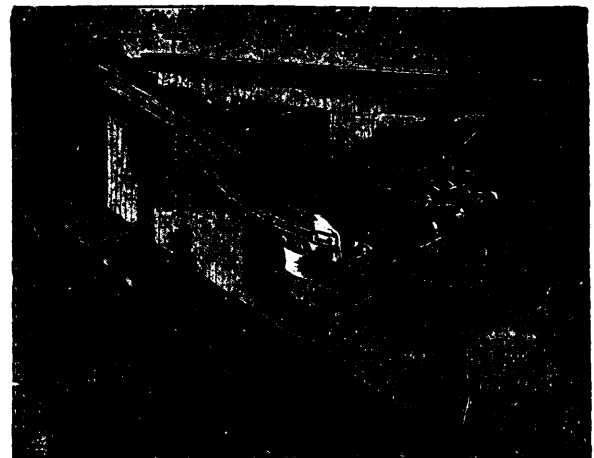
	1905.	1904.	1903.
Imports .....	32,172 tons	40,859 tons	27,260 tons
Exports .....	4,413 tons	2,651 tons	3,833 tons
	27,759 tons	38,208 tons	23,427 tons

Out of the above, 26,720 tons were imported from the United States.

#### THE OTTUMWA BOX CAR LOADER.

The illustration below shows the Ottumwa Loader of the dock pattern as installed at the Canadian Pacific Railway Company's docks, Fort William, Ont. This loader has been in successful use there about two years, and is giving excellent satisfaction. Similar loaders are in use at West Superior, Wis., U.S.A., and at Lake Erie Coal Co.'s docks, Walkerville, Ont. One is now being installed for George Hall Coal Co., at Prescott, Ont., and one at the wharf of the Dominion Coal Co., Montreal.

These dock loaders not only greatly reduce the expense of loading coal in box-cars, but increase the loading capacity, and load the coal in better condition. The machines are also quite extensively used for moving loaded cars, thereby increasing the capacity of the docks on account of their being able to move cars when there is no switch engine at hand.



Stationary loaders, manufactured by the same company, are in use by the Souris Coal Mining Co., Winnipeg; the Intercolonial Coal Mining Co., of Westville; International Coal & Coke Co., of Coleman, Alta.; the Acadia Coal Co., of Stellarton, N.S.; and Dominion Coal Co., Glace Bay.

These loaders have entirely changed the method of loading box-cars, and it is no longer a hardship to do such loading. The advantages of shipping coal in closed cars can be readily understood by anyone, and is thoroughly appreciated by purchasers of coal, as box-car shipments are protected from loss in transit.

Those of our readers interested in this useful appliance can obtain catalogues and fuller information from the Canadian sales agents, Messrs. W. H. C. Mussen & Co., of Montreal.

## TWO GOOD OPENINGS.

Enquiry has reached the Mining Review office whether we can recommend:

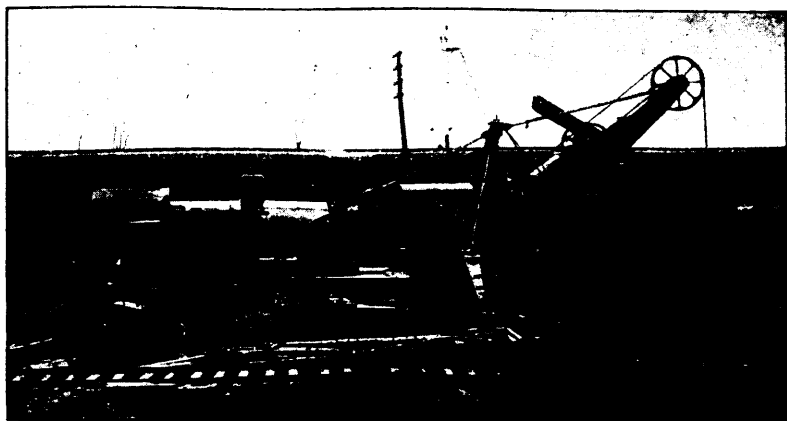
- (1) A man thoroughly conversant with economic methods of mining and packing mica for the European market, who would go to South Africa on a three years' engagement.
- (2) A qualified practical miner to take charge of a high-grade silver mine in Ontario, as mine captain.

Applications may be addressed to the Editor of the Canadian Mining Review, 171 St. James Street, Montreal.

## INDUSTRIAL NOTES.

The Canadian Pacific Railway has just purchased four powerful steam shovels from the Locomotive & Machine Co., of Montreal, Limited. These machines are of the new Robinson wire-rope type, designed by Mr. A. W. Robinson, of 14 Phillips Square, Montreal. The first machine was placed in service some weeks ago, on trial, at Montreal Junction, and on the strength of its successful performance, the company, through Mr. W. R. Baker, has ordered three more. It has been subjected to most exhaustive tests, and on comparing its performance with that of a Bucyrus shovel, on the same work, it was found to have excavated fifty per cent. more material in the same working time, and to have consumed only three-fourths of the fuel. Mr. Robinson is also the designer of the Bucyrus machine, which is so well and favorably known, about a thousand of them being in service; but in this latest production he has made a most remarkable advance in speed, power and efficiency. Some idea of the power of this machine may be gained from the fact that it can dig a cutting 60 feet wide and 25 feet deep at one time, loading the material on a train of cars alongside. It loads standard cars, 34 feet long, in 1½ minutes each, scooping up five tons at a time with its immense steel dipper. Although so large and powerful, it is handled with greater ease and rapidity than the old style, and seems almost human in its motions. It is a matter of satisfaction that these machines are now built in Canada, as heretofore they have all been imported from the United States. Not only that, but this Canadian design is being largely used in the United States, where it is being introduced by the American Locomotive Company, and bids fair to supersede the old style by reason of its superior speed and efficiency.

One of these shovels has also been sold to the Canada Copper Company, for digging heavy ore.



At a meeting of the board of directors of the Westinghouse Electric and Manufacturing Company, held in New York last month, Mr. E. M. Herr was elected first vice-president and chief executive officer under the president. The advent of heavy electric traction and the adoption of electricity by main line railways render the services of a man skilled not only in manufacture, but also conversant with railroad operations, especially desirable at this time. Mr. Herr was locomotive superintendent of the Northern Pacific Railway for a number of years, and previous to that had many years' experience in various positions on important railways in the west. For the last seven years he has been vice-president and general manager of the Westinghouse Air Brake Company.

The Westinghouse Electric & Manufacturing Company has now four vice-presidents, namely, Messrs. E. M. Herr, Frank H. Taylor, L. A. Osborne and Newcomb Carlton, which makes an especially able and efficient force of officials. It is said that the works at East Pittsburgh have never in the history of the company been so busy with the construction of electric railway apparatus than at present. This is due to the fact that nearly all the larger trunk lines are now ready to adopt electric power, since the Westinghouse alternating current single phase system has proved itself such a signal success in practical demonstrations.

The interests of the Ingersoll-Sergeant and the Rand Drill Companies were recently amalgamated, and a new corporation, the Ingersoll-Rand Company, formed under the laws of New Jersey, with a capital of \$10,000,000, of which \$5,000,000 is preferred stock and the balance common. This is a union of valuable patents and of expert engineers of large experience in this special line of work. It should be advantageous to purchaser as well as manufacturer, as improved machinery and better service will result. The factories of the two companies are located at Phillipsburg, N.J.; Easton, Pa.; Tarrytown, N.Y.; Ossining, N.Y.; Painted Post, N.Y.; 34th Street, New York City; and Sherbrooke, Quebec. The officers of the Ingersoll-Rand Company are as follows:—President, Mr. W. L. Saunders, formerly president of the Ingersoll-Sergeant Drill Company; first vice-president, Mr. Geo. Doubleday, formerly treasurer of the Ingersoll-Sergeant Drill Company. Vice-presidents: Mr. Jaspar R. Rand, formerly president of the Rand Drill Company; Mr. John A. McCall, president of the New York Life Insurance Company; Mr. J. P. Grace, vice-president of W. R. Grace & Co.; Mr. Geo. R. Elder, general manager of the manufacturing department, Treasurer, Mr. W. R. Grade, formerly secretary of the

Ingersoll-Sergeant Drill Company; secretary, Mr. F. A. Brainerd, formerly treasurer of the Rand Drill Company. For the present, the main offices of the new company will be at 26 Cortland Street, New York.

The Abner Doble Company, of San Francisco, announces that arrangements have been made with the John McDougall Caledonian Iron Works Company, Limited, of Montreal, whereby the latter become sole licensees for the manufacture of the Doble system of water-wheels in Canada. The tangential water-wheels and needle-regulating nozzles, manufactured by the Abner Doble Company, are well known for their excellence of design and workmanship, and considerable engineering interest has recently been shown in relation to the four 8,000 h.p. wheels, which that company has built for operation in California power plants. The McDougall Company have a most extensive machine works, their plant including machine shops, pattern shop, foundry, forging works, and structural material shop. Their plant is, therefore, well equipped for the manufacture of water wheels and other hydraulic machinery. They already have in hand the building of a 100-h.p. wheel to operate under 170 ft. head taking water through a 3½ in. jet and having a speed of 130 revolutions per minute. The Canadian licensees are prepared to furnish the steel pipe, structural work and all machinery necessary for complete power plant.

The Elwood Tin Workers' Gold Mining Co., of Lardeau, B.C., has ordered from the Allis-Chalmers-Bullock, Limited, Montreal, a compound, duplex, power-driven Ingersoll Sergeant Air Compressor with piston inlet valves. The cylinders are 12¼ and 20¼ by 14-in. stroke, the machine travelling at 130 revolutions per minute. Mounted directly on the shaft of the compressor is a double water wheel, designed by the Doble Engineering Co., of San Francisco, which will develop 90-h.p. under the head of 170 ft. afforded by this stream. The wheel is equipped with a patent needle nozzle fitted with hand control. The compressor will deliver 625 cub. ft. of free air per minute. This system of mounting a water-wheel directly on the compressor is an ideal way of generating power, as the loss by friction is very slight and all gearing, shafting, etc., is rendered unnecessary. In addition to the compressor, Allis-Chalmers-Bullock, Limited, supplied a complete outfit of drills, air receivers, columns, tripods, hose and mining sundries.

Work has already commenced on the new factories of the Canadian Rubber Company, of Montreal, Papineau Avenue and Notre Dame Street. A new roof and many other improvements are being added to the existing plant. All the contemplated improvements, it is anticipated, will be completed within eighteen months, and as the present management have a reputation for doing big things quickly and thoroughly, no doubt this time limit will not be exceeded. The extension of the manufacturing facilities will make it possible to add very largely to the present force of work-people employed.

The Dominion Iron & Steel Company's new hydraulic engine, and a portion of the machinery of the new steel rail mill, was tested during the month, and found to work satisfactorily. It is expected that the entire equipment of the mill will have been adjusted and in readiness for operation before the beginning of July. The cooling mill is meanwhile complete.

The Alberta Railway & Irrigation Company, of Lethbridge, has ordered a 175 horse-power Robb-Mumford boiler from the Robb Engineering Company. This makes eight boilers of this type purchased during the past few years by this undertaking.

The installation of the new air compressor at the Drummond Colliery was recently completed, the engines having been manufactured by Messrs. Walker Bros., Limited, Wigan, England.

The contract has been awarded the Canadian General Electric Company for furnishing two 30-kilowatt generators with switchboard and general supplies for the Western Fuel Company of Nanaimo, B.C.

A new 90 h.p. boiler has been installed at the Providence Mine, near Greenwood, for the purpose of supplying power for hoisting and steam drilling.

The White Bear Mine, at Rossland, has ordered a 400 h.p. motor, which will be installed at the mine on the 15th of July.

## DIGEST OF RECENT PATENTS: MINING AND METALLURGICAL.

(Specially Reported for The Canadian Mining Review.)

## CANADIAN.

- May 9, 1905.
- 789,134.—Copper-pouring Spoon and Splash Shield. Ralph Baggaley, Pittsburg, Pa. Casting apparatus comprising a spoon open throughout its length, having converging trough-shaped sides and a pouring-lip mounted in nearly vertical position between a converter and the molds.
- 789,371.—Ore Roaster. John W. R. Laxton, Lynn, Mass. In an ore-roasting apparatus, a hollow drum revoluble on a horizontal axis and having a series of pockets in its periphery; each pocket being formed with one side continuous with one side wall of said drum, but with a space between the opposite side and the other side wall of the drum, the remaining wall of each pocket being one continuous curve with its axis parallel with the axis of the drum, and a tubular passage being formed through each pocket parallel with its said curved wall but farther from the bottom of the pocket than from the curved surfaces more removed from said bottom.
- 789,648.—Method of Continuously Producing Matte by Dissolving Ores. Ralph Baggaley, Pittsburg, Pa. A method which consists in forming a bath of molten matte, blowing air thereinto, and adding thereto, from time to time, solid charges of ore, rich in fuel value and low in silica and other solid charges of ore rich in silica.

- 789,523.—Process of Electrolytically Refining Copper-Nickel Alloys. Anson G. Betts, Troy, N.Y. A process which consists in dissolving the alloy as anode in a solution containing copper salts, for the electro deposition of metallic copper and production of a solution of nickel salt, preparing a nickel-sulfate solution therefrom, electrolyzing the nickel-sulfate solution with a suitable cathode and with a spongy lead anode for the electro deposition of metallic nickel, and production of lead sulfate, and reducing the lead sulfate formed to metallic lead by electrolysis as a cathode in a solution containing the sulfuric-acid radical.
- 789,160.—Apparatus for Feeding and Distributing Molten Material in Blasting Furnaces. Edward W. Lindquist, Chicago, Ill., assignor to Ralph Baggaley, Pittsburg, Pa. An apparatus comprising a vessel extending along the furnace, supported by a metal cradle carried on cast-metal trunnions, means for revolving it in either direction and for completely inverting it when necessary.
- 789,440.—Process of Treating Phosphate Rock and Producing Phosphorous Chlorids and Alkali-Metal Cyanids. Florentine J. Machalske, Brooklyn, N.Y., assignor to Frederick Darlington, Great Barrington, Mass. A process which consists in mixing the rock with an alkali-metal chlorid and carbon, smelting the mixture at a high temperature in the presence of nitrogen, and smelting the resulting cyanamids with an alkali-metal carbonate.
- May 16, 1905.
- 789,796.—Automatic Fuel Feeding Device. William H. Cooke, Rochester, N.Y., assignor to Susan V. Cooke, Rochester, N.Y. The combination with a fuel-supply, of a spout to discharge fuel upon the grates; means for conveying fuel from said supply to said spout; and means for automatically oscillating the discharge end of the spout at angles with both the horizontal and vertical planes.
- 790,238.—Method of Recovering Copper from its Ores. Henry M. Wilcox, Chicago, Ill., assignor to Esmeralda Copper Precipitating Company, Chicago, Ill., a corporation. A process which consists in leaching the ore with suitable reagent to form cupric-sulfate solution, dosing the solution with sulfur dioxide, and thereafter, in a closed vessel having proper vacant space left therein, subjecting said solution to heat and pressure, suited for precipitation, of the copper in metallic form while the sulfur dioxide is free to escape from the liquid into the confined space in such vessel provided, to perfect the reaction.
- 790,000.—Amalgamator. Joseph J. Peacock, Chicago, Ill. The combination with a suitable sluice provided with a well having impermeable end walls, of a cylinder rotatably mounted in bearings inside said end walls and dipping into the well, said cylinder being positively restrained by its bearings against rising.
- 790,156.—Ore Concentrator.—William M. Reely, Missoula, Mont. A concentrating apparatus involving a reciprocatory and vertically adjustable inclined table provided with a series of pans, a series of sluiceways arranged at one side of and communicating with said pans, and a pair of sluiceways arranged over said table and communicating with a plurality of the pans at one end of said series of pans, combined with means for feeding the material to be concentrated to the pans independent of said plurality of pans, and means for transferring the material conveyed by certain of the sluiceways of said series of sluiceways to the said plurality of sluiceways.
- May 23, 1905.
- 790,391.—Process of Smelting Metallic Compounds. Edgar F. Price, Niagara Falls, N.Y. A process which consists in establishing an electric arc within the charge, surrounding the zone of reduction and protecting the electrodes from the oxidizing and cooling effect of the atmosphere by a considerable body of the charge, and maintaining between the electrodes the minimum potential difference requisite to effect reduction, thereby substantially preventing loss of electric current by leakage through the charge and heat radiation.
- 790,342.—Concentrator. Harry H. Campbell, Steelton, Pa. The combination of the table, the series of magnets arranged adjacent thereto in a row extending from near one corner of the table to near the diagonally opposite corner thereof, means for reciprocating said magnets transversely to said table, and means for magnetizing and demagnetizing said magnets at predetermined times, and means for tending to carry the material in the direction transverse to that of the magnet series.
- 790,429.—Process of Recovering Metals and Oxides from Solutions. Adolf Guttensohn, Southend, England. A process which consists in mixing the solution containing said metallic bodies with a solution composed of an alkali and resin, separating the liquid from the coagulated mass and then retorting the latter to drive off the resin.
- 790,394.—Process of Smelting Refractory Ores. Edward F. Price, Niagara Falls, N.Y. A process which consists in interposing a charge of the ore and a reducing agent as a resistance-conductor between electrodes, one of said electrodes being of metal and comprising a liquid portion and a solid portion, electrically heating said charge to the temperature requisite for reduction, and cooling the solid portion of said metal electrode.
- 790,586.—Automatic Revolving Car-Dump. Arthur Moore, War Eagle, W. Va. A device having a plurality of circular members rigidly mounted upon a common axis and a platform rigidly secured within such circular members, in combination with two railroad-tracks secured one on each side of and adjacent to the axis and having the individual rails of each track on opposite sides of but unequally distant from said axis.
- 790,811.—Conveyer. Benjamin H. Alvery, Louisville, Ky., assignor to The Alvey-Ferguson Company, Louisville, Ky., a Corporation of Kentucky. An elevator comprising a frame having approximately horizontal end portions and its intermediate part arranged at an inclination with its said end portions and gradually merging into the same, rollers constituting a portion of the track or way, a stationary portion arranged at the junction of an end and intermediate portion of the frame, and travelling means for conducting the articles upward along said track or way.
- May 31, 1905.
- 790,922.—Apparatus for obtaining Oxides of Alkaline Metals. Charles W. Roepper, Philadelphia, Pa., and Willis E. Harmon, Mechanic Falls, Me., assignors to American Electrolytic Company, a Corporation of Delaware. An apparatus for the practice of mercurial alkaline process, a transferring-wheel for effecting circulation of the mercury, formed of electrically-conductive material, and provided with pockets for carrying the mercury and also for increasing the extent of the discharging-surface in contact with the amalgams.
- 791,341.—Electrolytic Deposition of Metals. Herbert C. Harrison, London, and Joseph Day, Weston-super-Mare, England, assignors to said Herbert C. Harrison. A process which consists in causing the electrolyte to impinge all around upon a vertically-mounted cylindrical cathode, by directing continually against every part of and all around the surface of said cathode and throughout the length thereof during deposition, a series of jets of electrolyte arranged certain distances apart around said cathode, whereby the rapid and continuous change of the electrolyte immediately contiguous to and all around the surface of the cathode and throughout the length thereof is effected.
- 790,913.—Mineral Reclaimer and Saver.—Homer L. Orr and Fred. B. Finley, Fort Collins, Colo. In an apparatus, a tank divided into a plurality of compartments of different sizes, a screen arranged in the larger compartments, a trough arranged below the screen, a plurality of compartments each containing a filtering medium and means for supplying oil and water to the compartments, and means for causing the liquids to traverse a tortuous path therethrough.
- 791,090.—Process of Extracting Nickel from Nickel-Bearing Substances. Hans A. Frasch, New York, N.Y. A process consisting in pulverizing the matte, adding to it sulfuric acid and flowers of sulfur, and subjecting the mixture to the action of heat.
- 791,305.—Art of Separating Gold or other Diamagnetic Metals. Louis T. Weiss, New York, N.Y. A process which consists in first coating with magnetic metal by electrolysis such diamagnetic particles, and then separating such coated metallic particles from the accompanying matter by magnetic means.
- 791,175.—Conveyer. Clarence K. Baldwin and Lincoln Moss, New York, N. Y., assignors to Robins Conveying Belt Company, New York, N.Y., a Corporation of New Jersey. The combination of a main conveyer and a plurality of secondary conveyers disposed at an angle thereto, the main conveyer and secondary conveyers being relatively adjustable, and operative means whereby material may be removed from or delivered to said main conveyers by means of the secondary conveyers.
- June 6, 1905.
- 791,577.—Process of Smelting Ore.—Elfego Piveroll, Los Angeles, Cal. A process which consists of subjecting part of the ore to the product of an imperfect combustion; thereby depositing carbon on that ore, and at the same time subjecting that ore to a monoxide gas, and deoxidizing that ore, and at the same time subjecting a previously-deoxidized portion of the ore to a smelting heat, the monoxide gas being formed when subjecting the ore with carbon to the smelting heat.
- 791,799.—Ore Briquet. William A. Koneman, Chicago, Ill. A method which consists in mixing together in suitable proportions ore-fines and finely-divided uncoked bituminous coal and anthracite coals, adding to the mixture a binding agent, forming the mass into briquets and drying the same without coking, whereby to provide briquets of mixed ore and fuel for subsequent coking by the direct heat of the blast-furnace.
- 791,928.—Process of Treating Ferruginous Ore for the Manufacture of Iron and Steel therefrom.—Montague Moore, Melbourne, and Thomas J. Heskett, Brunswick, Victoria, Australia. A process which consists in suitably concentrating and separating the material, then subjecting the concentrated and separated material in a finely-divided state while passing in a continuous stream to such temperature as to bring the material to a red heat, then subjecting the heated material in a finely-divided state while passing in a continuous stream to a suitable gas so as to convert the material into metallic particles without coming into contact with an oxidizing atmosphere, and then fusing and balling up the metallic particles without coming into contact with an oxidizing atmosphere.

# 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.

Mining concessions are divided into three classes :—

1. In unsurveyed territory (a) the first class contains 400 acres, (b) the second, 200 acres, and (c) the third, 100 acres.

2. In surveyed townships the three classes respectively comprise one, two and four lots.

All lands supposed to contain mines or ores belonging to the Crown may be acquired from the Commissioner of Colonization and Mines (a) as a mining concession by purchase, or (b) be occupied and worked under a mining license.

No sale of mining concessions containing more than 400 acres in superficies can be made by the Commissioner to the same person. The Governor-in-Council may, however, grant a larger extent of territory up to 1,000 acres under special circumstances.

The rates charged and to be paid in full at the time of the purchase are \$5 and \$10 per acre for mining lands containing the superior metals\* ; the first named price being for lands situated more than 12 miles and the last named for lands situated less than 12 miles from the railway.

If containing the inferior metal, \$2 and \$4 according to distance from railway.

Unless stipulated to the contrary in the letters patent in concessions for the mining of superior metals, the purchaser has the right to mine for all metals found therein ; in concessions for the mining of the inferior metals, those only may be mined for.

\*The superior metals include the ores of gold, silver, lead, copper, nickel, graphite, asbestos, mica, and phosphate of lime. The words inferior metals include all other minerals, and coal.

Mining lands are sold on the express condition that the purchaser shall commence *bona fide* to mine within two years from the date of purchase, and shall not spend less than \$500 if mining for the superior metals ; and not less than \$200 if for inferior metals. In default, cancellation of sale of mining lands

(b) Licenses may be obtained from the Commissioner on the following terms :—Application for an exploration and prospecting license, if the mine is on private land, \$2 for every 100 acres or fraction of 100 ; if the mine is on Crown lands (1) in surveyed territory, \$5 for every 100 acres, and (2) in unsurveyed territory, \$5 for each square mile, the license to be valid for three months and renewable. The holder of such license may afterwards purchase the mine, paying the prices mentioned.

Licenses for mining are of two kinds: Private lands licenses where the mining rights belong to the Crown, and public lands licenses. These licenses are granted on payment of a fee of \$5 and an annual rental of \$1 per acre. Each license is granted for 200 acres or less, but not for more ; is valid for one year, and is renewable on the same terms as those on which it was originally granted. The Governor-in-Council may at any time require the payment of the royalty in lieu of fees for a mining license and the annual rental—such royalties, unless otherwise determined by letters patent or other title from the Crown, being fixed at a rate not to exceed three per cent. of the value at the mine of the mineral extracted after deducting the cost of mining it.

The fullest information will be cheerfully given on application to

THE MINISTER OF LANDS, MINES AND FISHERIES,  
PARLIAMENT BUILDINGS, QUEBEC.

# Ontario's

## Mining

### Lands..

**T**HE 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; zincblende, 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

HONORABLE E. J. DAVIS,

Commissioner of Crown Lands,

or

THOS. W. GIBSON,

Director Bureau of Mines,

Toronto, Ontario.



# Dominion of Canada

## SYNOPSIS OF REGULATIONS

### For disposal of Minerals on Dominion Lands in Manitoba, the North-west Territories and the Yukon Territory.

#### 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 ten cents per ton of 2,000 pounds shall be collected on the gross output.

#### QUARTZ.

Persons of eighteen years and over and joint stock companies holding free miner's certificates may obtain entry for a mining location.

A free miner's certificate is granted for one or more years, not exceeding five, 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 1500 x 1500 feet by marking out the same with two legal posts, bearing location notices, one at each end on the line of the lode or vein.

The claim shall be recorded within 15 days if located within ten miles of a mining recorder's office, one additional day allowed for every additional ten miles or fraction. 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 \$1.00 an acre.

Permission may be granted by the Minister of the Interior to locate claims containing iron and mica, also copper, in the Yukon Territory of an area not extending 160 acres.

The patent for a mining location shall provide for the payment of a Royalty of 2½ per cent. of the sales of the products of the location.

#### PLACER MINING.

Manitoba and the N. W. T., excepting the Yukon Territory.—Placer mining claims generally are 100 feet square; entry fee \$5, renewable yearly. On the North Saskatchewan River claims are either bar or bench, the former being 100 feet long and extending between high and low water mark. The latter includes bar diggings, but extends back to the base of the hill or bank, but not exceeding 1,000 feet. Where steam power is used, claims 200 feet wide may be obtained.

Dredging in the rivers of Manitoba and the N. W. T., excepting the Yukon Territory.—A free miner may obtain only two leases of five miles each for a term of twenty years, renewable in the discretion of the Minister of the Interior.

The lessee's right is confined to the submerged bed or bars of the river below low water mark, and subject to the rights of all persons who have, or who may receive entries for bar diggings or bench claims, except on the Saskatchewan River, where the lessee may dredge to high water mark on each alternate leasehold.

The lessee shall have a dredge in operation within one season from the date of the lease for each five miles, but where a person or company has obtained more than one lease one dredge for each fifteen miles or fraction is sufficient. Rental, \$10 per annum for each mile of river leased. Royalty at the rate of two and a half per cent. collected on the output after it exceeds \$10,000.

#### DREDGING IN THE YUKON TERRITORY.

Six leases of five miles each may be granted to a free miner for a term of twenty years, also renewable.

The lessee's right is confined to the submerged bed or bars in the river below low water mark, that boundary to be fixed by its position on the 1st day of August in the year of the date of the lease.

The lessee shall have one dredge in operation within two years from the date of the lease, and one dredge for each five miles within six years from such date. Rental, \$100 per mile for first year and \$10 per mile for each subsequent year. Royalty, same as placer mining.

#### PLACER MINING IN THE YUKON TERRITORY.

Creek, gulch, river and hill claims shall not exceed 250 feet in length, measured on the base line or general direction of the creek or gulch, the width being from 1,000 to 2,000 feet. All other placer claims shall be 250 feet square.

Claims are marked by two legal posts, one at each end, bearing notices. Entry must be made within ten days, if the claim is within ten miles of mining recorder's office. One extra day allowed for each additional ten miles or fraction.

The person or company staking a claim must hold a free miner's certificate.

The discoverer of a new mine is entitled to a claim of 1,000 feet in length, and if the party consists of two, 1,500 feet altogether, on the output of which no royalty shall be charged, the rest of the party ordinary claims only.

Entry fee, \$10. Royalty at the rate of two and one-half per cent. on the value of the gold shipped from the Yukon Territory to be paid to the Comptroller.

No free miner shall receive a grant of more than one mining claim on each separate river, creek or gulch, but the same miner may hold any number of claims by purchase, and free miners may work their claims in partnership by filing notice and paying fee of \$2. A claim may be abandoned, and another obtained on the same creek, gulch or river, by giving notice and paying a fee.

Work must be done on a claim each year to the value of at least \$200. A certificate that work has been done must be obtained each year; if not, the claim shall be deemed to be abandoned, and open to occupation and entry by a free miner.

The boundaries of a claim may be defined absolutely by having a survey made and publishing notices in the Yukon Official Gazette.

#### PETROLEUM.

All unappropriated Dominion Lands in Manitoba, the North-West Territories and within the Yukon Territory are open to prospecting for petroleum, and the Minister may reserve for an individual or company having machinery on the land to be prospected, an area of 640 acres. Should the prospector discover oil in paying quantities, and satisfactorily establish such discovery, an area not exceeding 640 acres, including the oil well and such other land as may be determined, will be sold to the discoverer at the rate of \$1.00 an acre subject to royalty at such rate as may be specified by order-in-council.





## 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, transfers, 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 land 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 conditions 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. A. DRYSDALE,

Commissioner Public Works and Mines,

HALIFAX, NOVA SCOTIA.

# DIAMOND

# DEEP DRILLING

makes economical mining and the deepest hole can be drilled at the smallest cost by a

# DIAMOND ROCK DRILL

It can cut through 2,500 feet of solid rock in a vertical line. It brings up solid cylinders of rock, showing formation and character.

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**HADFIELD'S** STEEL FOUNDRY CO. LIMITED **SHEFFIELD**

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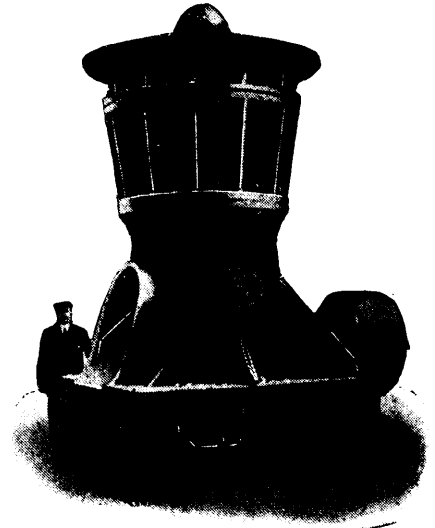
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**The Only Perfect Gyrotory Stone-Crusher**

THE PARTS THAT ARE SUBJECT TO EXCESSIVE WEAR ARE MADE OF

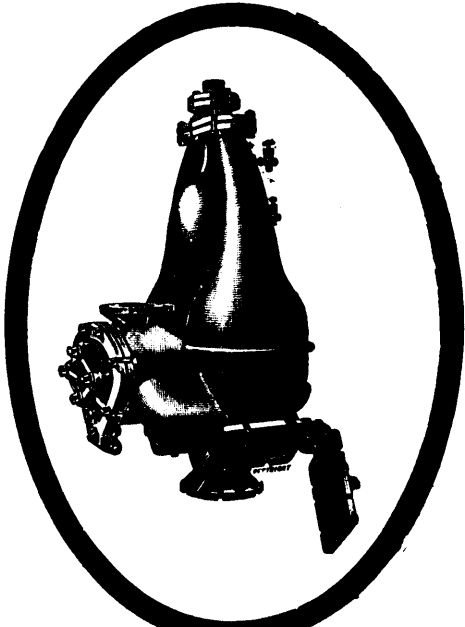
**Hadfield's Patent "Era" Manganese Steel**

WE MANUFACTURE **JAW** BREAKERS, CRUSHING ROLLS, ELEVATORS, BIN GATES, AND GOLD MINING REQUISITES.



Sole Representatives of the Hadfield Steel Foundry Co., Ltd., Sheffield, for Canada

**PEACOCK BROTHERS, Canada Life Building, Montreal.**



## A Thing to Remember!

The water can often be got out  
and the job finished by means of.

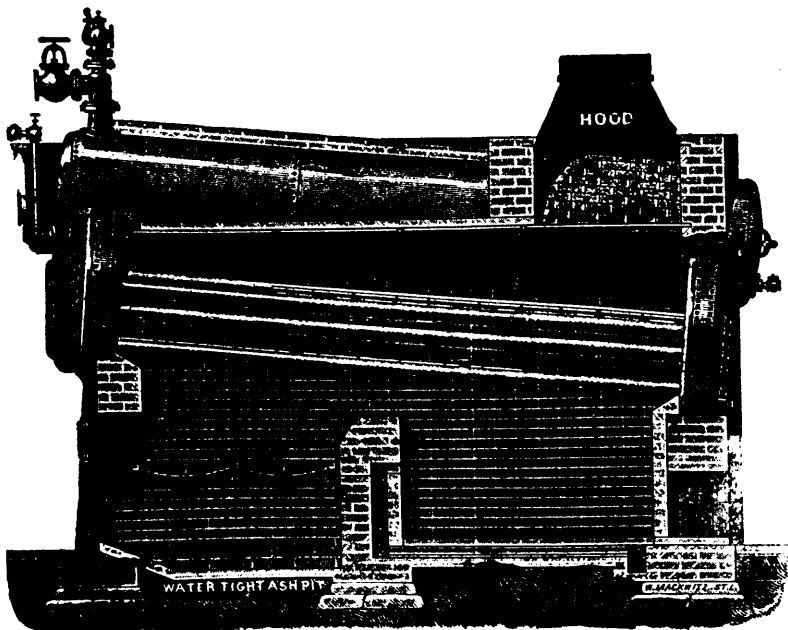
Trade **The Pulsometer** Mark

### Steam Pump

whilst you would be collecting the  
necessary tackle for ordinary pumps.

The Pulsometer Engineering Co. Ld., Reading, England.

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**HEINE SAFETY BOILER**

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**THE HEINE SAFETY BOILER**—Made in units of 100 to 500 h.p., and can be set in batteries of any number. Suitable for Mines, Pulp Mills, Water and Electric Installations, and large plants generally. The best and most economical boiler made.

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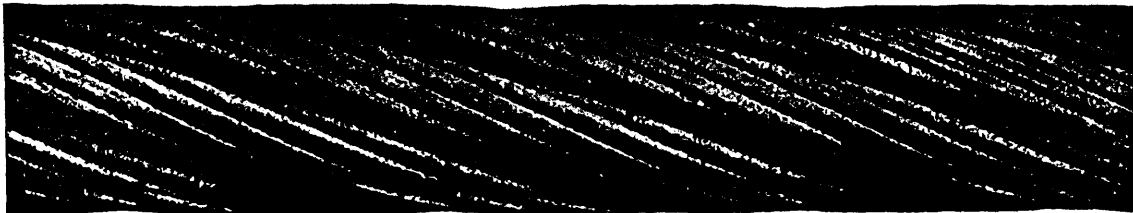
## WIRE ROPES for Collieries, Mines, Aerial Tramways

Transmission of Power, Logging and general Hauling and Hoisting Purposes.

Wire specially selected for own exclusive use.

We have made many records with our Winding, Haulage and Crane Ropes.

Illustration of Winding Rope, 240 fms. long x 3 1/2 circ., Galvanized Special Improved Patent Steel, Compound Make, supplied



to Kenneil Collieries, Bolness, Scot., which gave a record life of 6 years and 2 months, showing condition when taken off.

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

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W. H. Thorne & Co., Ltd., Saint John, N.B.

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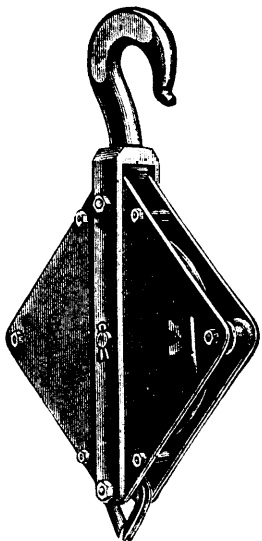
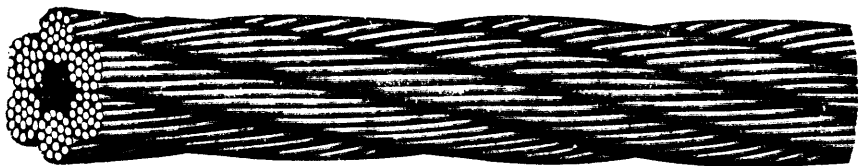
CANADA IRON FURNACE COMPANY, LIMITED

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MIDLAND, ONT.

GENERAL OFFICES

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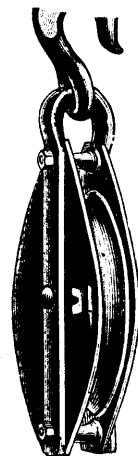
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WE MANUFACTURE THE HIGHEST QUALITY OF WIRE ROPES FOR HOISTING, MINING, GUYS, HAULAGE, CRANES, LOGGING, ETC., ETC.

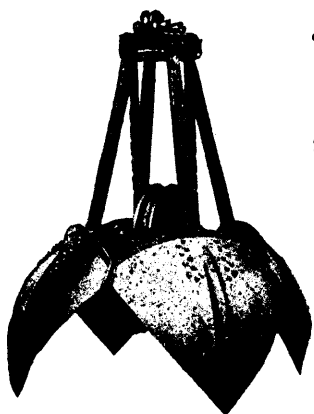
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WE CARRY IN STOCK:--  
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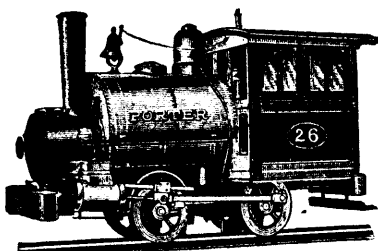
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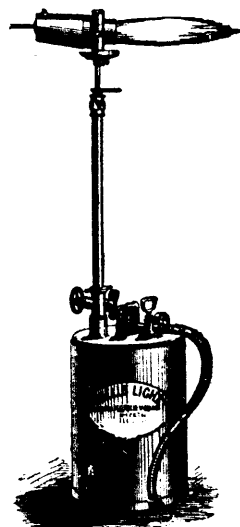
Orange Peel Bucket

JUST A FEW SUGGESTIONS OF SUPPLIES YOU MAY REQUIRE

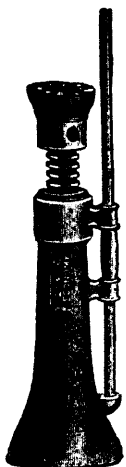


Saddle Tank Locomotive

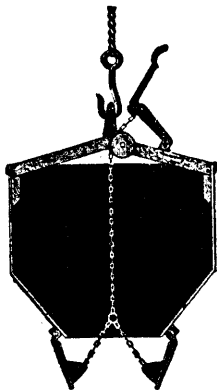
FOR SOME ADDITIONAL LINES, SEE THE NEXT ISSUE OF THIS PAPER



Wells Lights



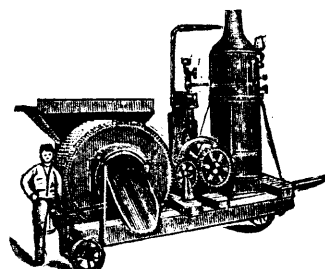
Jack Screw



Concrete Tub



Tubular Steel Barrow



Ransome Concrete Mixer