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CANADIAN MINING REVIEW

Established 1882

Vol. XXII—No. XI.

OTTAWA, NOVEMBER 30th, 1903.

Vol. XXII—No. XI.

	<p>THE CANADIAN RAND DRILL Co SHERBROOKE, QUE. BRANCH OFFICES IN MONTREAL, QUE. TORONTO, ONT. HALIFAX, N.S. ROSSLAND, B.C. RAT PORTAGE, ONT. GREENWOOD, B.C. VANCOUVER, B.C.</p>	
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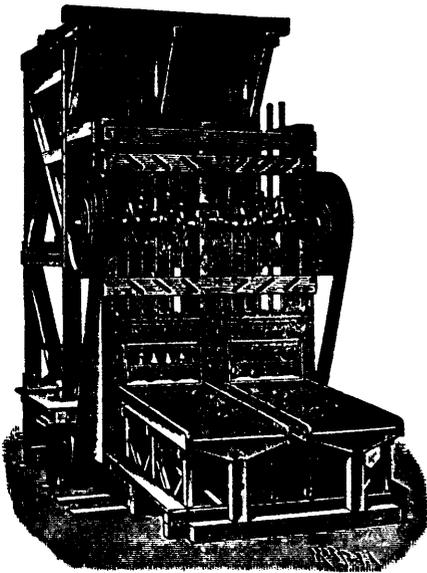
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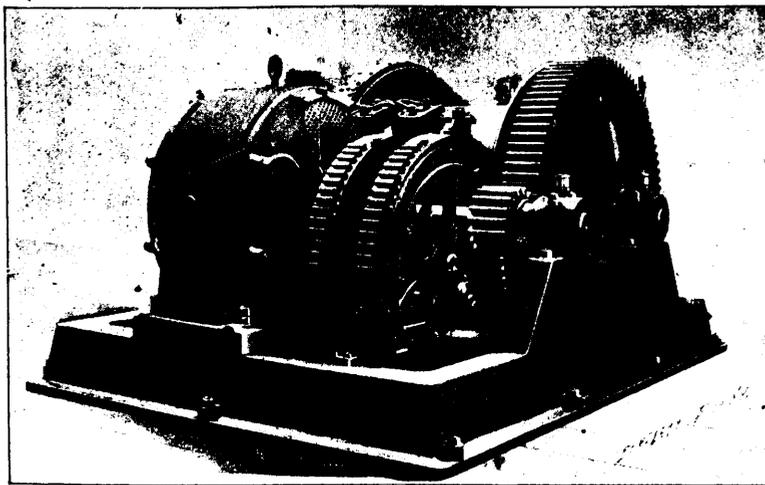
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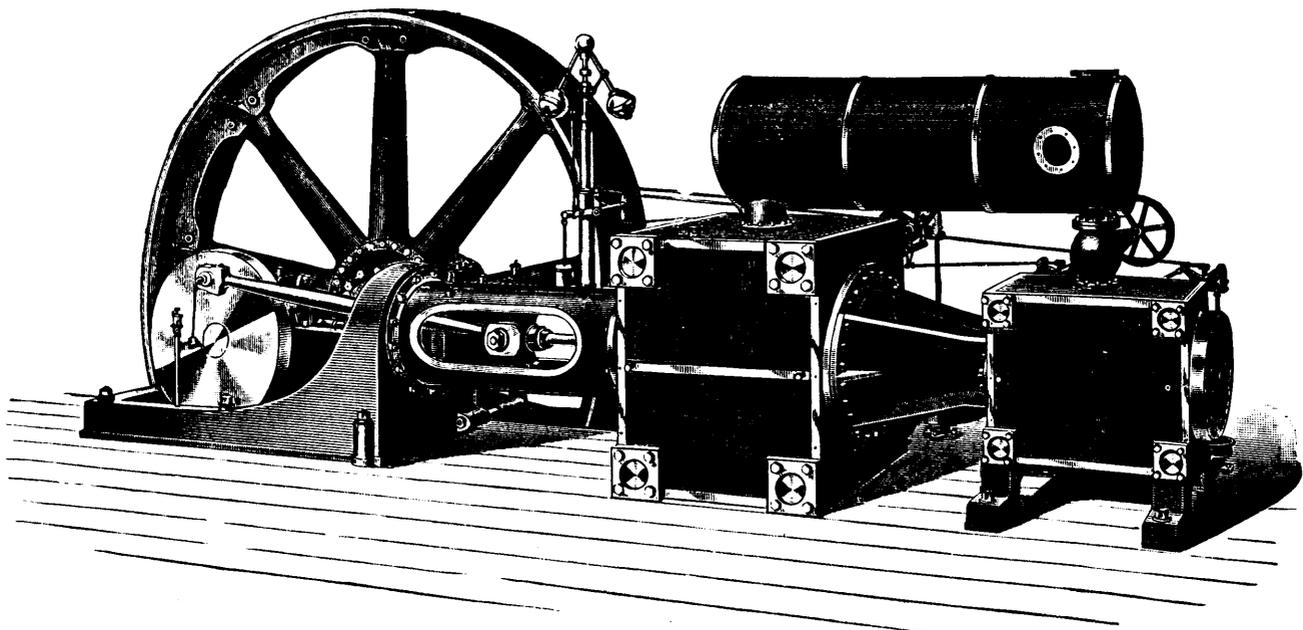
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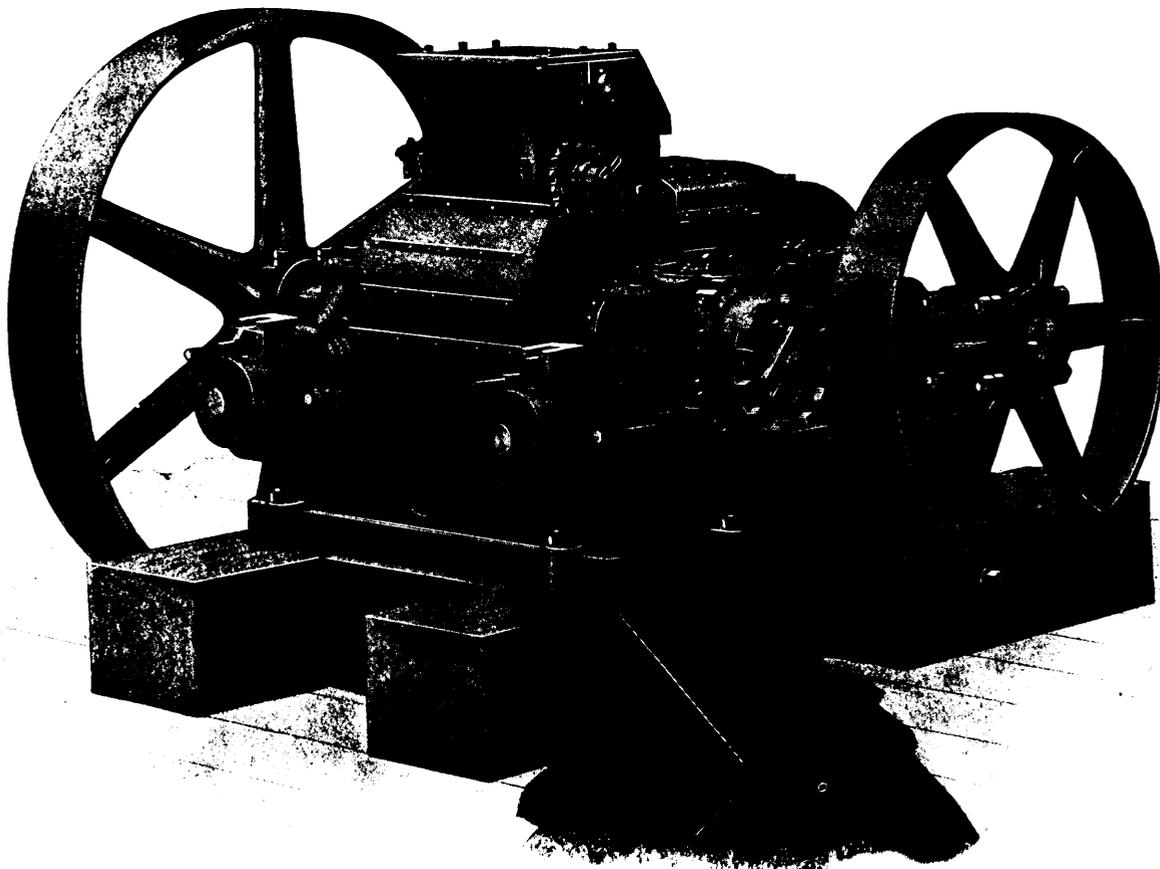
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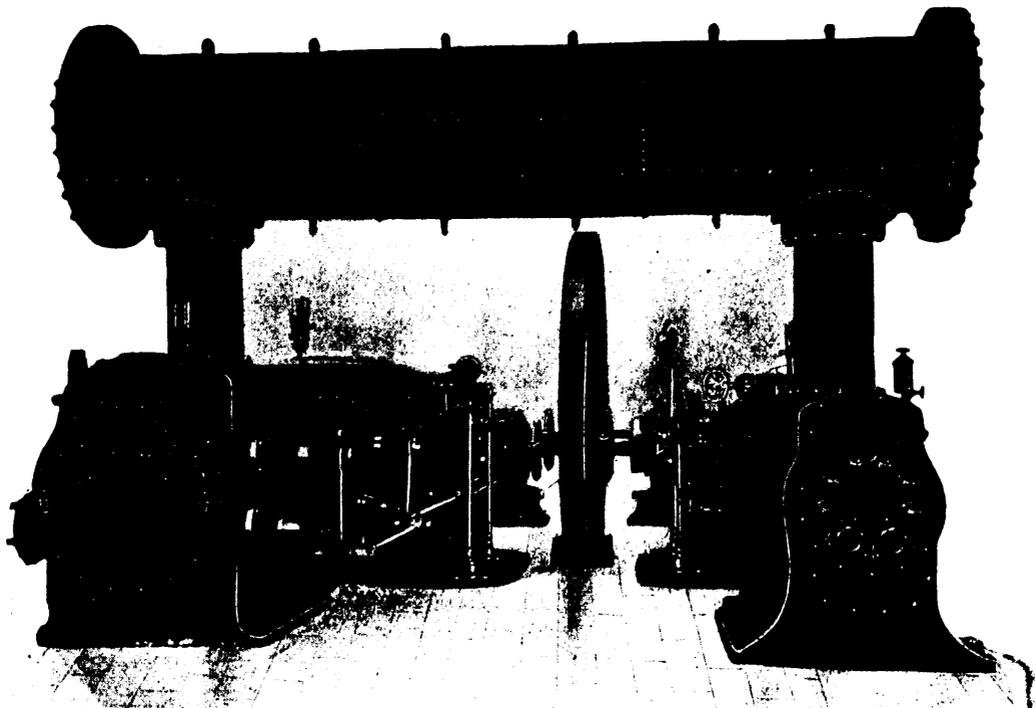
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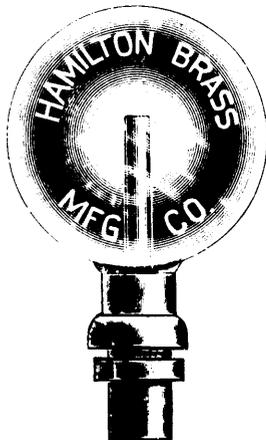
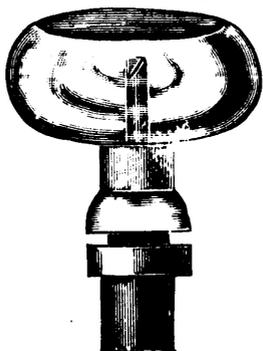
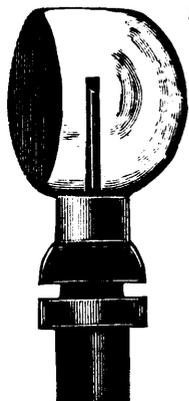
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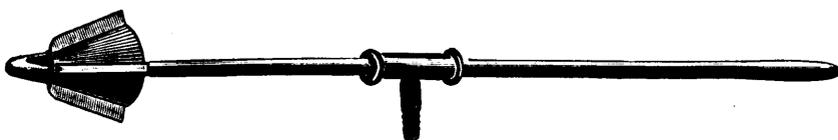
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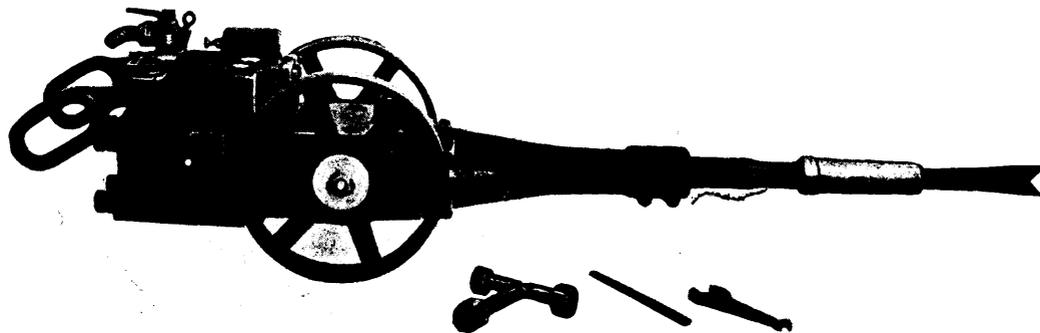
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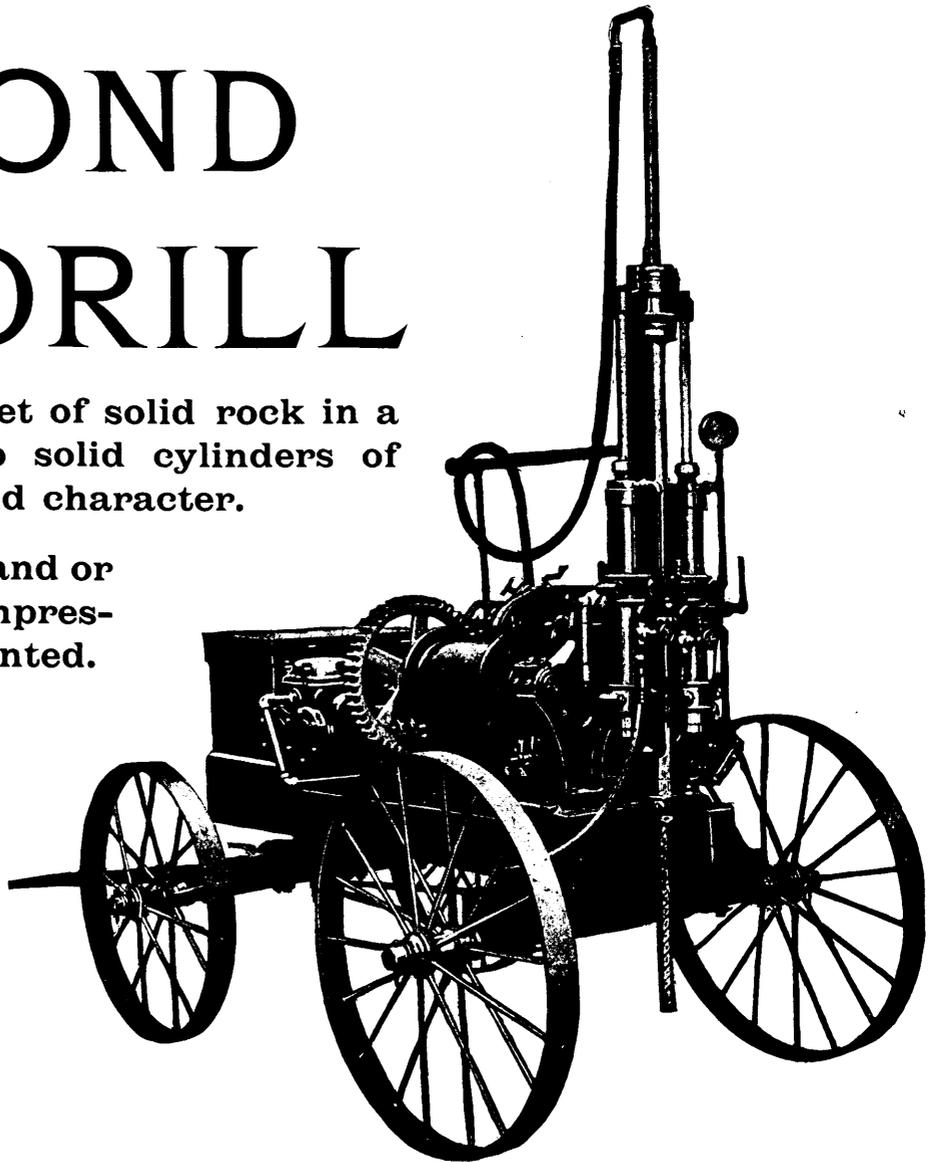
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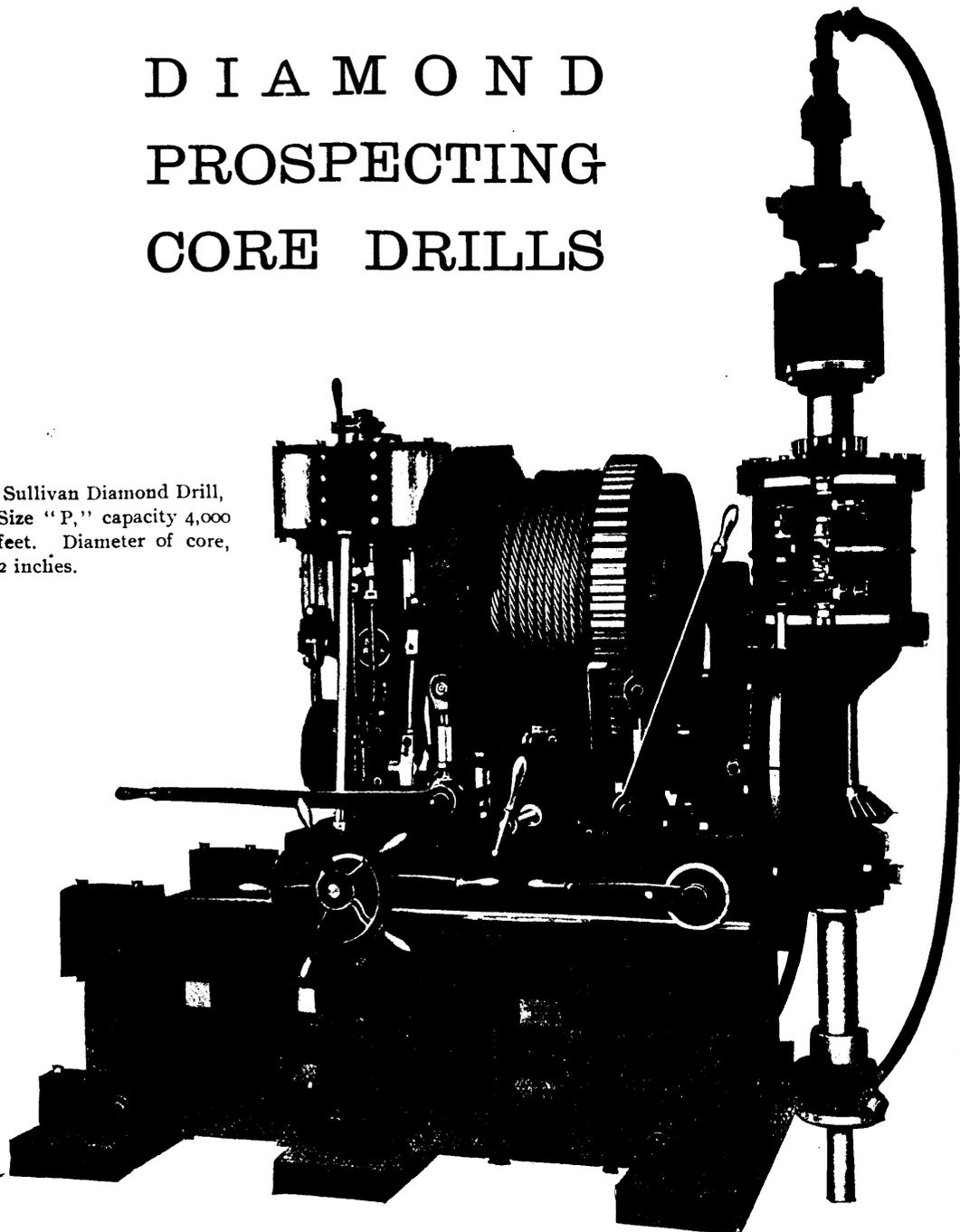
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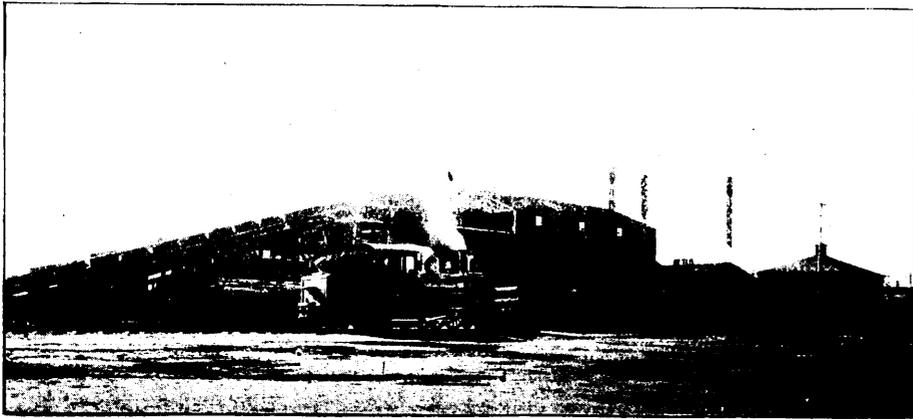
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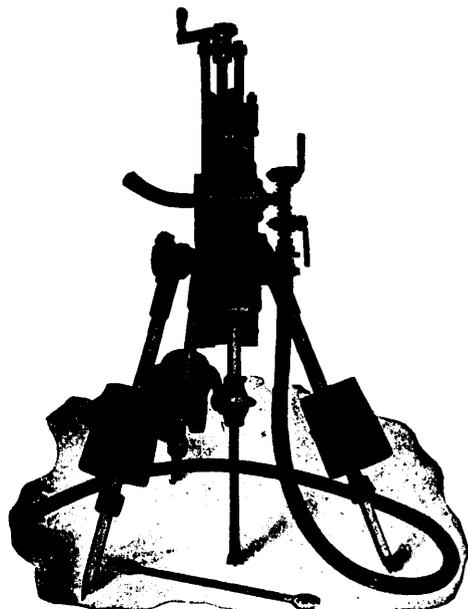
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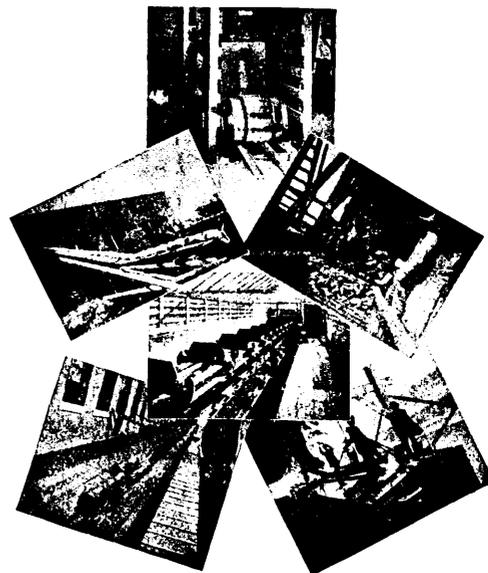
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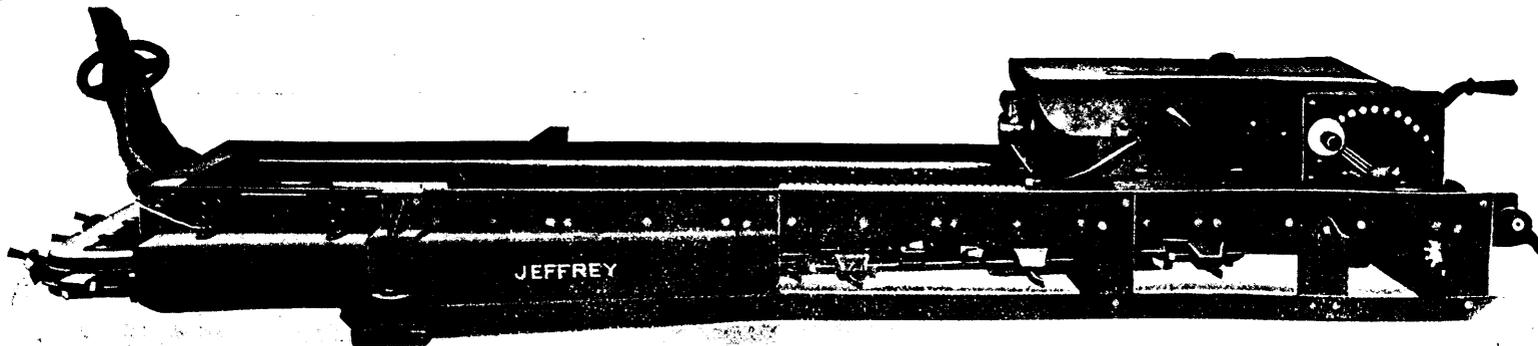


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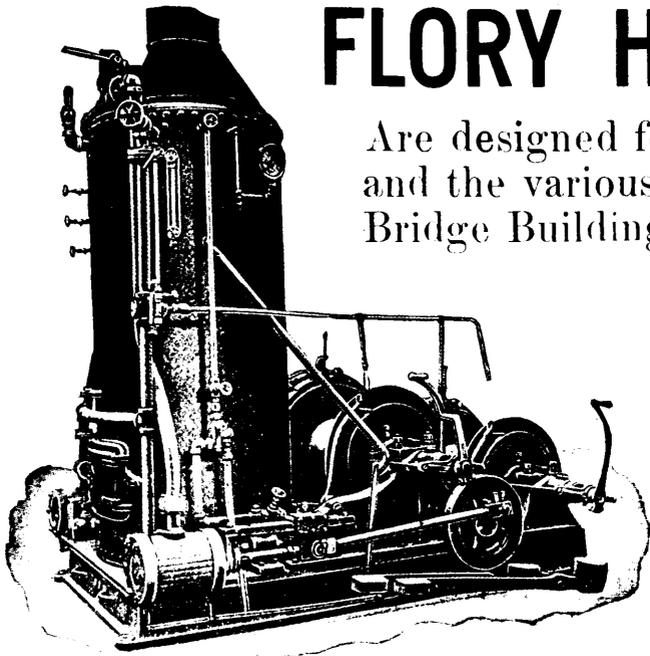
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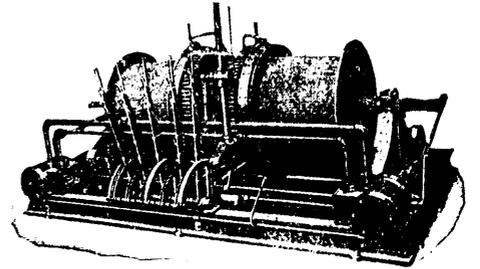
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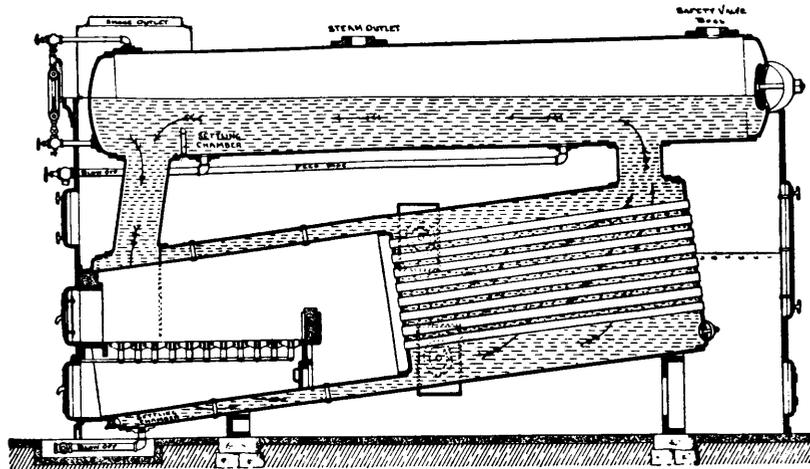
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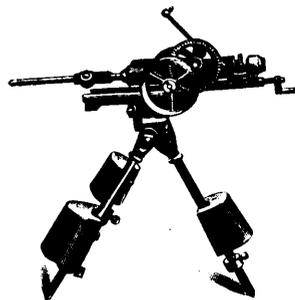
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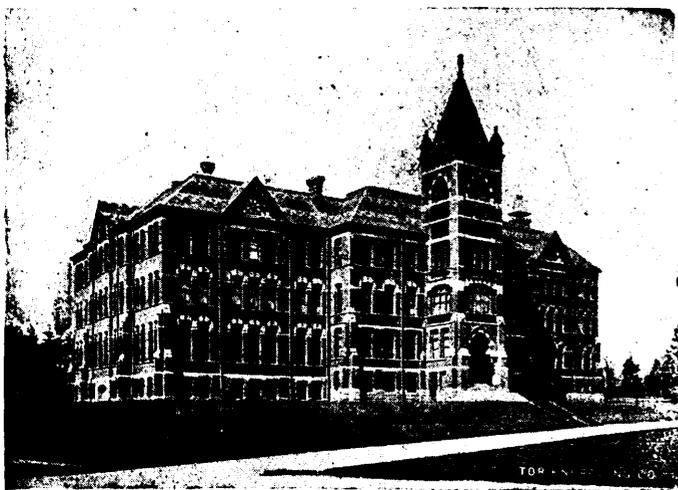
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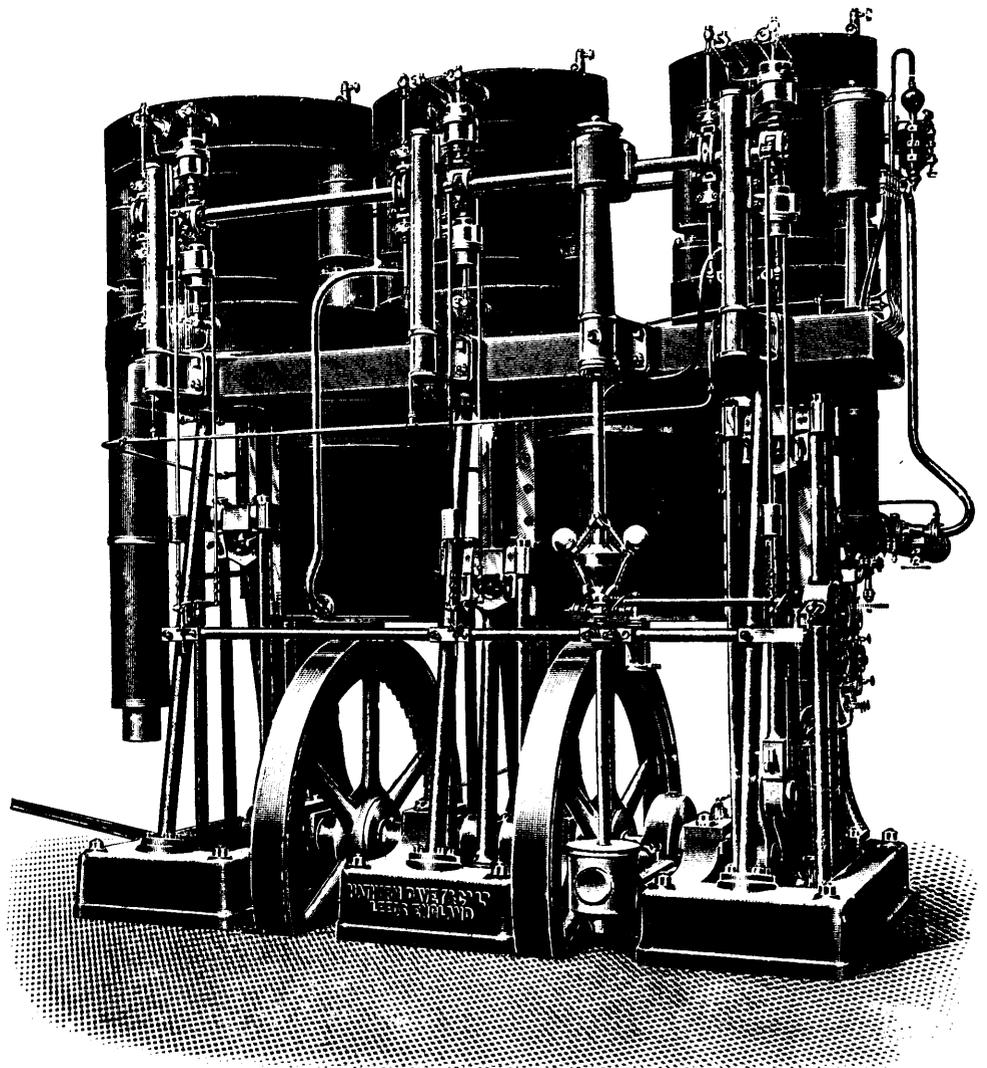
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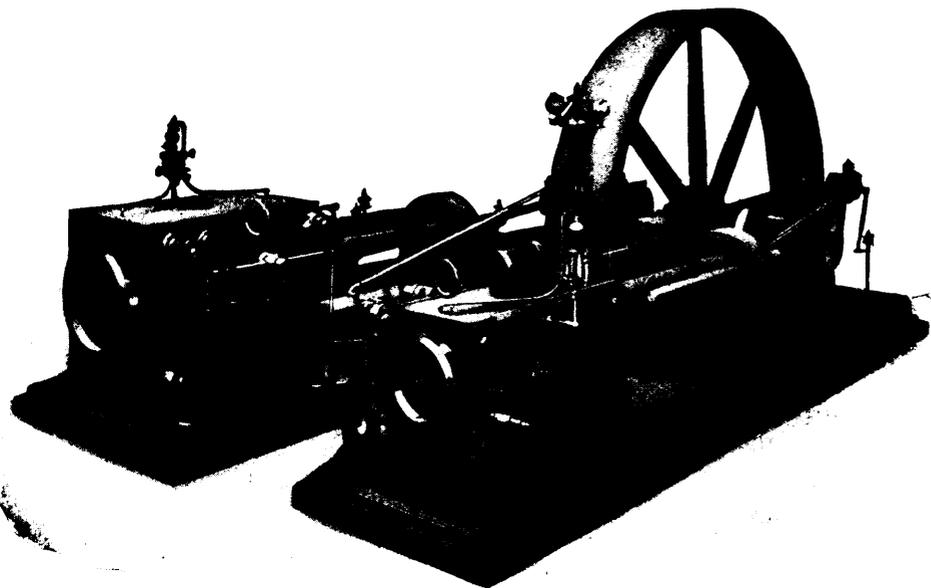
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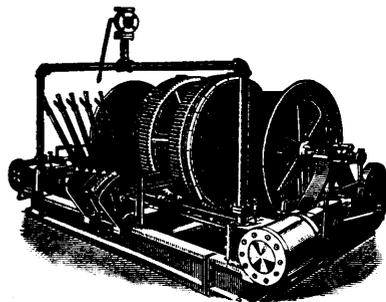
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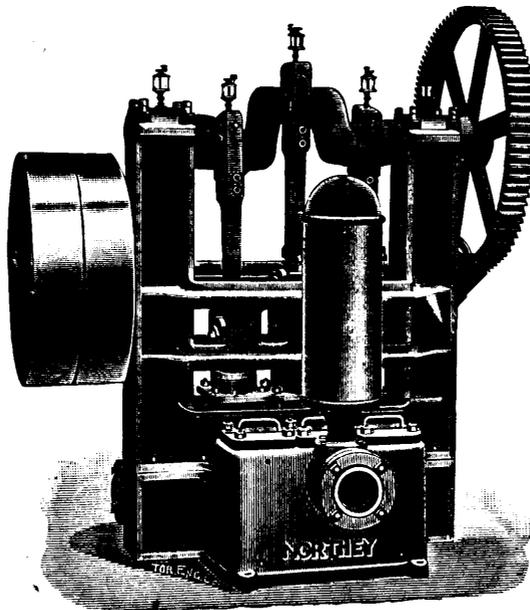
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VOL. XXII., No. 11.

NOVEMBER, 1903.

VOL. XXII., No. 11.

### Metalliferous Mining in British Columbia.

There is no more interesting and important feature than the application of the Elmore Oil Process to the concentration of the ores of the Rossland Camp. As this process has been fully described it is not necessary to go into details as to the method. We are content with chronicling the important fact that it has solved the problem of recovering from the waste dumps of 90 per cent. of the values in gold and silver. The result has already justified the establishment of a plant by the War Eagle and Centre Star companies and now the Le Roi No. 2 Co. is installing one. The development of this process has been in the natural line of the evolution of economical ideas in a low grade camp. In the early days attention was devoted entirely to extracting small tonnages of high grade ore and consequently returns running as high as \$25.00 per ton were made. Upon these returns properties were sold for fabulous prices but the purchasers discovered that as soon as they began to increase the tonnage the values rapidly diminished and it may be taken for granted to-day that the statement made in our columns in 1897, that the Rossland Camp was an eight to ten-dollar camp has been amply verified. This, however, now that the dumps can be treated and got to yield from two to three dollars a ton will justify the development of mining to an extent hitherto unknown. The increase in tonnage will find employment for many miners and will support a larger community and already there are not wanting evidences of greatly increased activity and of development undreamt of a year or two ago. Rossland has passed through trying times, but has held its own better than most western camps and will yet justify the opinion of those who have all along believed in its permanency.

One would fain hope that the recent tour of the English members of the Associate Chambers of Commerce in British Columbia would have the effect of attracting English capital for the development of the mineral resources, which at the present are being exploited by American capitalists. It is true that English investors have been singularly unfortunate in their Canadian speculations but this has been due to the irrational methods of the English companies as much as to the unscrupulousness of Canadian and American mine owners. The ill-luck attending English mining investments is not entirely chargeable to Canadians. If there has been misrepresentation and exaggeration on one part there has been ignorance and pigheadedness on the other. In few instances have really competent men been sent out to examine properties, and important deals have been closed by greenhorns who knew little more about metal-mining than cheese-making, but whose

report was relied upon because forsooth they were English. We have have always contended that the best experts only should be sent out and if this were done they would be able to hold their own against sharks, whether American or Canadian. In many instances where really competent men have been sent out they have not been sent in the first instance but only when it was too late to correct the mistakes of their predecessors. We are driven to these remarks because Americans are still snapping up all the best mining propositions in the west. They will not retain them for permanent operation, this is not the American method. Their method is to obtain and then after spending a small amount re-sell them to English companies at a high figure. This has been the history of nearly every mining enterprise in B.C. The development of the coal and coke industries during the last year has been enormous. The opening up of an entirely new district in Alberta, which in the near future will produce a million tons of coal per annum has been done without the employment of one dollar of English money, a most regrettable fact. We are on the eve of the establishment of steel making in this country and the benefits of this new and vastly important industry will go to our American neighbours. Among the visitors to the west recently were some of the most prominent iron, steel, and coal magnates of the old country, and these could render no more greater service to the Empire than by interesting English capital in the development of the mineral resources of the Canadian West.

### Deep Gold Mining in Nova Scotia.

Gold mining in Nova Scotia began about the year 1860, and has not made much progress since that date. The annual output has varied from 10,000 to 35,000 ounces.

The early operations were conducted with little skill, and some thirty years passed before the experience gained in other countries was applied to the provincial mines. At present several companies are working on business lines and getting good returns. Continual losses however show that many have not learned the principles of legitimate mining.

Owing to the abandonment of every mine, in the earlier days, as soon as the quartz fell below the pretty high figure required to yield profits, it soon became an undisputed dogma that all Nova Scotia gold was shallow. The gold being free milling no one tried to see if it still remained in the quartz and sulphides even if invisible. Mines were abandoned which today show no free gold but enough in the metals to pay the careful miner. It may safely be said that for a long period

in Nova Scotia no assays were ever made, and it became a maxim that all ore was valueless unless the miner could see the gold in the quartz.

This fallacy has now been pretty well exposed, and tailings and concentrates receive considerable attention. Still the lakes, rivers, and swamps have received thousands of tons of tailings which represented in many cases handsome margins of profit.

The other axiom, the persistence of gold to shallow depths only, is dying hard. For years the capitalist invited to invest in our gold mines invariably objected, "Your mines carry gold only to limited depths," and there is no opening for investment. This criticism was true as far as experience had gone. The dome shape of the Nova Scotia gold fields became known at an early date, with its intercalated quartz bands radiating away from an anticlinal and sweeping round the dome of elevation. The veins were worked as they outcropped down as far as the gold held to depths up to 500 feet. It appeared from the structure probable that there might be veins underneath these not coming to the surface and binding over the anticlinal. It was some time before this was proved by working.

The discovery at Bendigo, Australia, that a shaft sunk on the line of the anticlinal axis would cut the crowns of such unexposed veins as they turned over the fold led to a comparison with the structure of the Nova Scotia veins. It may be said that the veins in Nova Scotia do turn over the anticlinal axis as in the Australian district, referred to but it may be questioned if the facts so far observed in Nova Scotia can be relied upon to permit of a prediction that the physical conditions of the strata here will reproduce equally large and rich vein crowns, or saddles, and legs.

Any dictum as to the finding of gold at any particular point along the vertical plane of an anticlinal axis must be based on the rules governing the deposition of the gold. As yet it may be said this important point has not been studied in Nova Scotia.

It may be stated that the gold in the Nova Scotia veins was deposited before the transverse foldings took place, and possibly to some extent later. There is presumably no proof that the gold came from ascending waters, as the lessening in thickness of the legs, with depth, would point to a line at which the strata were absolutely compact.

Inferentially the source of the gold is to be found in the rocks adjacent to the openings or loosened portions of the folds. These rocks originally receiving the fold as an alluvium would receive it with more or less irregularity. Hence caution as to any positive assurance of any shaft in any anticlinal axis giving access to succeeding rich quartz bands.

However the analogy with Australia is striking and the practical comparison seems to be fairly borne out.

For a number of years the Government of Nova Scotia has been importuned to sink a deep shaft and settle for ever the question of the existence of gold at depths in this province. The only practical outcome seemed to be a premium to the miner who found gold in depth, but it was difficult to see how any miner could do his share without some guide as to location, etc.

Mr. Faribault, the geologist of the Canadian Geological Survey, having made for years a close study of the Nova Scotia gold fields, satisfied himself that the conditions here closely paralleled those of Bendigo, and that the life of the industry warranted the test of the pick. His advocacy of this view inspired the bolder miners of the province and they seem to have so far proved the correctness of his reasoning. The Government were now encouraged to believe that they saw a reasonable ground for action. The development of the coal fields of Nova Scotia had been materially quickened by the boldness of Premier Fielding. The gold fields if they could be proved

to be capable of systematic development, offered, owing to their great extent, a source of revenue greatly exceeding that derivable from coal, and the Government appear willing to venture again. In order that the public interested in this subject might be informed they procured from Mr. Faribault a report embodying the conclusions he has arrived at.

This report, which might have been in greater detail, gives important suggestions. Mr. Faribault urges that aid should be given to vertical shafts sunk close to the anticlinal axes so that the apices of veins in the richer zones should be intersected, and their legs be tested by cross cuts. As far as mining developments have been carried his advice is good.

The Government recently passed legislation pledging itself to subsidize the sinking of shafts, already 500 feet deep, provided they are properly located, if the owners are ready to go to greater depths.

In these notes no reference has been made to fissure veins. There are a number of these in the province, some of which have yielded good returns. Mr. Faribault contends from the standpoint of his theory of the intercalated veins that the permanency in depth of the gold contents of the fissure veins is a matter already so well thrashed out in other countries that no special government attention is needed as far as they are concerned.

This point of view is, again, connected with the source of the gold, but every one acquainted with the gold fields of the province will agree that the interests involved in the development of the intercalated veins as to number etc., is greater than in the case of the comparatively limited number of fissure veins hitherto opened. Under the head of the fissure veins may be classed the hitherto little known auriferous veins and deposits of several other old geological horizons of the province.

The public interested in gold mining will view with pleasure Mr. Faribault's labors in Nova Scotia and his deductions, and the boldness of the Government in grappling with a question of so much interest from a geological as well as a mining and revenue point of view.

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#### Canadian Portland Cement Companies.—The Present Position of the Industry and its Future as an Investment.

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While the columns of the "Official Gazettes" of the provinces are giving frequent notice of the incorporation of various companies organized for the manufacture and sale of Portland cement, and the country is covered by specious and glib-tongued agents, busily engaged in the sale of the stocks and shares of some already chartered, it is perhaps timely to draw attention to a few points concerning this important industry, which may not be in the possession of a considerable portion of the general public. When one considers the fact that most of the shares now being exploited are disposed of to persons unaccustomed to the methods of modern finance as interpreted and administered by the genial company promoter, the necessity seems to arise that such persons should be instructed in the idea, that perhaps there might be a *possible* chance for them to lose their money. Does it not seem strange that enterprises which their prospectuses endow with a dividend earning capacity of ten, twenty and even forty per cent., should have to peddle their shares around the small towns and villages of the country, in blocks of from a hundred, to one or two thousand dollars, when, if the success of the ventures was so transparently certain, our shrewd capitalists and business men would leave little, if any, of the stock to be taken up by the clergymen, lawyers, doctors, elderly maidens and widows, who are now being induced to subscribe such a large bulk of the shares. While it is not our desire

to in any way injure or retard the progress of any bona fide industrial enterprise, there is a duty we owe to a public, already severely scorched in illegitimate mining schemes; in obedience to which we will endeavour to state as clearly as possible the conditions which are to-day governing the production and sale of Portland cement in the Dominion. Having given the main facts as taken from the most trustworthy sources available, we can then leave the issue with our readers, satisfied that we have done what we could in the endeavour to put our information in such a shape as to be readily understood and digested by anyone possessed of a normal degree of intelligence.

Previous to 1897 no statistics of the Canadian production are readily accessible, as up to that year the figures given by the Geological Survey Department (which alone collected this data) included both natural and Portland cement. In 1897, however, the output of the latter material reached 119,763 barrels valued at \$209,380, or an average value of \$1.75 per barrel. During the ensuing four years the production shows a gradual and steady increase, as in 1901 the figures quoted by the Survey give the output as 317,066 barrels valued at \$565,615, or nearly three times the production of 1897. About this time it seems to have dawned upon some enterprising individuals that with such a remarkable expansion in the business, in a few years, *there must be money in it*. Whether this surmise proved correct or otherwise we have no means of ascertaining, but the fact, nevertheless, remains that, in the following year (1902) the production had increased to 594,594 barrels of a value of \$1,028,618, an increase in five years amounting to almost exactly *five hundred per cent*.

During the year ending June 30th last (1903) the Canadian imports of Portland cement as given by the Department of Customs in the Trade and Navigation returns, amounted 2,316,853 cwt., valued at \$868,131, divided as follows:—

|                         |                |           |
|-------------------------|----------------|-----------|
| From Great Britain..... | 516,796 cwt.   | \$187,572 |
| " United States.....    | 610,445        | 305,775   |
| " Belgium.....          | 814,252        | 244,633   |
| " Other countries.....  | 375,360        | 130,151   |
| Total.....              | 2,316,853 cwt. | \$868,131 |

This would amount, taking the weight of a barrel of foreign cement as 400 pounds, to an importation of 579,213 barrels of an average value of \$1.50 per barrel, to this cost must be added a duty of 12½ cents per hundred pounds amounting, at the average weight taken to 50 cents a barrel. Now add to these importations the amount of the Canadian production and we have the following:—

|                                  | Bbls.     | Value.      |
|----------------------------------|-----------|-------------|
| Imports of foreign cement.....   | 579,213   | \$1,157,737 |
| Production of Canadian cement... | 594,594   | 1,028,618   |
| Total.....                       | 1,173,807 | \$2,186,355 |

Assuming these figures to be fairly correct we find that roughly speaking, Canada's consumption of both foreign and domestic Portland cement amounted at the latest available date to less than twelve hundred thousand (1,200,000) barrels.

The next point to consider is, how long can we hope for such a phenomenal increase in the use of Portland cement to continue? We must not lose sight of the fact that during the past five years at least, Canada like the United States has enjoyed a period of prosperity and expansion unexampled in her history. But signs are not wanting in the business outlook, which indicate beyond question that this era of abnormal commercial activity is on the wane and that the time is fast approaching when operations of every kind will need to be conducted on the very closest margins in order that the period of depression may be passed in safety.

Are the manufacturers of cement both present and prospective, basing their calculations for future production on the figures reached in the past? The arrangements under way for the flotation of new

companies and increasing the capacity of several now in operation, would lead one to conclude that such is their idea.

Now the only safe basis upon which it is possible to figure, when dealing with commodities other than foodstuffs is undoubtedly the demand for the same. In hard times as well as in times of plenty, poor humanity must be fed and if some of us unfortunately have not the wherewithal to purchase the necessaries of life, these necessaries must be supplied by the community at large, or the benevolence of individual citizens more independently situated. In any event no one ever heard of much food being given away on account of over-production, but the same rule does not apply regarding cement. In Germany a kingdom which has for many years past annually produced the greatest amount of cement manufactured by any one country in the world, the output in 1902 amounted to 29,000,000 barrels, while the home consumption in the same year was but 14,600,000 barrels, or in round numbers just *one-half* of the production. As the population of Germany is about 56,000,000 this would mean a *per capita* consumption of one-quarter of a barrel per annum.

Persons at all familiar with the conditions which have for a long time existed in the land of the Kaiser, as well as in other and older civilizations in the populous centres of Europe, will readily accept the fact that it will be *many years* before a country like Canada, whose population is scattered over a territory larger than that occupied by all the Great Powers, will be in a position to consume any such *per capita* amount of the material in question.

In the United States the production last year as given in the "Mineral Industry" is placed at 16,535,000 barrels, while the imports amounted to 1,945,490; deducting the amount exported, which was 340,821, this leaves the whole consumption of nearly 80,000,000 of people as 18,139,669 barrels or *less than a quarter of a barrel* per head of population.

Admitting for the sake of illustration that the *per capita* consumption of Canada at the present time is equal to that used in Germany and the United States, our annual production on the basis of a population of 6,000,000 should *not be more than 1,500,000 barrels* as our *exports are practically nil*. If then the extreme limit of consumption is placed at one barrel to every four persons in the country and that we should need another million of people to consume even 250,000 barrels more, what are we going to do with the production of the near future as foreshadowed by all these new companies entering the field and apparently entirely ignoring the economic needs of the community. At the present time the following companies are, according to a western Ontario exchange, steadily producing at the rate of 725,000 barrels per annum, and can easily increase their output to well over a million and a half: The Owen Sound Co., Canadian Portland Cement Co., The Lakefield Co., The Imperial Co., The Hanover Co., The Grey and Bruce Co., The Crescent Co., The Sun Co., and the National Portland Cement Co.

In addition to these actual producers we have the following works now under construction:—

|                                        | Projected Capacity |
|----------------------------------------|--------------------|
| The Raven Lake Portland Cement Co..... | 600 bbls. per day  |
| The Ontario.....                       | 1000 " "           |
| The Belleville.....                    | 2000 " "           |
| The International.....                 | 1000* " "          |
| The Colonial.....                      | 1000 " "           |

Making a total daily capacity of 5600 bbls. or at the rate of 1,680,000 per annum taking the year as 300 working days.

If this were all there might still be a chance by strict economy and careful management to keep the production down to such a figure as would enable the various companies with plants now in operation or under construction, to make a fairly decent financial shewing, but alas,

\*Projected capacity now given as 1,800 barrels per day.

even this small shred of hope seems about to be taken from them as still another lot of prospective cement makers is looming up, in those lately granted charters by the provincial governments of Ontario, Quebec and Manitoba, viz:—

|                                 | Projected Capacity |
|---------------------------------|--------------------|
| The Standard Co., Ontario.....  | 500 bbls. per day  |
| The Superior Co., " .....       | 600 " "            |
| The St. Mary's Co., " .....     | 800 " "            |
| The Manitoulin Co., " .....     | 1,000 " "          |
| The Royal Co., Quebec.....      | 800 " "            |
| The Western Co., Manitoba. .... | 1,000 " "          |
| The Manitoba Co., " .....       | 1,000 " "          |
| Total.....                      | 5,700 " "          |

or an annual output of 1,710,000 barrels. Should all these companies be in operation by 1905 the capacity of the cement kilns in the Dominion would be equal to a yearly production of 4,890,000 barrels or more than three times the possible consumption.

We might add that there may perhaps be a few more cement propositions which have been overlooked when going through our list of incorporations.

## EN PASSANT.

There is this consolation at any rate; in the Alaska shuffle we drew the two islands with the best and most pronounceable names.

We regret very much to learn that, according to a cable despatch from Lord Strathcona to the Militia Department, Major R. G. E. Leckie of the British force in Somaliland has been dangerously wounded by a leopard. Major Leckie formerly held a commission in the Canadian militia, and is a son of the well-known mining engineer, Major R. Gilmour Leckie, now of Sudbury, Ont. We extend our sympathy to the latter, and hope his gallant son may speedily recover from this mishap.

New Zealand has long enjoyed the reputation of being the most advanced of the British colonies in paternal legislation and government ownership of industries. So far has the management of business by the state gone in that country that is said one man out of every half dozen is in Government employment of some kind, or in receipt of a pension from the Government. What a paradise for politicians on the right side, with gifts in their pockets for one-sixth of the voters!

The Cataract Power, Light and Traction Company of Hamilton have let a contract to substitute aluminium for copper wire on their transmission line from De Cew Falls, Ont., to Hamilton a distance of about 35 miles. It is expected that twice the quantity of power can be transmitted over the new as compared with the old line. The copper wires are to remain in place until the current can be turned on over the aluminium line, consequently there will be no interruption to the service.

On October 19th the price of bar silver in New York reached 61¾ cents an ounce, the highest point touched for several years. Although this high figure has not been entirely maintained it still seems fairly steady above the sixty cent mark. The slight falling off is in a large measure due to the announcement by the United States Government that it would cease to buy on account of the Philippine coinage. The reselling by many of the Oriental banks was also largely a factor in the lowering of prices. Messrs. Pixley and Abel's circular gives the following as the shipments from London to the East from January 1st to October 15th, 1903:—

|               | 1902.      | 1903.      | Changes.    |
|---------------|------------|------------|-------------|
| India .....   | £4,799,170 | £4,778,975 | D. £20,195  |
| China .....   | 158,200    | 302,123    | I. 143,923  |
| Straits ..... | 390,820    | 721,879    | I. 331,059  |
| Total.....    | £5,348,190 | £5,802,977 | I. £454,787 |

The only occasion during the last three years upon which a higher price was quoted than that mentioned above was during January, 1901, in which month the average price was 62.82 cents per ounce Troy.

What influences are now at work to cause this marked advance in the face of the U. S. Government's adverse action *re* the Philippine coinage is of course hard to determine, especially when taken in conjunction with the recent decision of the Government of the Straits Settlements that no more silver dollars would be imported into that colony, due to the fact that in Singapore the quantity of silver dollars was entirely out of proportion to the currency requirements of the country. The fact remains, however, that prices still hold at a high level and there would seem to be every probability of the advance being maintained, as the opinion is freely expressed that the stoppage of silver purchases for the Philippines is merely a temporary measure and that the Indian mint will also resume buying at an early date owing to the relatively small silver balance in the hands of the currency department. Should the present level be maintained it cannot but be of immense advantage to the British Columbia mine, and taken in connection with the lead bounties recently granted by the Dominion Government, mining in that province should enjoy a revival of prosperity such as it has not experienced in many years.

The \$500,000 stock in the Canadian Westinghouse Company, which Ahearn & Soper, Limited, of Ottawa, undertook to place in Canada, was disposed of by the 15th inst. A very large amount of the shares have been subscribed for in the Capital where the greatest confidence is felt in the future of the Company. This confidence is due in a large measure to the high standing of the Canadian directorate, which is mainly composed of our most successful capitalists and men intimately acquainted with the practical side of all branches of electrical industry.

Messrs. Aron Hirsch & Son, through their New York representative, Mr. L. Vogelstein, of 90-92 Wall Street, kindly send us the following figures showing the German consumption of foreign copper for the months of January and September, 1903, compared with the same period of 1902-1901:—

|                    | 1903.        | 1902.       | 1901.        |
|--------------------|--------------|-------------|--------------|
| Import .....       | 63,527 tons. | 62,091 tons | 48,755 tons. |
| Export .....       | 7,797 "      | 6,718 "     | 7,233 "      |
| Consumption ... .. | 55,730 "     | 55,373 "    | 41,522 "     |

The production of anthracite coal during 1903, which is already many millions of tons in excess of that for a similar period in 1902, is shown in the figures given below. Up to November 1st the tonnage mined and sold amounted to the enormous figure of 51,286,293 tons, or nearly 30,000,000 tons more than at the corresponding date last year. This is by far the greatest production ever reached in the history of the trade. With such an enormous output, persons unacquainted with present conditions would naturally expect that lower prices would rule during the coming winter, but such is not the case. The long continued strike which was terminated last fall, exhausted the large reserves usually held in the various cellars, yards and depots to such an extent that on the 1st of May of the current year they were practically nil—instead of amounting as usual to more than ten millions tons. The increased production will therefore be largely used in restoring stocks on hand to their former condition. Another

reason for maintaining prices at their present level is the fact that owing to the fixing by the Gray Commission, of the minimum wages scale, for the next two years, the cost of production will not be lessened in the meantime. The following are the figures of production for the first ten months of 1903 compared with the same months last year:—

|                 | Tons 1903. | Tons 1902. |
|-----------------|------------|------------|
| January .....   | 5,964,950  | 4,538,138  |
| February .....  | 5,670,608  | 3,741,253  |
| March .....     | 5,211,450  | 3,818,767  |
| April .....     | 5,044,998  | 4,924,830  |
| May .....       | 5,156,449  | 1,708,892  |
| June .....      | 5,436,497  | 92,203     |
| July .....      | 5,377,495  | 250,079    |
| August .....    | 5,169,402  | 300,774    |
| September ..... | 4,654,444  | 445,883    |
| October .....   | 4,200,000  | 1,276,257  |
| Totals.....     | 51,286,293 | 21,097,076 |

Speaking editorially of the work done in the Atlin mining district during the season of 1903, the *Atlin Claim* has the following:—

The mining season, just closed, in Atlin, has been marked by many changes, more particularly as regards methods of mining. The passing of placer claims from individual miners to companies has likewise been a feature of the past season. A very large amount of outside capital has found its way into the district while many of the pioneer miners are taking themselves off to other fields. We regret to see many of these good men, who have done so much to bring the camp to its present state of importance, leave us now, but in leaving Atlin they will do for other districts what they have done for this.

As the years go on and the shallow diggings become exhausted, it becomes apparent that, with a few exceptions, the deep ground of the district can most profitably be worked by hydraulic or mechanical methods, both of which are beyond the reach of the average miner, and as a matter of course, the day of company operations is even now at hand. In the progress of events we must bury sentiment and welcome the new order of things, as being the best for the development of the district.

Though much of the older part of the camp has passed or is passing into the hands of capitalists, there is yet much ground available and open for the prospector and miner in the contiguous country to the east and south. This territory has hitherto received but an occasional passing glance from hunters or from men en route to Teslin or the Liard country. Developments during the past season have shown that the Dixie valley is worthy the close scrutiny of miners, and it is a well known geological fact that the gold area is by no means confined to the Pine and McKee watersheds. As we have already said, the land is open, why, then, should our pioneers leave Atlin for other districts?

The American Iron and Steel Association has collected statistics showing the growth of the Canadian production of iron and steel within recent years. Beginning with 1895, the Association's figures show the following production:—

|            | TONS     |              |                       |
|------------|----------|--------------|-----------------------|
|            | Pig Iron | Steel Ingots | Rolled Iron and Steel |
| 1895 ..... | 37,829   | 17,000       | 66,402                |
| 1896 ..... | 60,030   | 16,000       | 75,043                |
| 1897 ..... | 53,796   | 18,400       | 77,021                |
| 1898 ..... | 68,755   | 21,540       | 90,303                |
| 1899 ..... | 94,077   | 22,000       | 110,642               |
| 1900 ..... | 86,000   | 23,577       | 100,690               |
| 1901 ..... | 244,976  | 26,084       | 112,007               |
| 1902 ..... | 319,557  | 182,037      | 161,485               |

For the present year a definite bounty of \$6 per ton on wire rods, \$3 per ton on structural shapes, \$3 per ton on plates and \$3 per ton on pig iron has stimulated production. The output is expected to greatly exceed that of last year.

In charging the grand jury recently in the celebrated Whittaker-Wright case, the Recorder of London said:—

"I cannot refrain, and I do not see that I ought to refrain, as Recorder of London, a city which is the very heart of the Empire, from making this observation. Whatever may be the result of this prosecution to the person most directly interested, I earnestly hope that the facts disclosed in the papers now lying before you will serve as a solemn warning to persons in high positions, and make them consider long before they lend their names to commercial enterprises with the working of which they have no practical acquaintance, which, however honest they themselves may be, thus renders them an easy prey to wicked and designing men. It is no wonder that the public are deceived and misled as to the solvency and respectability of joint-stock enterprises, when a prospectus almost invariably contains the names of persons of high position who have often, in other capacities, rendered distinguished services to the State, but, alas! are not sufficiently mindful of the sacred obligations which attach to their position."

Speaking editorially as to the suspension of the Consolidated Lake Superior Company and the closing down of the Company's works, the *Victoria Colonist* has the following:—

The Clergue industries at the "Soo," about which so much have been heard of recent years, have passed into the hands of a receiver chosen by Speyer and Company as mortgagees. The receiver is presumably expected to keep things running and thus preserve the business good will from being impaired. In the meantime Senator Dandurand and Mr. Clergue will make strenuous efforts to interest capitalists in the acquisition of the property. Naturally they turn to Great Britain for assistance of this kind. Such enterprises cannot be run on wind, nor will they stand financing on the lines adopted in the notorious Shipping Combine bubble. Hard cash, and lots of it, is necessary, and in no part of the world can it be looked for to better advantage for Canada than in Great Britain. It would be a source of gratification to know that the Clergue industries will be owned and operated by British capital.

Whilst it is true that the lead mining industry is somewhat improved during the last few months, its present conditions cannot be considered satisfactory and in view of the strong representations made to the Government at Ottawa by a deputation from B.C., who were trying to obtain Government aid, it is regrettable that more definite information has not been afforded as to the reasons why, since the decision to grant a bonus of five hundred thousand dollars, the results have not been more pronounced. Having instituted careful enquiries we are able to say that the present position can be explained upon satisfactory grounds which do not for one moment admit of doubt either as to the ultimate revival of the industry or the immense benefit of the bonus.

While it is nearly three months since Mr. Fielding made the promise, it was only a few weeks ago that the Government officially ratified the grant and the various lead mining companies were either unable or unwilling to proceed with the heavy expenditure necessary to re-open the mines until the payment of the bonus was an assured fact. This made it too late in the season to do very much as in the Sandon District snow fell in the middle of October, meanwhile however with the single exception of the St. Eugene Mine, at Moyie there has been an all round increase in the staff and every effort put forward to secure large out-puts. Only those on the spot know the adverse conditions which have to be contended with in deporting the products of the British Columbia lead mines. Many of the mines are of great

elevation and quite inaccessible to mechanical traction. These depend upon raw-hiding which cannot be commenced until there is a heavy fall of snow and considerable frost. Allowance must also be made for the fact that in consequence of the long continued depression in this industry many of the men have become scattered and the majority have returned to the Western States, principally Idaho and Washington. It takes a long time to secure the return of these men, and to get the necessary supplies. We are satisfied that the present aspect of things as it appears to the on-looker is not a true index of the effect of the bonus or of the extent to which it has already stimulated activity in the lead mines of B.C. The work which counts does not show at the present stage, it is being vigorously carried on and will bear fruit next season in the undoubted revival of this important industry. Whether ultimately the bonus will have as wide a spread and permanent an effect as the tariff legislation asked for remains to be seen; but if the result is that the Government aid attains what it aimed at then the logical sequence is to make that aid permanent by incorporating it with the tariff.

### Canadian Chromite.\*

By JOSEPH HYDE PRATT.

The principal chromite deposits of Canada are in the vicinity of Black Lake and Coleraine, Quebec Province. The mineral occurs in the peridotite rocks or serpentine, an altered facies of this. In this district these rocks form a series of approximately parallel belts of varying width, which can be traced in a general northeast-southwest direction for a distance of over 20 miles. These rocks are not continuous throughout this distance, but are intercepted by masses and narrow dikes of granitic rock, and seams and small masses of this granitic rock were observed that were entirely surrounded by the peridotite. This latter rock has in some instances been entirely converted to serpentine and has lost its own individuality, while in some places it has the structural appearance of the original peridotite. The chromite does not occur scattered throughout the mass of serpentine, but is in most cases concentrated in pockets and seams of varying dimensions, near the contact of the serpentine with the granite. The sizes of the original masses of peridotite have determined to some extent the relation of the chromite to the contact. This is in accord with the theory advanced for the origin of the chromite found in these basic magnesian rocks, which is, that it was held in solution in the molten magma when it was intruded into the country rock and was among the first minerals to separate out as this magma began to cool. This separation would take place usually near the outer boundary of the intruding masses of peridotite, for here it would cool first; but where the magma had included within itself masses of granitic rock, these would exert a cooking influence and tend to cause a separation of chromite adjacent to them. Then, again, with the narrower masses of peridotite, the mass would quickly lose some of its fluidity, and there would be less chance for the chromite to be concentrated together and to separate out in large masses. Thus, as would be expected, the chromite does not occur in well-defined veins, but in pockets of varying dimensions, which in some cases are connected with one another by small seams of chromite and in others are entirely separated from one another. It is also found more or less intimately mixed with the serpentine, and often there is a gradual transition from the nearly pure mass of chromite through the mixture of chromite and serpentine to the pure serpentine. The larger masses of chromite ore are associated with the larger masses of serpentine, and the mixtures of ser-

pentine and chromite are found with the smaller areas of serpentine and with those which have the included masses of granite.

There has been considerable work done in this Black Lake district in the development of the chromite deposits. The mineral was observed in some instances lying directly between the serpentine and the granitic rock, making a sharp contact with each, as is well illustrated at the Caribou chromite pit. In other cases the chromite was separated from the granitic rock by a narrow seam of serpentine, and in still others the ore consisted of an intimate mixture of chromite and serpentine. Where the ore occurs in masses it is usually of sufficient purity to ship directly, as mined, without any further treatment. Where it is an intimate mixture of the serpentine and chromite the ore has to be crushed, rolled, or stamped, and then passed over Whifley tables or other concentrators. The method now being used at a number of mines is first to crush the ore, then to pass it through a stamp mill and over Whifley concentrating tables. The concentrates are then dried and bagged, and are ready for shipment. At the Whitney mine the company has recently increased its plant from a 5 to a 10 stamp mill. The concentrates carry a high percentage of chromic oxide, as does also the pure masses of chromite that have been shipped directly as mined. Since these chromite fields were opened there have been shipped about 12,000 to 15,000 tons of chromite. A large part of this has been mined by means of open cuts and pits, the largest one being the chrome pit No. 1 of the Coleraine mine, which is 50 feet deep and 60 feet long. Some of the mining has been done by means of shafts and tunnels, and in some respects this is by far the more satisfactory method. At the Caribou mine the deepest shaft is down 105 feet.

During 1902, mining was carried on at the Whitney and Coleraine mines and at the mine of the Montreal Chrome Company. The production amounted to 900 short tons, valued at \$13,000. This will undoubtedly be increased in 1903, as the Coleraine mines are being extensively and systematically worked.

### Rope Tramways.\*

By S. DE ZOMBORTA.

There is a tendency to-day to render the aerial tramway more and more automatic in its operation. It is a question in the mind of the trained engineer: Just what is the limit? What is of more concern to the prospective or actual owner of a tramway? How far can we go in making the tram entirely independent of human control and then take the risk of eventualities which are connected with all such machinery? Reduction of labour costs is always an object in considering operating costs, but it is, in the opinions of many engineers, not advisable to attempt to dispense entirely with it. The aim of the constructing engineer should be to plan a tramway which will be as nearly automatic as is consistent with due regard for the safe conveyance of its traffic.

In all the double-rope systems which are in general use, the principle of construction is the same. That is, the ropes, pulleys, and sheaves, as well as the other machinery in use, perform their duties in the same general fashion, differing only in design. The difference between the systems is chiefly in the manner of attaching buckets to the rope. Therefore, double-rope tramways might be divided into three general types:—First. That system in which a clip or lug nut is permanently attached to the running rope, which drags the bucket suspended on a standing or immovable rope. Second. That system in which a clutch attached to the bucket seizes the running rope and remains attached thereto by means of friction. This latter system might be further sub-

\* Extract from "Mineral Resources of the U. S.," Washington, 1903.

\*Abstract of a paper read before the American Mining Congress, at Deadwood, S.D. Sept., 1903.

divided into two classes:—One in which the friction is created by an eccentrically operating lever locked and released automatically, securing a constant friction that is independent of the angle which the traction rope forms with the horizontal; second, one in which the clutch exerts friction on the traction rope by a lever on which the weight of the bucket is transmitted. This friction varies with the cosine of the angle which the line forms with the horizontal. The third and latest development is that system in which the buckets are fastened permanently at certain distances to the traction rope. On this system the buckets are loaded with a walking-bin which runs simultaneously on parallel rails above the buckets in the station, loading the same.

Of these three systems of double-rope tramways, it can be said that the clip system enables us to handle the buckets at exactly the same intervals. This prevents accidents which might result from the failure of labourers to keep the buckets loaded and moving at the proper distances. One marked disadvantage of this type is the fact that the wear on the traction rope is constantly in the same place, thereby weakening the strength of the rope at these points. Shifting the clips from time to time is resorted to in an effort to overcome this difficulty, but it entails a loss of time. In the second class this difficulty is not encountered, because the grip seldom ever clutches the same spot on the traction rope at the same place twice in succession. Slight alterations, also, in the relative position of the buckets on the rope, work no disadvantage in the operation of this second type. To secure an even distribution of the buckets along the line, signals are easily arranged by which the workman is enabled to estimate the proper intervals. With the assistance of the eccentrically working friction grip arrangement, as well as with the clip, all grades can be overcome, because the friction on the traction rope is constant and uniform. In the type in which the weight of the bucket is transferred by means of a lever on the clutch, and is transformed to friction, the limitation of grades to be overcome is confined to those not in excess of 45 degrees. The third system, that in which the buckets are attached permanently to the traction rope, is probably the most promising one, as here the loading as well as the loading of the buckets is automatic, with a corresponding saving in operating costs. The more or less complicated grips and clip-catchers are done away with. It requires buckets of less expensive construction and overcomes any grade that any other system of rope tramways can traverse. This last type of construction is of such recent development that comparatively few plants are in operation in this country. As far as is known it renders most successful service.

And now a word as to the costs of installation of rope tramways. Naturally, the single-rope tramway is the cheaper type of construction, but popular opinion is more favourable toward the double-rope tramway, as evidenced by the number of that type which have been and are being installed by mine managers. The heavier the traffic to be handled the heavier and more substantial parts must be used in the construction work. Many other considerations, based upon the peculiar conditions which attend the installation of tramways at different mines, must be considered in the individual case. Generally speaking, we are within limits when we say that, including all the machinery parts, the average per foot of line constructed may be regarded as ranging from 1.80 to 2 dollars per foot. These figures include the necessary cables, towers, sheaves, and buckets. To these figures must be added the construction costs, which vary according to freight rates, price of timber, labour, and delivery to the point of construction. Very naturally this affords a wide variation in costs, but as an example it might be cited that in Colorado the construction costs would probably be from 1 dollar to 1.15 per foot. Therefore it is safe to estimate the entire cost of a tramway per foot in any region where the conditions are approximately the same as in Colorado, at from 3 to 3.10 dollars per running foot.

### The Cyaniding of some Silver Ores by Percolation.\*

By ANDRÉ P. GRIFFITHS and FRANK W. OLDFIELD.

The treatment of gold ores by the cyanide process has, during the past ten years, been brought to a very high degree of excellence, and the literature of the subject is both varied and exhaustive. The same cannot be said, however, of the cyaniding of silver ores, of which practically nothing is known. The reference to this subject occasionally made in standard works, is generally vague and short, and no information of practical value can be obtained or has yet been published, at all events in so far as the percolation treatment is concerned.

The cyaniding of silver ores has, up to the present, been generally considered as presenting many difficulties, principally owing to the complex nature of the chemical reactions involved, of which many are still obscure; and the practical application of this process has been retarded by numerous failures and the extensive vogue of the pan-amalgamation process.

The latter process, however, is an expensive one, necessitating roasting, dry crushing, and the use of large amounts of salt, &c. In certain countries like Mexico, where there are large and numerous low grade silver lodes, and where fuel is scarce and expensive, and transport charges are heavy, the dry crushing and pan-amalgamation of silver ores cannot be made a profitable undertaking in all cases. It was with a view to reducing costs mainly, and increasing a restricted output, that the treatment of the low grade ores of the Palmarejo Mines was suggested and tried. Although the authors are not the initiators of this new departure, yet in their respective capacities of General Manager and Cyanide Manager of these mines, they have treated, since the beginning of operations, nearly 30,000 tons of ore, and have put the process to the test, and brought it to its present commercially successful basis. They are aware of the existence of several plants for the cyaniding of silver ores by agitation, but do not know of any successfully worked percolation plant.

It is in the hope that the results obtained by them may prove interesting, and of some value to the metallurgy of silver, that the authors have been induced to submit these notes to the members of the Institution.

*Description of the Ore and Plant.*—The ore which is treated belongs to the class of so-called "Sulphide" ores. The silver occurs mostly in the form of Argentite ( $Ag_2S$ ), with small quantities of Stephanite, the sulphide of antimony and silver, and occasionally is accompanied by Embolite, the chlorobromide. The other minerals present are iron sulphides (mostly), with small amounts of galena, blende, and chalcopyrite. The gangue is in large part quartz, with a considerable amount of calcite and black oxides of manganese: to this is added much clay and iron oxides from some of the upper workings. The ore contains a small amount of gold, generally \$1 to \$2. The ore is crushed wet, in a converted 50-stamp dry crushing mill, passed over Wilfley tables, and led into four masonry tanks, each of 350 tons capacity, where the pulp is allowed to settle and drain. The large portion of the slimes produced overflow, and are run into pits, and reserved for future treatment.

The cyanide plant proper consists of ten steel vats, 30 ft. in diameter and 4 ft. 6 in. deep over the filters, and of a capacity of 110 tons each. In addition to these, there are two wooden vats of the same diameter and capacity which have just been completed.

The solutions from the treatment tanks drain into 3 cement sumps of an aggregate capacity of 90 tons; from these they are pumped by 12-in. centrifugal pumps to the upper solution tanks, which are two in number and each of a capacity of 20 tons. From these the solutions

\* Paper read before the Institution of Mining and Metallurgy, June 18th, 1903.

pass through five zinc extractors, which are made of steel, each being 18 ft. long, with eight compartments 2 ft. wide, 2 ft. deep, and 2 ft. long. After passing through the extractors the solutions fall into the "strong" and "weak" tanks of 30 tons capacity each, and thence by gravity are led to the twelve treatment tanks already described.

The plant was not designed for any slimes-separation, and without important structural alterations this could not be done. This must be borne in mind when judging of the results obtained.

TABLE I.

|                          |                      |                            |  |
|--------------------------|----------------------|----------------------------|--|
| Tank number . . . . . 3  | Assay value of ore { | Gold . . . . . \$1.24      |  |
| Charge " . . . . . 189   |                      | Silver . . . . . oz. 14.24 |  |
| Tons (dry) . . . . . 104 |                      |                            |  |

| Date             | Tons of Solution added.          | Strength of Solution % of KCN. | Assay Value of "Tails." |        |
|------------------|----------------------------------|--------------------------------|-------------------------|--------|
|                  |                                  |                                | Gold                    | Silver |
|                  | Filled                           |                                | \$ c.                   | Oz.    |
| Jan. 16. . . . . | 20                               | .37                            | 0 0                     | —      |
| " 17. . . . .    | 37                               | .36                            | 0 41                    | 10.98  |
| " 18. . . . .    | 26                               | .77                            | 0 00                    | —      |
| " 19. . . . .    | 22                               | .78                            | 0 00                    | —      |
| " 20. . . . .    | 10                               | .75                            | 0 20                    | 9.39   |
| " 21. . . . .    | 15                               | .40                            | 0 00                    | —      |
| " 22. . . . .    | 38                               | .32                            | 0 00                    | —      |
| " 23. . . . .    | 37                               | .35                            | 0 00                    | —      |
| " 24. . . . .    | 26                               | .35                            | 0 00                    | —      |
| " 24. . . . .    | { Water Washers<br>sluiced out } | —                              | 0 10                    | 6.85   |

Duration of treatment . . . . . 8 days.  
 Extraction . . . . . { Silver . . . . . 51.9%  
 { Gold . . . . . 91.9%

TABLE II.

|                          |                      |                            |  |
|--------------------------|----------------------|----------------------------|--|
| Tank number . . . . . 11 | Assay value of ore { | Gold . . . . . \$2.48      |  |
| Charge " . . . . . 250   |                      | Silver . . . . . oz. 13.38 |  |
| Tons (dry) . . . . . 105 |                      |                            |  |

| Date    | Tons of Solution added | Strength of Solution % of KCN | Strength of Solution With-drawn % of KCN | ASSAY VALUR. |        |        |        |
|---------|------------------------|-------------------------------|------------------------------------------|--------------|--------|--------|--------|
|         |                        |                               |                                          | Solution.    |        | Tails. |        |
|         |                        |                               |                                          | Gold         | Silver | Gold   | Silver |
|         |                        |                               |                                          | c.           | Oz.    | c.     | Oz.    |
| Mar. 19 | —                      | —                             | —                                        | —            | —      | —      | —      |
| " 20    | 20                     | .28                           | —                                        | —            | —      | —      | —      |
| " 20    | 24                     | .28                           | .05                                      | 1.24         | 1.54   | —      | —      |
| " 21    | 20                     | .28                           | —                                        | —            | —      | 0.82   | 11.96  |
| " 21    | 10                     | .80                           | .10                                      | 1.65         | 2.34   | —      | —      |
| " 21    | 12                     | .80                           | —                                        | —            | —      | 0.82   | 10.88  |
| " 22    | 10                     | .80                           | .16                                      | 1.81         | 5.39   | —      | —      |
| " 22    | 12                     | .80                           | —                                        | —            | —      | 0.20   | 9.69   |
| " 23    | 12                     | .80                           | .54                                      | 2.06         | 10.30  | —      | —      |
| " 23    | 12                     | .80                           | —                                        | —            | —      | 0.10   | 6.40   |
| " 24    | 20                     | .30                           | .52                                      | 1.65         | 2.22   | —      | —      |
| " 24    | 20                     | .30                           | —                                        | —            | —      | 0.10   | 6.00   |
| " 25    | 20                     | .31                           | .25                                      | 1.24         | 4.72   | —      | —      |
| " 25    | 20                     | .31                           | —                                        | —            | —      | 0.10   | 6.00   |
| " 26    | 20                     | .28                           | .25                                      | 0.82         | 1.10   | —      | —      |
| " 26    | 20                     | .30                           | —                                        | —            | —      | 0.10   | 6.00   |
| " 27    | 25                     | .16                           | .23                                      | 0.10         | 0.85   | —      | —      |
| " 27    | 20 water               | —                             | —                                        | —            | —      | —      | —      |
| " 28    | 10 "                   | —                             | .07                                      | 0.10         | 1.09   | —      | —      |
| " 28    | Sluiced out            | —                             | —                                        | —            | —      | 0.10   | 5.98   |

Duration of treatment . . . . . 9 days  
 Extraction . . . . . { Gold . . . . . 95.98%  
 { Silver . . . . . 55.24%

TREATMENT.

With but little to guide them, and before being able to arrive at fairly definite conclusions, the authors worked with solutions of greatly varying strength and tonnage—the strength of the "weak" solution varying from .25% to .7%, and that of the "strong" from .7% to 1.25%, the tonnage of solutions used varying from one to three tons per ton

of ore. The amount of cyanide and of zinc consumed was gradually brought down from 6 lb. and 1 1/2 lbs. to about 4 lb. and 1 lb. respectively.

The present treatment, briefly, consists in the introduction, from the bottom, of about 25 tons of "weak" solution of .30% strength, which is allowed to "soak" for about six hours. This is followed by 30 to 35 tons of "weak" solution of same strength, which is in turn displaced, after 36 hours from commencement, by about 60 tons of "strong" solution containing .75% of cyanide. These 60 tons are turned on from the top, with intervals of "soaking" varying from three to six hours. After this more "weak" solution is added, amounting to about 160 to 180 tons, and finally the treatment is completed by water washes.

The solutions are titrated immediately before and after passing through the ore, and both solutions are kept separate and assayed daily for silver and gold.

Tables I and II are the actual record of the working of two typical tanks.

Although the ore is crushed through a 20-mesh screen with an average height of discharge of 2 1/2 in., the slimes-forming material is such that over 60% of the pulp passes through a 100-mesh and more than 25% through a 200-mesh. In order to show the action of the cyanide solutions upon the various particles, and the distribution of values, Table III is appended:—

TABLE III.

|                          |                      |                            |  |  |  |  |  |  |  |
|--------------------------|----------------------|----------------------------|--|--|--|--|--|--|--|
|                          |                      | SIZING TEST.               |  |  |  |  |  |  |  |
| Tank number . . . . . 11 | Assay value of ore { | Gold . . . . . \$2.48      |  |  |  |  |  |  |  |
| Charge " . . . . . 250   |                      | Silver . . . . . oz. 13.38 |  |  |  |  |  |  |  |
|                          |                      |                            |  |  |  |  |  |  |  |

| Mesh      | % of Weight | Assay Value |        | % of Value of Original Ore. |        | Assay Value after Treatment |        | % of Extraction of Silver |                                  |
|-----------|-------------|-------------|--------|-----------------------------|--------|-----------------------------|--------|---------------------------|----------------------------------|
|           |             | Gold        | Silver | Gold                        | Silver | Gold                        | Silver | On sized particles        | Calculated (original extraction) |
|           |             | \$ c.       | Oz.    | %                           | %      | \$ c.                       | Oz.    | %                         | %                                |
| Stayed on |             |             |        |                             |        |                             |        |                           |                                  |
| 30        | 10.35       | 2.48        | 13.10  | 10.35                       | 10.13  | 0.20                        | 9.19   | 29.85                     | 3.02                             |
| 50        | 13.00       | 2.06        | 12.72  | 10.80                       | 12.36  | 0.10                        | 6.60   | 48.11                     | 5.94                             |
| 60        | 15.30       | 1.85        | 11.34  | 11.41                       | 13.00  | Tr.                         | 5.70   | 49.74                     | 6.46                             |
| 80        | 7.50        | 1.65        | 10.16  | 4.99                        | 5.70   | "                           | 4.40   | 56.70                     | 3.23                             |
| 100       | 8.50        | 1.60        | 10.28  | 5.48                        | 6.53   | "                           | 3.90   | 62.00                     | 4.04                             |
| 120       | 9.65        | 1.60        | 9.67   | 6.22                        | 6.97   | "                           | 3.80   | 60.71                     | 4.23                             |
| 150       | 2.70        | 1.85        | 12.56  | 4.03                        | 2.53   | "                           | 3.50   | 79.86                     | 2.02                             |
| 200       | 6.50        | 1.90        | 10.26  | .98                         | 4.98   | "                           | 4.30   | 58.09                     | 2.89                             |
| passed    |             |             |        |                             |        |                             |        |                           |                                  |
| 200       | 26.50       | 3.80        | 20.30  | 40.60                       | 40.20  | 0.10                        | 7.20   | 64.54                     | 25.94                            |
|           | 100.00      |             |        | 98.86                       | 102.40 |                             |        |                           | 57.57                            |

The above test was made on the same ore and same charge as that shown in Table II. The authors have made many such tests and have found but little variation from the one given in the table

It is clear from the above that fine crushing has an important bearing on the treatment and the extraction.

In addition to these tests, numerous samples of the tailings before sluicing out were taken in sections, and invariably the assay values of the material gradually increased from the top downwards; although this of course is to be expected, the difference is sometimes so very marked, amounting to several ounces, that the authors were led to believe that oxygenation of the mass is even more important than in the case of gold ores. In order to prove this several charges, after receiving the usual treatment and practically having reached ultimate extraction, were transferred into other tanks, the bottom layer being thus shovelled out last, and becoming the top layer of the fresh tank. Invariably, these charges on being further treated from two to four days with "weak" solution, which had no effect before, yielded from 1 to 3 oz. more silver per ton.

The average extraction is from 50 to 55% of the silver and 90 to 95% of the gold, and the authors think that the silver extraction would be increased by double treatment.

## EXTRACTORS.

The size of these has already been given; the precipitation by means of zinc shavings obtained by cutting zinc sheets in a lathe, is extremely good. The total tonnage of solution passed through each extractor is about 60 tons per 24 hours, this being over one ton of solution per cub. ft. of shavings per 24 hours. The assay of the solutions average:—

|                   |                             |
|-------------------|-----------------------------|
| "Weak" solution   | { Gold . . . . . \$0.80     |
|                   | { Silver . . . . . 2'00 oz. |
| "Strong" solution | { Gold . . . . . \$1.00     |
|                   | { Silver . . . . . 3'75 oz. |

After passing through the extractors the solutions assay a trace of gold and from '02 to '08 oz. of silver.

The precipitation is always accompanied by a very brisk evolution of hydrogen gas. The amount of precipitate to be dealt with is, as might be expected, very large, and its assay value averages silver 20,000 oz., and gold \$8,000 per ton.

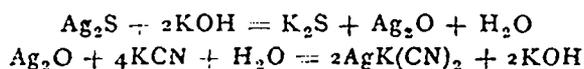
The ore being filled wet, containing sometimes as much as 25% moisture, there would be an accumulation of "weak" solution. In order to avoid this, the first few tons of "weak" and the last water washes, as required, are run through a "waste" solution zinc extractor, the amount of cyanide lost is small, whilst practically all the bullion is extracted from these "waste" solutions.

*Consumption of Cyanide, Zinc, etc.*—The average duration of the treatment is 10 days, including one day for sluicing and filling.

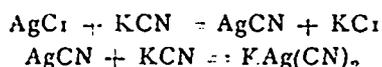
The consumption of cyanide per ton of ore is fractionally less than 4 lb., whilst that of the zinc is about 1'1 lb. The amount of cyanide consumed is very large, compared with that in the cyanidation of gold ores, and, although the authors are unable to account analytically for all this consumption, they believe that it is due to a variety of causes which may be classified under the following heads, viz.:—

1. "Cyanides" in the ore, such as manganese minerals, copper, and iron sulphides, viz.:—
2. The proportionately larger amount of metal to be dissolved which, if compared with a 10-dwt. gold ore, means a proportion of nearly 30 to 1.
3. The complex and obscure re-actions taking place between the silver minerals and the cyanide.

Without entering into the chemistry of these re-actions, which in themselves are sufficient matter for much discussion, the authors think that the solution of the silver sulphides might be explained by the following equations, re-actions in which the presence of alkalis would seem to be necessary:—



Whilst with the Halides the following would take place—



The authors admit, however, that their research in this direction has been very limited owing to want of time, and their explanation of the re-actions is only tentative. There seems to be no direct action between the silver sulphides and the cyanide, and undoubtedly they are most refractory to the treatment by cyanide.

The acidity of the ore calls for an alkalinity of 1 lb. pure lime per ton.

*Working Costs.*—A table of working costs, which explains itself, is appended.

TABLE IV.

## AVERAGE COST OF CYANIDING.

|                                          |        |
|------------------------------------------|--------|
| Potassium cyanide, 4 lb, at 65c. . . . . | \$2.60 |
| Zinc, 11 lb, at 25'5c. . . . .           | 0.28   |
| Lime . . . . .                           | 0.03   |
| Filling and sluicing out . . . . .       | 0.19   |
| Wages . . . . .                          | 0.18½  |
| Sampling, assaying, &c. . . . .          | 0.17½  |
| Maintenance, filters, &c . . . . .       | 0.01½  |
| Management . . . . .                     | 0.15   |
| Treatment of precipitates . . . . .      | 0.05½  |
|                                          | \$3.68 |

Mexican money, say 5s. 10d. per ton of 2,000 lb.

*General Conclusions.*—From the results of their work and experience the authors think that certain conclusions can be drawn, amongst which are the following:—

- (1) The cyanide treatment by percolation is suitable for the economical working of certain low-grade silver ores.
- (2) Fine crushing, and classification of the crushed material, are necessary.
- (3) The success of the treatment is brought about more by a larger tonnage of a weaker solution rather than by a smaller tonnage of very strong solution.
- (4) Thorough oxygenation of the mass is absolutely necessary, and double treatment would appear the most satisfactory practice.

NOTE.—All the gold values are expressed in U.S. currency, the working costs being in Mexican money.

## Asbestos.

By JOSEPH H. DE PRATT.\*

The sources of supply of commercial asbestos are deposits of two distinct minerals; one is a variety of serpentine known as chrysotile, and the other is a variety of amphibole.

## OCCURRENCE.

The amphibole asbestos is usually found in granitic or schistose rocks, sometimes in pockets, and again in well-defined veins. The chrysotile variety does not occur in a vein formation, but is in seams of varying width, which pinch out and widen, sometimes being thickly clustered together, and again occurring sparingly, and it is always found in serpentine rocks. The demand for the chrysotile asbestos is far in advance of that for the amphibole variety, on account of its being adapted to many more purposes. The amphibole variety can, however, be mined and prepared for market at less expense than the chrysotile variety, and as it makes a cheaper product there is some demand for it for those purposes where its nonconductivity of heat is the principal quality desired, as in the manufacture of fireproof paints, for wall plasters, for packing in the manufacture of fireproof safes and of boiler coverings. Where, however, strength of fiber as well as nonconductivity of heat is desired, as in the manufacture of cloth, ropes, felt, boards, tubes and washers, it is the chrysotile variety that is used.

## AMPHIBOLE ASBESTOS.

There are many sources of supply of the amphibole asbestos known in the United States, but owing to its limited demand and its small value, only those deposits that are the most favorably located for mining and transportation and are near a market can be profitably worked. When one considers that there are used in the United

\* Extract from Reports of U. S. Government Survey, 1903.

States per annum only about 1,000 to 1,500 tons of the amphibole variety of asbestos, valued at \$16 per ton, one can readily understand how the market for this mineral could be easily oversupplied, with a corresponding decrease in price. Unless, therefore, new uses are devised for this variety of asbestos or there is a considerable decrease in the supply of the chrysotile variety, there will be a very limited market for amphibole asbestos.

Considerable development work has been done on this type of asbestos deposits in several different States during 1902, and a number of new companies have been organized to mine and prepare it for the market.

The Connecticut Asbestos Mining Company is developing a deposit in the town of New Hartford, Conn., about 3 miles from the railroad station. The asbestos occurs in a ledge that outcrops strongly for a distance of about 750 feet in length. The outcrop is 20 feet wide, and has been opened in places to a depth of 45 feet. The strike of this seam or vein is northeast-southwest. The company is erecting a plant for preparing the asbestos for market, and hopes to be able to place the product on the market during 1903.

In Bedford County, Va., the American Asbestos Company has obtained control of about 4,000 acres in the vicinity of Chestnutfork post office, about 14 miles south of Bedford City. A number of veins and seams of an amphibole asbestos, from 8 to 50 inches in thickness, has been uncovered, which dip at angles varying from almost perpendicular to 45 degrees. This company is preparing to mine this asbestos on the old Hubbard plantation, which is nearly in the center of the tract.

At a number of places in North Carolina amphibole asbestos has been found in quantity; the more important localities are on Fryon Mountain, Polk County, about 1½ miles west of Skyuka, and in Mitchell County, near Plumtree. Neither of these deposits was worked in 1902.

The deposits at Sall Mountain, White County, Ga., are the largest producers of asbestos in the United States. They are located at Santee, 12 miles northwest of Clarksville, near the Chattahoochee River, and are operated by the Sall Mountain Asbestos Company. In Habersham County some development work was done at the deposits near Northeast. The Pine Mountain Mica and Asbestos Company is opening some amphibole asbestos deposits in the northeast corner of Rabun County, Ga., about 1½ miles from Russell, S.C., and near the main road from Walhalla, S.C., to Highlands, Macon County, N.C. As described by Mr. Daniel Lesley, president of the company,† the asbestos occurs in several small veins that outcrop on the surface. They have been developed by means of a tunnel run into the hillside for a distance of 60 feet, exposing a seam of asbestos 30 to 40 inches thick, which seems to be the union of several of the small veins observed on the surface. About a mile from this point there is another hill where several veins, 2 to 4 feet in width, have been found, but no exploration has been made as yet to determine their extent or the quality of the asbestos.

The Wisconsin Valley Asbestos Mining Company is developing a deposit of amphibole asbestos near Stevens Point, in Wood County, Wis.

#### CHRYSOTILE ASBESTOS.

The basic magnesian rocks that extend northeasterly from Alabama across Georgia, South Carolina, North Carolina, Virginia, Maryland, Pennsylvania, the New England States, and into Canada, are more or less altered to secondary serpentine. In the more northern sections different areas are often completely altered to this secondary rock, while in North Carolina, Georgia, and Alabama there are but very

few areas that have been altered to this extent, although serpentine in small amount has been found at nearly all of them. It is only in those areas in which the rocks have been completely altered to serpentine that the chrysotile asbestos could be expected to occur in commercial quantity.

In the United States the principal work that has been done for chrysotile asbestos is in Vermont. The deposits are located in the northern central part of the State, in the town of Eden, Lamoille County, and in the adjacent town of Lowell, Orleans County, and have been described in previous reports.‡ Although a great deal of development work was done on these deposits, and one company, the New England Asbestos Company, has erected a complete mill for treating the asbestos, there was no production of this material from these deposits in 1902. The company named has purchased some of the better asbestos mines in the Black Lake Thetford district, Canada, and its name has been changed to the New England Canadian Asbestos Company. One of the difficulties to contend with in the production of the Vermont asbestos is the transportation, but if the proposed railroad is built into this section it will undoubtedly lead to the mining and milling of this asbestos on a considerable scale.

In North Carolina there is a promising deposit of chrysotile asbestos near North Wilkesboro, Wilkes County, which is within three-fourths of a mile of the railroad. It occurs in a serpentine formation that is from 75 to about 200 feet in width and can be traced in a general northwest to southeast direction for nearly 600 feet. The deposit has been worked by means of an open cut 100 feet long, which was made on the land of Mr. J. B. Church. The cut varies in depth from 1 to 35 feet, and near the surface the serpentine encountered was badly decomposed, but at lower depths a compact, dark-green rock was found. This harder rock is similar to a bold outcropping of the serpentine that occurs on a low hill about 300 yards a little east of south of this cut on land belonging to Mr. G. W. Hinshaw, of Winston. A similar outcrop of serpentine was observed on the summit of a hill 200 yards nearly north of the cut. In nearly all of this serpentine small seams of the chrysotile asbestos were observed that varied in width from a quarter of an inch to nearly 2 inches, the latter seams being encountered near the bottom of the cut. These seams run at all angles through the rock, and as the firmer serpentine was encountered the asbestos became of better quality. Sufficient work has not been done to demonstrate the actual value of this property as a source of asbestos, but it is worthy of further investigation.

In the range of mountains just north of Ishpeming, Marquette County, Mich.,§ chrysotile asbestos was discovered about twenty years ago, but no special attention was paid to the occurrence until 1893, when specimens were collected and sent to the World's Fair at Chicago. Some attempt was made at that time to interest capital in the further development of the deposits but without success. During the latter part of 1902 some work was done which demonstrated that the asbestos was more plentiful than was at first supposed. It is probable that sufficient capital can now be obtained to carry the development work to the point of determining whether or not there is a commercial deposit of the mineral.

Although there has been some very good asbestos found at the Wyoming deposits, which are in the vicinity of Casper, Natrona County, there was no production of this material in 1902. The serpentine rocks of the Pacific slope in California, Oregon and Washington are promising fields for investigation, and it is possible that some good deposits of the chrysotile asbestos will be opened.

‡ Mineral Resources for 1900, pp. 862-866, and for 1901, pp. 889-890.

§ Western Mining World, September 12, 1902.

† Private Communications.

## CHEMICAL AND MINERALOGICAL COMPOSITION.

There are a number of minerals belonging to the amphibole group that occasionally assume a fibrous structure and are asbestiform in appearance. Where these occur in quantity they can undoubtedly be utilized as commercial asbestos, but they can not be used for the same purposes as the chrysotile variety.

The most common amphibole to assume a fibrous structure is tremolite, which crystallizes in the monoclinic system and whose chemical composition is represented by the formula  $(MgCa)SiO_3$ , a magnesium-calcium metasilicate. There is nearly always a little iron and alumina present, together with some moisture.

Anthophyllite, the orthorhombic amphibole, has been found with a fibrous structure at a number of localities, and as shown by Dr. George P. Merrill,\* a considerable proportion of the asbestos that is called the amphibole (tremolite) variety is in reality an anthophyllite. It is also true that many specimens which have at first been considered anthophyllite have proved on close examination to be one of the monoclinic amphiboles, and in some cases to be enstatite. Many mistakes of this character have been made in connection with the fibrous minerals occurring with the basic magnesian rocks extending from Alabama in a northeast direction to the Gaspé Peninsula in Canada. These, as a rule, occur in very small quantity. The chemical composition of the anthophyllite is represented by the formula  $(MgFe)SiO_3$ , a magnesium-iron metasilicate. There is nearly always from a trace to several per cent of alumina and a small amount of moisture found in anthophyllite. Occasionally a pyroxene is observed that has an asbestiform structure, this being more noticeable in the enstatite than in the orthorhombic pyroxene.

The following analyses† illustrate the chemical composition of the tremolite and the anthophyllite varieties of asbestos, and show how readily the anthophyllite, which contains but a very small amount of lime, can be distinguished from the tremolite, which contains over 10 per cent:

*Analyses of Tremolite and Anthophyllite Asbestos.*

| CONSTITUENT               | I.               | II.              | III.               | IV.                |
|---------------------------|------------------|------------------|--------------------|--------------------|
|                           | Tremo-<br>lite   | Tremo-<br>lite   | Antho-<br>phyllite | Antho-<br>phyllite |
|                           | <i>Per cent.</i> | <i>Per cent.</i> | <i>Per cent.</i>   | <i>Per cent.</i>   |
| Silica, $SiO_2$ .....     | 56.96            | 56.26            | 56.52              | 55.21              |
| Alumina, $Al_2O_3$ .....  | .52              | 1.81             | 3.57               | 2.78               |
| Ferrous oxide, FeO.....   | 1.12             | 6.40             | 10.18              | 8.58               |
| Lime, CaO.....            | 13.84            | 11.98            | Trace              | .82                |
| Magnesia, MgO.....        | 23.90            | 20.85            | 27.13              | 28.95              |
| Manganese oxide, MnO..... |                  | Trace            |                    | Trace              |
| Ignition, $H_2O$ .....    | 2.37             | 2.65             | 2.96               | 2.23               |
| Total.....                | 98.71            | 99.95            | 100.36             | 99.57              |

I. From Parkton, Md., George P. Merrill, analyst.

II. From Albemarle County, Va., R. L. Packard, analyst.

III. From Rabun County, Ga., George P. Merrill, analyst.

IV. From Caldwell County, N.C., George P. Merrill, analyst.

As is well known, pyroxene suffers alteration very readily, passing over into some one of the amphiboles, and it is not improbable that considerable asbestos was originally a pyroxene. The fibrous structure of these minerals represents a crystalline phenomenon, and the individual fibers either may be distinct crystals which are more or less perfectly developed in the prismatic zone or may be due to an abnormal cleavage which has been very highly and perfectly developed. There would be a tendency to distortion in the fibers, due to pressure and other forces to which the mineral mass may have been subjected. In some instances it is undoubtedly true that the fibrous structure has been produced by a process of shearing, which has drawn out the

mineral parallel to the vertical axis, so that in the recrystallization it has assumed the fibrous structure.

Dr. George P. Merrill, in his paper already cited,‡ sums up the results of his investigation as follows:

The points brought out in this paper and the suggestions advanced are (1) that a very considerable proportion of the mineral in commercial use and labeled as asbestos in mineral cabinets is in reality anthophyllite, and (2) that the fibrous structure in this case and in that of the true asbestos as well, is due, in many instances at least, to a process of shearing, is, in fact, an exaggerated form of the process of uniaxialization.

That a great deal of the amphibole asbestos is the result of the alteration of a pyroxene is undoubtedly true, but it is also true that a large proportion of the asbestos represents an original amphibole mineral. It has not yet been definitely determined, however, whether or not this asbestos represents an original crystallization, although there is some evidence in favor of its not being a secondary mineral. Dr. Merrill believes "that the asbestos form is never a result of original crystallization, but is always secondary, the original mineral doubtless being an orthorhombic or monoclinic pyroxene, or perhaps an amphibole." As further stated by Dr. Merrill, there is an ample field for investigation along this line in determining the original character of the different varieties of amphibole asbestos and also their present mineralogical character.

The chrysotile variety of asbestos is an entirely distinct mineral species from the amphibole varieties. It is a fibrous serpentine, whose composition is represented by the formula  $H_4Mg_3Si_2O_{10}$ , a hydrous magnesium silicate. Chemically it is readily distinguished from the amphibole varieties by its containing a large percentage of water. Physically, it is more silky in luster and its fibers are stronger and more elastic. In the table below are given analyses of chrysotile, anthophyllite and tremolite asbestos.

*Analyses of Asbestos.*

| CONSTITUENT     | I.                     | II.                              | III.                        |
|-----------------|------------------------|----------------------------------|-----------------------------|
|                 | Chrysotile<br>(Canada) | Antho-<br>phyllite<br>(Virginia) | Tremo-<br>lite<br>(Georgia) |
| $SiO_2$ .....   | 40.57                  | 56.52                            | 55.81                       |
| $Al_2O_3$ ..... |                        | 3.57                             | 1.66                        |
| $Fe_2O_3$ ..... | .90                    |                                  |                             |
| FeO.....        | 2.81                   | 10.08                            | 6.81                        |
| CaO.....        |                        | Trace                            | 12.74                       |
| MgO.....        | 41.50                  | 27.13                            | 21.09                       |
| $H_2O$ .....    | 13.55                  |                                  |                             |
| Ignition.....   |                        | 2.96                             | 1.81                        |
| Total.....      | 99.33                  | 100.26                           | 99.92                       |

I. J. T. Donald, analyst.

II. R. L. Packard, analyst.

III. George P. Merrill, analyst.

The fibers of this asbestos are usually perpendicular or at high angles to the walls, but very rarely they have been observed where they are parallel to the walls. They occur in the serpentine, as a rule, near the source of some local disturbance, as the presence of granitic dikes in the serpentine, or near the contact of the serpentine with the main mass of the country rock. It has not been definitely determined what the causes are for the formation of this fibrous serpentine, but suggestions regarding this matter are considered later under the heading "Canadian asbestos."

## PRODUCTION.

The production of asbestos in the United States during 1902 was chiefly from the mines at Sall Mountain, White County, Ga., with smaller amounts from near Hinsdale, Berkshire County, Mass., the total quantity being 1,007 short tons, valued at \$16,200. This is an increase of 258 tons in quantity and of \$2,702 in value over the pro-

\* Proc. U. S. Nat. Mus., vol. 18, pp 281-292.

† Proc. U. S. Nat. Mus., vol. 18, p. 291.

‡ Proc. U. S. Nat. Mus., vol. 18, p. 289.

duction of 1901, which was 747 short tons, valued at \$13,498. Of this production all but a few tons was amphibole asbestos. In the development work of the Connecticut Asbestos Company there were about 500 tons of asbestos taken out, but none of it was treated or placed on the market. The same is true of the Vermont deposits, although during 1901 it was fully expected that this asbestos would be placed on the market in 1902. The production of asbestos in the United States has never been over 1,200 tons per annum, and when these figures are compared with the amount of asbestos imported, which is almost entirely of the chrysotile variety, it will be appreciated how large is the demand for this variety. In the table following are given the quantity and value of the annual production of asbestos in the United States since 1880, inclusive :

*Annual production of Asbestos, 1880-1902.*

| Year | Quantity   | Value   | Year | Quantity   | Value   |
|------|------------|---------|------|------------|---------|
|      | Short tons |         |      | Short tons |         |
| 1880 | 150        | \$4,312 | 1892 | 104        | \$6,416 |
| 1881 | 200        | 7,000   | 1893 | 50         | 2,500   |
| 1882 | 1,200      | 36,000  | 1894 | 325        | 4,463   |
| 1883 | 1,000      | 30,000  | 1895 | 795        | 13,525  |
| 1884 | 1,000      | 30,000  | 1896 | 504        | 6,100   |
| 1885 | 300        | 9,000   | 1897 | 580        | 6,450   |
| 1886 | 200        | 6,000   | 1898 | 605        | 10,300  |
| 1887 | 150        | 4,500   | 1899 | 681        | 11,740  |
| 1888 | 100        | 3,000   | 1900 | 1,054      | 16,310  |
| 1889 | 30         | 1,800   | 1901 | 747        | 13,498  |
| 1890 | 71         | 4,560   | 1902 | 1,005      | 16,200  |
| 1891 | 66         | 3,960   |      |            |         |

IMPORTS.

In 1902 the total value of the imports of asbestos was \$762,432, an increase of \$70,604 over that of 1901, which amounted to \$691,828. This in turn was an increase of \$335,877 over that of 1900, which was \$355,951, and illustrates the phenomenal increase in the demand in the United States for the chrysotile asbestos.

In the following table is given the value of the asbestos imported into the United States since 1869, inclusive :

*Value of Asbestos imported, 1869-1902.*

| Year ending | Unmanu-<br>factured | Manufac-<br>tured | Total  | Year ending | Unmanu-<br>factured | Manufac-<br>tured | Total    |
|-------------|---------------------|-------------------|--------|-------------|---------------------|-------------------|----------|
|             |                     |                   |        |             |                     |                   |          |
| 1869        | \$ 310              | \$ 310            | \$ 620 | 1885        | \$73,026            | \$ 617            | \$73,643 |
| 1870        | 7                   | 7                 | 14     | 1886        | 134,193             | 912               | 135,105  |
| 1871        | 12                  | 12                | 24     | 1887        | 130,264             | 581               | 130,845  |
| 1872        | ...                 | ...               | ...    | 1888        | 168,584             | 8,126             | 176,710  |
| 1873        | \$ 18               | ...               | 18     | 1889        | 254,239             | 9,154             | 263,393  |
| 1874        | 152                 | ...               | 152    | 1890        | 252,557             | 5,342             | 257,899  |
| 1875        | 4,706               | 1,077             | 5,783  | 1891        | 353,589             | 4,872             | 358,461  |
| 1876        | 5,485               | 396               | 5,881  | 1892        | 262,433             | 7,209             | 269,642  |
| 1877        | 1,671               | 1,550             | 3,221  | 1893        | 175,602             | 9,403             | 185,005  |
| 1878        | 3,526               | 372               | 3,908  | 1894        | 240,029             | 15,989            | 256,018  |
| 1879        | 3,204               | 4,624             | 7,828  | 1895        | 225,147             | 19,731            | 244,878  |
| 1880        | 9,736               | ...               | 9,736  | 1896        | 229,084             | 5,773             | 234,857  |
| 1881        | 27,717              | 69                | 27,786 | 1897        | 263,640             | 4,624             | 268,264  |
| 1882        | 15,235              | 504               | 15,739 | 1898        | 287,636             | 12,897            | 300,533  |
| 1883        | 24,369              | 243               | 24,612 | 1899        | 303,719             | 8,949             | 312,668  |
| 1884        | 48,755              | 1,185             | 49,940 | 1900        | 331,799             | 24,155            | 355,954  |
|             |                     |                   |        | 1901        | 667,087             | 24,741            | 691,828  |
|             |                     |                   |        | 1902        | 729,421             | 33,011            | 762,432  |

CANADIAN ASBESTOS.

Nearly all the asbestos imported into the United States is obtained from Canada, and is of the chrysotile variety. These deposits are associated with the basic magnesian rocks mentioned above as extending from northern Alabama, in the United States, northeast to Gaspé Peninsula, in Canada. There are three distinct Canadian districts, all in the Province of Quebec, from 60 to 100 miles south and southwest of Quebec. One is in the vicinity of Danville; the second is near Coleraine, Black Lake and Thetford, about 30 miles northeast of the

first; and the third is near Broughton, about 15 miles northeast of the second. All these deposits have good railroad facilities, those near Danville being on the Grand Trunk Railroad and the others on the Quebec Central. There is still another district in the vicinity of Ottawa where asbestos occurs in limited amount, but it has not yet assumed any importance as a producer of this mineral.

Intercepting the serpentine, with which the asbestos is associated, are masses and dikes of a granitic rock; and there is a relation to be inferred between the asbestos and these granitic dikes. In nearly all cases where asbestos is mined, small seams or dikes of the granitic rock are observed cutting the serpentine. On one side of these granitic dikes the serpentine is hard and compact and contains very few and very small seams of the asbestos, while on the opposite side the serpentine is softer, less compacted, contains seams, and in some cases has strong indications of a shearing movement. It is in rock of this character that the asbestos seams are the largest and most abundant.

These seams are often cut off from the denser serpentine by a very sharp and distinct line similar to a fault line. The presence of these dikes of granitic rock would be sufficient cause to account for the cracking and fracturing of the original peridotite rocks, with perhaps a certain amount of a shearing action. In the subsequent alteration of these rocks into serpentine the fibrous or crystalline serpentine, due to recrystallization aided by aqueous reactions, would be formed along these cracks and fractures. Some chrysotile asbestos is undoubtedly formed by a shearing movement, which may be the case where the fibers are parallel to the sides of the seam. In most cases, however, the fibers are at nearly right angles to the sides and were more probably formed as described above.

In this Canadian district the presence of the small granitic dikes is an aid in following the asbestos and should be of considerable assistance in locating favorable places to work from surface indications, if these granitic dikes outcrop on the surface.

The seams of asbestos vary from one-sixteenth of an inch to, rarely, 3 inches in thickness. The fiber, which measures from one-half inch to several inches in length, is put on the market as crude asbestos, and is the profitable product of the mines. The percentage of this quality of asbestos in the rocks is very variable, and from 30 to even 90 tons of rock have to be mined to yield 1 ton of crude asbestos. Besides this, there is more or less very short fiber that is milled and sold as mill fiber or paper stock. The necessary removal of such a very large percentage of waste rock renders it necessary to economize in every way possible in the handling of this rock.

The general method employed for mining this kind of asbestos is by open cuts or pits, as in quarrying; the rock being worked out by benches as far as practical. In most cases drilling is by steam or compressed air, except in the smaller places, where hand drills are employed. Holes are drilled from 8 to 12 feet and the blasting is only intended to thoroughly loosen and shatter the rock. It is then pried out with crowbars, and the pieces containing asbestos are broken by means of heavy sledges and steel wedges to such size that the asbestos can be readily broken out with small hammers. In the smaller mines the waste rock and asbestos are removed by means of a derrick, but in the larger ones cables are used. The asbestos is then transferred to a drying room, and when dry is hammered in order to separate as completely as possible all attached rock and also to separate the fibers. This material is divided into three grades, according to quality, which are known as No. 1 crude, No. 2 crude (white), and No. 3 crude (red). It is shipped in bags of 100 pounds each. The remainder of the asbestos rock, which contains fibers from a minute fraction of an inch to about one half inch in length is treated in the mills and made into mill fiber or paper stock. This material is first dried, then crushed to the right

degree of fineness, and then passed into the "cyclone," where there is a nearly complete separation of the fibers from the rock. The fibers are thrown on the separating sieves, from which they are drawn away by exhausts. The rock, which during this process has been reduced to a sand, is ejected into bins. This still carries some asbestos, and it is beginning to be used in some quantity, being placed on the market as asbestic. The prices of these various grades of asbestos are about as follows: No. 1 crude asbestos, \$150 to \$250 per ton; No. 2 crude (white) asbestos, \$75 to \$125 per ton; No. 3 crude (red) asbestos, \$50 to \$75 per ton; mill fiber or paper stock, \$20 to \$40 per ton; asbestic, \$1 to \$3 per ton.

The following companies are mining asbestos in these Canadian fields: Bell's Asbestos Company and Beaver Asbestos Company, at Thetford; King Brothers and Johnston's Company, Limited, (A. S. Johnston, manager), at Thetford and Black Lake; the Union mines (T. H. Crabtree, manager), Standard Asbestos Company, Canadian Asbestos Company, Manhattan Asbestos Company, and the Kerr-Murphy Mine at Black Lake; the James Reed Mine at Reedsdale; the East Broughton Asbestos Manufacturing Company, at East Broughton; the Asbestos and Asbestic Company, Limited, at Danville, and the Columbia and Ottawa Asbestos Company, of Ottawa. During the last six months there has been a consolidation of a number of the mines of Black Lake and Thetford, which have been brought under the control of the New England-Canadian Asbestos Company, which also owns asbestos deposits in Vermont.

During the last year two interesting articles have appeared on the Canadian asbestos deposits, one by Mr. W. Mollmann, on Asbestos and its Production in Canada,\* the other by Fritz Cirkel on Vorkommen und Gewinnung von Asbest in Canada.†

#### PRODUCTION OF CANADIAN ASBESTOS.

As nearly all of the asbestos used in the United States is obtained from Canada, the following table, which gives the production of this mineral in that country, will be of interest:

*Annual production of Asbestos in Canada, 1879-1902.*

| Year | Quantity   | Value     | Year | Quantity   | Value     |
|------|------------|-----------|------|------------|-----------|
|      | Short tons |           |      | Short tons |           |
| 1879 | 300        | \$19,500  | 1891 | 9,279      | \$999,978 |
| 1880 | 380        | 24,700    | 1892 | 6,042      | 388,462   |
| 1881 | 540        | 35,100    | 1893 | 6,473      | 313,806   |
| 1882 | 514        | 52,650    | 1894 | 7,630      | 420,825   |
| 1883 | 955        | 68,750    | 1895 | 8,756      | 368,175   |
| 1884 | 1,141      | 75,079    | 1896 | 12,250     | 429,856   |
| 1885 | 2,440      | 142,441   | 1897 | *30,442    | 445,368   |
| 1886 | 3,458      | 206,251   | 1898 | *23,785    | 486,227   |
| 1887 | 4,619      | 226,976   | 1899 | *25,536    | 485,849   |
| 1888 | 4,404      | 255,007   | 1900 | *30,641    | 763,431   |
| 1889 | 6,113      | 426,554   | 1901 | *38,079    | 1,186,434 |
| 1890 | 9,360      | 1,260,240 | 1902 | 140,416    | 1,148,219 |

\* Including asbestic.

† Including 10,197 tons of asbestic.

The demand for Canadian asbestos is still increasing, as indicated in the above table. The apparent decided variation in value of the asbestos produced is due to the varying amount of asbestic put on the market. Thus the increase of less than 4 per cent. in value accompanying an increase of nearly 150 per cent. in production of 1897 was due to this fact; and, conversely, the increase of 17 per cent. in value in 1898, with a decrease of nearly 22 per cent. in production, was due to a smaller production of the asbestic.

\* The Canadian Mining Review, June 30, 1902, p. 152.

† Zeitschr. für prak. Geol., vol. 11, 1903, p. 123.

The annual dinner of the Institution of Mining and Metallurgy was held in London, England, on the 25th Nov. The new edition of the list of members corrected to August, 1903 has also been issued.

## BOOK REVIEWS.

**ORE DEPOSITS—A DISCUSSION.**—Reprinted from the Engineering and Mining Journal. Pages, 90; octavo; cloth. Price, \$1.00 postpaid. Engineering and Mining Journal, New York.

This valuable little volume contains a reproduction of the views expressed before the Geological Society of Washington, at two consecutive monthly meetings held early in the present year, and which were afterwards in the columns of the Engineering and Mining Journal. Some important corrections and amplifications have, however, been made in the present volume. The latest opinions on an ever interesting subject are here given clear expression, and will be read with interest by all persons engaged in the practical or theoretical study of ore-bodies valuable to man.

The discussion proper is preceded by an exceedingly able and interesting review of some fourteen pages from the pen of Mr. T. A. Rickard, Editor-in-Chief of the Engineering and Mining Journal. Among the well-known and authoritative writers, geologists, and engineers taking part in the discussion were:—Messrs. S. F. Emmons, W. H. Weed, J. E. Spurr, W. Lindgren, J. F. Kemp, F. L. Ransome, C. R. Van Hise, T. A. Rickard, and C. W. Purlington.

**THE METALLURGY OF ZINC AND CADMIUM.**—By Walter Renton Ingalls. The Engineering and Mining Journal, New York. Pages, 700; profusely illustrated. Price, \$6.00 postpaid.

In this comprehensive, useful and reliable work the author has handled his subject in a manner fully sustaining his acknowledged reputation as the leading authority in all matters relating to modern practices in this branch of metallurgy. Until the publishing of the present volume, no special or extensive treatise on this metal had been printed, although many essays and pamphlets have appeared from time to time describing various processes of treatment in a general way, and some literature concerning it may be found in the files of several technical periodicals and also in the transactions of certain foreign scientific societies, notably French and German, as until recently the Belgian and German engineers are entitled to the credit of being the leaders in the practical application of modern methods in the smelting and refining of zinc ores. In Mr. Ingalls' work minute descriptions are given of many furnaces and processes which are now old and out of date, and also of many new ones which have not so far been put to practical uses. The author has divided his subject into nineteen chapters, containing over 400 cuts and illustrations, and a perusal of the following headings which are fully described in the various chapters, will give some idea of the scope of this exceedingly valuable addition to the mining literature of the country:—Zinc and its Ores, Calcination of Calamine, Blende Roasting, Roasting Furnaces, Utilization of the Sulphurous Gases, General Principles of Zinc Distillation, Retort and Condenser Manufacture, Fuel and Systems of Combustion, Chimneys, Heat Recuperation and Furnace Design, Distillation Furnaces, Practice in Distillation, Losses in Distillation, Refining Impure Zinc and Composition of Commercial Spelter, Cadmium and its Recovery, Cost of Producing Zinc, Design and Construction of Smelter Works, Examples from Practice, Proposals to Smelt Zinc Ore in the Blast Furnace, Manufacture of Zinc Dust, Zinc White, Zinc Sulphate and Zinc Chloride.

**DEEP GOLD MINING IN NOVA SCOTIA.**—By E. R. Faribault, C.E., Geological Survey of Canada. A report on the best methods of testing the value of the deeper Gold Deposits of Nova Scotia. Printed by order of the Government of Nova Scotia.

During the last session of the Nova Scotia Legislature an Act was passed, entitled "An Act to Encourage Deep Mining in the Gold Fields of Nova Scotia," which, among other things, authorized the appropriation of a sum of money for the sinking of three deep shafts in the gold fields of the province. With a view to the selection of the most suitable locations for these test shafts, the Government deemed it advisable to utilize the intimate knowledge of the gold fields, acquired by Mr. Faribault during his many years field work in the gold districts. The results of this work done by Mr. Faribault, and the conclusions he has arrived at, are fully set forth in the above-mentioned report. The author draws attention to the analogy between the gold reefs of the province and the gold bearing saddle-reefs of the celebrated gold fields of the Bendigo District, in Victoria, Australia. In the latter diggings, shafts have been sunk to, and profitably operated, at depths reaching four thousand feet, and he infers from the similarity of the anticlinal and synclinal folds that there is every probability that the underlying saddle-veins of the province will be found as large in size and as rich in gold as those cropping at the surface. As most of the mining done in Nova

Scotia during the past forty years has been confined to the saddle-veins outcropping near the surface, the consequence is that the richest and most easily worked portions are now almost exhausted.

Mr. Faribault's report will be read with interest by all practical mining men, and should the facts and deductions he has presented be borne out by the work now being prosecuted by the Dolliver Mountain, Richardson, and other mining companies on the lines and recommendations laid down by himself and other members of the Survey, prove satisfactory, there would be cause for equal satisfaction from both an economic as well as a scientific standpoint.

**ECONOMIC MINERALS OF NOVA SCOTIA.**—A catalogue and description of the exhibit of Nova Scotia minerals made for the Provincial Exhibition held at Halifax, September, 1903.

In this catalogue, which was prepared by Dr. Edwin Gilpin, jr., Inspector of Mines, and Deputy Commissioner of Public Works and Mines, is given a description of the various coal measures of the Island of Cape Breton, and also those in Pictou and Cumberland Counties, Nova Scotia. Tables are also shewn illustrating the coal trade by counties for the year ending September, 1902. The production of the various mines and collieries for the same period appears in detail, together with much information respecting the number of engines in use and workmen employed in the industry. Gold mining, in the prosecution of which a very large amount of capital has been employed during the last forty years, is fully dealt with, and many interesting tables have been compiled setting forth the growth of this important source of wealth to the province, amounting as it did during the years from 1862 to 1902 to nearly \$15,000,000. A summary is also included which gives much useful information concerning operations respecting other minerals of economic importance, such as, graphite, oil, limestone, barytes, building stones, &c., fireclay, clay, moulding sand, pyrrhotite, talc, celestite, diatomaceous earth, and various hydrated oxides of iron and manganese used for making paints.

Mentioned in the list of minerals known to occur, but which have not so far been discovered in sufficient quantities to be of economic value, are sulphur, molybdenum, cobalt, nickel, zinc, tin, phosphates and salt. Persons interested in the mineral development of Nova Scotia will find much new and reliable information, which will reward a careful perusal of the pages of this timely pamphlet.

## MEETINGS OF MINING SOCIETIES, &c.

### The Nova Scotia Mining Society—Semi-Annual Meeting.

The semi-annual meeting of the Nova Scotia Mining Society was held at Halifax, on Tuesday, the 19th ulto, and was largely attended. In the absence of the president, Mr. Cornelius Shields, the chair was filled by Mr. Alex. McNeil, the vice-president. The following were among those present:—Alex. McNeil, Port Hood Coal Co.; Alex. Dick, Dominion Coal Co.; James Baird, manager, Maritime Coal Co.; A. A. Hayward, Waverley; G. W. Stuart, manager, N. S. and Mexican Mining Co.; Hugh Fletcher, Geological Survey, Ottawa; C. N. Crowe, manager, Dominion Antimony Co.; F. H. Mason, Halifax; Francis Burrows, general manager, Cumberland Coal and Railway Co.; G. D. Burritt, Halifax; G. J. Partington, manager, Dolliver Mountain Mining and Milling Co.; H. Piers, Halifax; H. S. Poole, Halifax; R. A. C. McNulty, Halifax; Charles C. Starr, J. Starr, Sun & Co.; J. H. Austen, Halifax; J. G. Rutherford, Windsor; F. P. Ronan, Halifax; W. C. Milner, Halifax; Prof. Ernest Haycock, Acadia College; H. M. Wylde, Halifax; J. M. Geldert, Halifax; G. E. Francklyn, Halifax; B. C. Wilson, Waverley; D. C. Hood, Dominion Antimony Co.; J. C. Taylor, Sullivan Drill Co.; Hon. S. H. Holmes, Halifax; J. A. Johnson, Halifax; W. B. Ross, Halifax; F. W. Hauwright, Halifax; T. R. Gue, Halifax; M. R. Morrow, Halifax.

During the meeting and since the annual meeting, the following named had been elected to membership in the society:—P. H. Moore, Chester Basin; J. B. Forrest, Port Hood; G. V. White, Sydney; G. H. Gillespie, Ecum Secum; J. C. Taylor, New Glasgow; Francis Burrows, Joggins Mines; Professor Sexton, Dalhousie College.

#### WORK OF PAST MONTHS.

Vice-President McNeil, in touching on the work done since the annual meeting, explained the reasons why the semi-annual meeting had not been held in Sydney as was intended. The majority of the committee, in the facetious language of the vice-president, thought that it would be better not

to go visiting "when a divorce was about to take place in the family," alluding to the condition of the big works at Sydney. At meetings of the executive council the question of legislation to prevent gold stealing had been considered. At the April meeting a resolution of gratification at the introduction into the legislature of a government measure to encourage deep mining in Nova Scotia was adopted. Allusion was made to the securing of the mining exhibit for the provincial exhibition, and to the fact that the society had been incorporated.

#### R. R. FARIBAULT ON DEEP MINING.

One of the first matters that came up at the forenoon session was a letter from Mr. W. L. Libbey, in reference to a report by E. R. Faribault on deep mining in Nova Scotia. Mr. Libbey criticised the report, holding that Mr. Faribault's investigations had been too hastily made to warrant the drawing therefrom of any definite conclusions. It was brought out in the discussion which followed, participated in by Messrs. Partington, Stuart, Poole, Hayward and Mason, that Mr. Faribault's investigation had been merely to find out to which classification the vein on which work was being done belonged. Mr. Hayward expressed doubts as to the correctness of Mr. Faribault's views regarding the Dufferin mine at Salmon River, but it was stated that the location of the shaft in that district was not properly placed. Mr. G. W. Stuart announced an important discovery at Goldenville, confirming Mr. Faribault's views with regard to that district.

#### BETTER MINING REPORTS

The committee composed of Messrs. Stuart, Drummond and Poole who, at a previous meeting, were appointed to prepare a reply to a request from the Commissioner of Works and Mines regarding the society's request for improvements in the report of the department, submitted a draft of a report. It was decided to send reply to the following effect:—(1) That the report be written in good English, free from typographical errors; (2) that it be accurate as regards statistics; (3) that appropriate comments be made on accidents that teach a lesson. Comment on the late report of the department would be incomplete without endorsement of the suggestion of D'Arcy Weatherbe, respecting the enforcement of the law referring to the keeping of mine plans, and to ask, with him, why this law has been neglected for so many years in spite of frequent complaints. Examples were quoted of shortcomings in the reports as of late presented.

#### INACCURATE SURFACE PLANS.

It was pointed out that the present surface plans of mining areas are entirely inaccurate. New plans are needed; a new survey is required. It is not so much, one speaker said, that they are wanted but that the province cannot afford to be without them. Mr. Partington, in referring to the inaccuracy of the mining and crown lands plan, mentioned the good work being done by Mr. Weatherbe. Mr. J. G. Rutherford spoke of accidents that had occurred in England through the failure to have plans of the old workings. When he came here he had strongly urged that such be prepared. Mr. Rutherford took occasion to highly commend the work of the Nova Scotia Mining Society.

#### CUMBERLAND COAL AREAS

The afternoon session was made particularly interesting by the presence of Mr. Hugh Fletcher, of the Dominion Geological Survey, who had maps of the coal districts of Cumberland, Colchester and Pictou counties not yet published. Mr. Fletcher made a valuable address, stating that he was giving the information by permission of Dr. Bell, director of the survey. He referred to the geological structure of the southern vein of a coal basin, and the probability that north of the Cobequid hills, between the coal mines of Pictou and Cumberland, workable seams of coal may be present, covered or overlapped by higher rocks, to be reached only by boring. In illustration of this he referred to the fact that, for twenty miles from the Joggins Mines eastward, the worked coal seams dip to the southward; and that at Springhill Mines large seams dip to the westward, but that on the south side of the Cumberland basin these seams do not reappear, but are apparently overlapped by higher rocks. Mr. Fletcher thought it highly desirable that both this basin and another, extending eastward from the neighborhood of Thomson Station into Pictou county, should be thoroughly tested. Explorations for coal in Cumberland and Colchester until some such test has been made, must be regarded as somewhat of a venture, but one which will warrant the judicious expenditure of capital.

#### MR. J. A. JOHNSON'S IDEA.

Mr. J. A. Johnson congratulated the society on having heard Mr. Fletcher, whose work had been of great advantage to the whole of Nova Scotia. When he (Johnson) had seen that the estimate for this work had been cut down in the House of Commons, he had written to the maritime members

showing them that about all that Nova Scotia got from the Confederation was the work of the geological department, and that now that was cut down. Perhaps Nova Scotia should do this work herself and be independent of the freaks of lithographers who take months to do the work that should be done in days. He was glad to say that the original amount had been restored. He did not think that members of the government, who lie back in luxury and grind out laws, treated with fairness a man like Mr. Fletcher, who had to rough it and who did much valuable work. He thought a much larger appropriation should be made.

Mr. A. Dick said he quite concurred in what had been said. After being in British Columbia he had concluded that the east and the importance of its interests were often overlooked. With our great resources a more generous policy should be displayed towards the east. Could it be that the reason is that we are not sufficiently strenuous in seeking our rights? We should receive from the Government better and more prompt reports of Mr. Fletcher's work. He thought with Mr. Johnson, that the society should memorialize the Ottawa authorities.

#### WORK FOR THE PROVINCE.

Hon. S. H. Holmes believed, on the other hand, that the local government, which receives all the revenues from the coal and minerals of Nova Scotia, should render adequate assistance. The Dominion Government, which has done all that has been accomplished, received no benefit.

Mr. F. W. Hanwright spoke in terms of warm praise of the work of Mr. Fletcher, and said that the results of his work should be made public by the government earlier than they are. Mr. Fletcher's work had been invaluable.

#### THE RESOLUTION ADOPTED.

Mr. Johnson then moved a resolution that, whereas the geological department had for years sent an agent to investigate the coal fields of Nova Scotia, and whereas yearly reports are made accompanied by maps, which the department does not publish; therefore be it resolved, that the Nova Scotia Mining Society memorialize the government that they should at the earliest possible moment, supply those maps to the public. The motion was seconded by Mr. Alex. Dick and passed unanimously. A vote of thanks was tendered to Mr. Fletcher.

Mr. H. S. Poole read an interesting paper on "A trip to the coal region of West Virginia," which was supplemented by a few remarks from Mr. Alex. Dick, of the Dominion Coal Co. pointing out that the ease of mining coal in Virginia and its consequent economy, is somewhat neutralized as compared with Cape Breton in the distance of the Virginia mines from the water, so that Nova Scotia can hope successfully to compete in the markets of the world.

Mr. J. A. Johnson, Halifax, though not a commissioner, said that he would do his utmost to impress on the Exhibition Commission the wisdom of erecting a suitable and artistic building for the accommodation of the mining exhibit. The meeting then adjourned.

#### American Mining Congress.

The sixth annual convention of the American Mining Congress closed its sessions at Deadwood and Lead, South Dakota on September 12th. The day first set for the opening of the congress was Monday September 7th, but this being Labor Day, no regular business was transacted, and the proceedings were limited to an address of welcome on behalf of the State delivered by Hon. Charles N. Herried, Governor of South Dakota. Mayor E. McDonald also welcomed the delegates on behalf of the citizens of Deadwood. On Tuesday, the 8th, the congress got down to work as on the afternoon of that day the president, Mr. J. H. Richards, of Boise, Idaho, delivered his annual address. Hon. Mr. Shaw, Secretary of the Treasury of the United States, who had come from Washington, D. C. specially for this purpose, delivered an address the same afternoon on "The Mining Industry and Its Relation to American Finances." Amongst other items he gave the value of the product of the mine in the United States as \$1,000,000,000, the proportions contributed by the metallic and non-metallic mineral being about equal. As his estimate of the U.S. production of iron ore Mr. Shaw quoted 30,000,000 tons an amount equalling about one-third of the world's supply, and probably as much as that produced by any other two countries on the globe.

Many excursions were indulged in but probably the most interesting being the one taken to the properties of the Homestake Mining Company at Lead, S.D., where the delegates were ably looked after by the company's staff under the direction of superintendent Grier.

In the course of the meeting many interesting and valuable papers were read, in most cases by their authors, the following is a partial list:—

Dr. Franklin H. Carpenter, Denver, Colorado, "Pyritic Smelting." Dr. J. N. Todd, State Geologist of South Dakota, Vermillion, South Dakota, "The Geology of South Dakota." Mr. Charles W. Merrill, Lead, South Dakota, "The Cyanide Process as Used in the Homestake Mine." Dr. D. C. O'Hara, State School of Mines, Rapid City, S. Dakota, "Geology and Mineralogy of the Black Hills." Prof. J. A. Holmes, Chief Department of Mines and Metallurgy at Louisiana Purchase Exposition, St. Louis, Mo., "The St. Louis Exposition." Mr. Nelson H. Darton, Geological Survey, Washington, D. C., "The Geology of the Black Hills." Mr. J. D. Irving, United States Geological Survey, Washington, D. C., "Ore Deposits of the Northern Black Hills." Hon. C. E. Van Dusen, M. E., Nevada, "Mining Industry in Nevada." Mr. E. W. Parker, Washington, D. C., "Coal." Mr. John Blatchford, Terry, S. Dak., "Practical Mining in Flat Formations of the Black Hills." Hon. George E. Roberts, Director of the Mint, Washington, D. C., "The Production of Gold and Its Relation to the Finances of the Country." Hon. J. L. Webster, Omaha, Neb., "The Money Metals and Their Influence Upon Civilization." Mr. C. L. Dignowity, Boulder, Colo., "The Revelation in Gold Mining and the Economic Treatment of Low-Grade Ores for North Carolina." Mr. C. O. Bartlett, Cleveland, Ohio, "The Drying of Metals." Dr. A. H. Elfton, Silverton, Colo., "The Gold Ores of San Juan Country." Dr. C. Willard Hayes, Assistant Director of the United States Geological Survey, "The United States Geological Survey and Its Relation to the Development of the Mineral Resources of the United States." Mr. Eben Parker Low, Honolulu, Hawaii, "The Mining Resources of Hawaii."

The election of officers for the ensuing year resulted as follows:—J. H. Richards, Boise, Ida., president, re-elected; Thomas Ewing, Los Angeles, Cal., first vice-president; R. C. Patterson, Omaha, Neb., second vice-president; John T. Grayson, Portland, Ore., third vice-president; Irwin Mahon Carlisle, Pa., secretary. Directors: J. H. Richardson, Ida.; T. Ewing, California; R. C. Paterson, Nebraska; J. T. Grayson, Portland, Oregon; E. F. Brown, Aspen, Colo.; J. Dern, Salt Lake, Utah; J. A. Holmes, Raleigh, N. C.; James H. Lynch, Butte, Mont.; John Gray, Terra-ville, S. Dak.

The seventh annual meeting will be held in Portland, Ore., during the autumn of 1904.

The Iron and Steel Institute of Great Britain will hold its next annual meeting in the United States, as at the conclusion of the last general meeting at Barrow-in-Furness, Mr. C. Kirchhof, of New York, tendered, on behalf of the American members of the Iron and Steel Institute, an invitation to the Institute to hold its next autumn meeting in New York. This invitation, which was endorsed by the American Institute of Mining Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the Franklin Institute, and the American Foundrymen's Association, was, on the motion of the president, accepted by the general meeting with acclamation.

It is proposed that the autumn meeting shall take place in New York on October 24th, 25 and 26th, 1904. After the meeting there will an excursion to Philadelphia, Washington, Pittsburgh, Cleveland, Niagara Falls, and Buffalo, returning to New York on November 10th. During the trip, night travelling will be avoided, and every endeavour will be made to obviate fatigue. The two Sundays will be spent at Washington and at Niagara Falls.

The California State Miners' Association met in San Francisco on November 16th. The session continued for three days.

The first meeting of the Canadian Section of the Society of Chemical Industry was held in the Grill Room of the King Edward Hotel, Toronto, on Wednesday, the 18th inst. Prof. W. R. Lang, D.Sc., in the chair. The following papers were read and discussed:—

1. "The Separation of Gold, Silver and Platinum," by Herbert Carmichael.
2. "The Economic Admission of Steam to Water-gas Generators of the Lowe Type," by Geo. W. McKee.

The next meeting of the Society will be held in Montreal during December.

A meeting of the Eastern Ontario Section of the Canadian Mining Institute took place at the School of Mining, Kingston, on Thursday, the 26th instant. The following papers were read and an interesting discussion ensued:—

1. "Typical Methods of Copper Extraction," by Prof. S. F. Kirkpatrick.
2. "Some Notes on Western Coals," by Prof. J. C. Gwillim.
3. "Notes on the Occurrence, Production and Uses of Mica," by E. T. Corkill.

### The Granby Consolidated.

In submitting the annual report of the Granby Consolidated Mining, Smelting and Power Company, Limited, at the meeting held in Montreal recently, the chairman said:—

"Its operations have been greatly hampered by the difficulties that have existed in the coke and coal situation, which have necessitated the running of our smelter plant at practically only one-half of its capacity. We are glad to state that these difficulties have now been overcome, and we look for no further trouble in this direction. Our smelter plant has now been increased by two furnaces, making six in all, which we expect will be run full from now on in place of the average of two furnaces, as was the case last year.

"The mines are now developed so as to produce a very large tonnage without further expenditure in this line. The plant at the mines, and also that at the smelter, are in the very highest state of efficiency. All development work and repairs have been charged to working expenses. Our company has no debt of any kind except current monthly accounts."

The following is a summary of the year's business:—

|                                                                                                                                           |             |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| The production for the year amounted to 12,551,758 lbs. fine copper, 277,574 oz. silver, 35,121 oz. of gold, for which was received ..... | \$2,232,741 |
| Received from rents and real estate sales.....                                                                                            | 38,511      |
|                                                                                                                                           | \$2,271,252 |

The above represents the net proceeds at Granby Works, freight to New York, refining and all other charges being deducted from the gross receipts.

#### COSTS.

|                                            |             |
|--------------------------------------------|-------------|
| Working expenses at mine and smelter ..... | \$1,136,830 |
| Foreign ore purchased.....                 | 72,954      |
| Foreign matte purchased.....               | 766,004     |
|                                            | \$1,975,789 |

|                                                |           |
|------------------------------------------------|-----------|
| Net profits for year ending June 30, 1903..... | \$295,463 |
| Surplus from previous year.....                | 398,071   |
|                                                | \$693,535 |

#### DEDUCT.

|                                                             |           |
|-------------------------------------------------------------|-----------|
| Bonus 1,000 shares treasury stock to valued employees ..... | 10,000    |
|                                                             | \$683,535 |

Net surplus June 30, 1903 .....

As shown in detail in annexed statement of assets and liabilities.

There has been expended in new construction at the mines and smelter during the year .....

Mine development, 3,127 lineal feet; mine surface stripping, 28,400 cubic yards; Granby ore shipped to smelter, 295,820 tons; Granby ore smelted, 289,583 tons; foreign ore smelted, 7,690 tons; foreign matte treated, 6,130 tons.

#### ASSETS AND LIABILITIES—JUNE 30TH, 1903.

##### ASSETS.

|                                                                                 |              |
|---------------------------------------------------------------------------------|--------------|
| Cost of land, real estate, machinery, buildings, dwellings, equipment, etc..... | \$13,845,516 |
| Cash, copper in transit and on hand, less advances.....                         | 179,807      |
| Store supplies .....                                                            | 93,913       |
| Accounts and bills receivable.....                                              | 55,496       |
|                                                                                 | \$14,174,734 |

##### LIABILITIES.

|                                          |              |
|------------------------------------------|--------------|
| Capital stock .....                      | \$13,363,030 |
| Accounts payable, current for month..... | 128,169      |
| Surplus .....                            | 683,535      |
|                                          | \$14,174,734 |

### Mineral Exports of Tasmania, 1902.

Taken from official sources, the following statement shows the value of the mineral products exported from the above colony during the year 1902. They do not greatly vary from the figures for 1900 and 1901, the differences being mainly due to the variations in prices:—

|                            |            |
|----------------------------|------------|
| Gold, ..                   | £ 170,968  |
| Silver ore,.....           | 193,905    |
| Silver-lead bullion, ..... | 191,034    |
| Tin, .....                 | 237,828    |
| Copper ore,.....           | 59,835     |
| Copper, blister,.....      | 583,795    |
| Copper, matte, .....       | 53,362     |
| Other minerals,.....       | 28,233     |
| Total.....                 | £1,318,960 |

Speaking generally as to the mining industry, Mr. Nowell, clerk of the Legislative Council says. "There are abundant opportunities for the employment of capital in mining in Tasmania (which would be immensely increased if a profitable mode of treating the zinc ore in bulk were discovered), but to insure success several requisites are necessary, viz., the nominal capital must be moderate, the working capital adequate for the purpose, the company managed economically, and the mining staff practically conversant with the latest and most successful modes of treatment of the particular kinds of ore to be operated on."

The Treasurer of Tasmania, in introducing the financial measures for the year 1904 remarked:—"There is no doubt that this State possesses very large deposits of tin, which must be worked upon an extensive scale to be made profitable, but this can only be secured by inducing outside capitalists to invest in this branch of Tasmanian mineral wealth."

### Coal Production in the N. W. Territories in 1902.

From the Annual Report of Mr. Arthur L. Sifton, Commissioner of Public Works of the Northwest Territories, we give the following interesting matter concerning the operations in this branch of industry during the year ending 31st December, 1902. It is satisfactory to note that the output during the year dealt with is largely in excess of 1901.

#### COAL PRODUCTION, 1902.

|                                  |               |
|----------------------------------|---------------|
| Bituminous and lignite coal..... | 494,087 tons. |
| Anthracite coal.....             | 16,587 "      |

Total .....

510,674 tons.

The figures given in the report for 1901 were:

|                                   |               |
|-----------------------------------|---------------|
| Bituminous and lignite coal ..... | 331,907 tons. |
| Anthracite coal. ....             | 14,742 "      |

Total .....

346,649 tons.

It will be noted that the total output for the past year exceeds that of 1901 by 164,025 tons, an increase of over 47 per cent.

The important bearing which the extensive coal areas of the Territories must have upon the future development of the country is now beginning to be realised and it seems quite certain that in the immediate future this industry must of necessity show marked extension in the line of the mining of coal for domestic purposes. Doubtless the great strike in the Pennsylvania coal fields of the United States during the year, and the resulting scarcity of fuel, has done much to direct attention to the inexhaustible coal supplies which we have near at hand, and the fact that the time has now practically arrived when the West can become entirely independent of the East for their fuel supply must have a marked bearing upon the rapid settlement and development of the Territories. It is true that as yet the anthracite coal fields have not been sufficiently developed to justify the hope that fuel of that class can be provided to meet all needs, but as far as the cheaper fuels of the lignite and bituminous coal classes are concerned it is now quite evident that we have an inexhaustible supply of both fuels of this kind.

#### SOURIS DISTRICT.

The area of lignite coal in the south-eastern portion of Assiniboia is now known to be practically inexhaustible and the use of that coal, owing to the improved methods of consumption in stoves, is very rapidly extending, and its use for the generation of steam has also shown a marked extension during the past year owing to the scarcity of other fuels and to the fact that experience has proved that, with proper grates and careful firing, very satisfactory results can be obtained from its use. In this connection it may be noted that a number of the larger steam grist mills in southern Manitoba, and one of the largest mills in Winnipeg, now use Souris coal altogether for the generation of steam. The Souris Coal Company, who now operate the mines previously worked by independent companies at Roche Percee and Coalfields, have extended their works so as to enable them to mine a much larger quantity of coal. The situation of their present works, however, on the banks of the Souris river is such that considerable difficulty is experienced in handling their coal, and a long up-grade haul is necessary before the coal reaches the prairie level for distribution east and west. It is probable that the company referred to will in the near future, find it expedient to abandon their present system of mining and adopt the system of reaching the coal by shafts sunk from the prairie level, with decreased cost of handling and material reduction in the mileage haul from the mines to the distributing centre at Estevan.

## CROW'S NEST PASS DISTRICT.

In the Crow's Nest Pass coal fields, in the Territories, the operations of the Canadian-American Coal and Coke Company at Frank show a marked development during the past year. That company is now putting out a large quantity of coal daily and the colliery promises to become an important one in the near future. Several other mines have been opened up in the district, but none of them have yet got beyond the development stages. Sufficient has, however, been done to clearly prove that the coal areas are of wide extent and of good quality, and there is every indication that in the near future this coal field will be one of the most extensive in the west. None of the coal so far mined has proved of first-class quality for cooking, but the indications are that coal which will make good coke will be located and that the manufacture of coke will be undertaken before long.

## LETHBRIDGE.

At the Lethbridge colliery the company are still extending their operations and the demand for this coal for domestic purposes is rapidly increasing.

## CANMORE.

At Canmore the indications are that the development work done by the company during the past season has now put the colliery on a more satisfactory basis and a large quantity of coal has been mined in that field during the past year, all of which, however, has been utilized for railway operation.

## ANTHRACITE.

The Anthracite mine shows an increase in output over the preceding year, but the deposit on the property owned by the company would seem, from the inspector's report, to have nearly reached the limit of output and, pending negotiations between the company and the owners of the adjoining property on which the anthracite deposits are situated, it seems probable that this mine will not show a marked increase of output in the near future.

## EDMONTON DISTRICT.

In the Edmonton country a marked extension is noted in the opening up of small mines, but I have again to direct attention to the fact that in view of the rapid extension of settlement in the Edmonton district and through the Saskatchewan valley to the east, it seems desirable that the coal mining industry should be taken in hand by a strong financial company and developed upon more permanent and extensive lines than those followed by the small companies, who operate on a hand-to-mouth basis and simply to meet local demands without any reference to the future extension of their workings.

## The World's Production of Gold.

The world's production of gold for the calendar year 1902, as estimated by the Director of the United States Mint, was \$285,888,600. Of this, Canada produced \$20,741,200 and the United States \$80,000,000. The silver production was \$215,861,800—Canada, \$5,546,500; United States, \$71,767,600.

The figures, compared with 1901, show an increase of 1,572,914 ounces of gold, and a decrease of 8,012,934 ounces of silver.

## The Rio Tinto Mine.

An English exchange has the following item respecting the above property which will be read with interest by Canadians as the Mr. Carlyle referred to is none other than Mr. W. A. Carlyle, M.E. who was a few years ago one of the Professors at McGill University and later Provincial Mineralogist of British Columbia:—

The Rio Tinto mine is said to be the largest in the world. It was managed at one time by a Cornishman, Captain Truran, and since then by Mr. William Rich, of Trevu Camborne. The present manager is Mr. Carlyle, a Scotsman. In the past three years under Mr. Carlyle's management, no less a sum than twenty-one millions of dollars has been paid out in dividends. The Rio Tinto has the largest reserve of ore in sight in the world, there being enough to permit of the present rate of extraction for the next 100 years. There are 2,600 men underground. When Mr. Carlyle assumed charge of the Rio Tinto he was beset with labor troubles, and was called upon to settle several strikes. This he did, and now matters are moving along smoothly, and the men are highly satisfied. The Rio Tinto was first worked by the Romans over twenty-six hundred years ago, and is rich in historical lore. There are 11,000 men on the payroll of the Rio Tinto, comprising 75 Englishmen on the staff in charge of departments. Mr. Carlyle,

says he has found the Spaniards excellent workmen. They receive their pay daily, a plan which is found to work well, as it tends to keep the men out of debt. The output of the Rio Tinto is about two million tons of ore per year, half of which is shipped to Europe and America, and sold for copper and sulphur values. About 5 per cent. of the ore is treated by smelting to blister copper in the latest type of American smelting plant. The balance is treated locally by leaching with water, a method distinctive to a few mines in the south of Spain, and no other part of the world. Every twenty-four hours seven million gallons of copper liquor from these leaches are run into canals filled with pig iron and metallic copper is precipitated, known as cement copper, which, with blister copper, is sent to the company's refining plant in Wales. The company turns out about eighty million pounds of copper a year, and it is one of the largest producers in the world, only being exceeded by the Anaconda, in Butte, and the Calumet and Hecla, in Michigan. It is not only the largest copper dividend paying mine, but pays more in dividends than any other mine in the world, with the exception of the De Beers' diamond mines in South Africa. The Rio Tinto pays from six and a half to nine millions a year in dividends, according to the price of copper.

## The Decline of Cornish Tin Mining.

In a recent issue of the *Cornish Post* appears the following letter from Sir Roper Lethbridge, an eminent authority:—

"Sir,—The kindly terms in which you speak of my services to India, as a professor of political economy, as a political agent, and finally as the Press Commissioner of India—whilst criticising my views as to the cause of the decay of Cornish tin mining, and the emigration of so many of our Cornish consins—are in accordance with the honourable tradition of courtesy to a political opponent held by the English Press; and I thank you for them.

On the Cornish trouble you say:—

Sir Roper Lethbridge attributes to Free Trade the decline in Cornish mining. We should like to know on what ground. The utmost protection to Cornish mining would not have enabled it to meet the growing demands of the world for tin. Cornwall's chief competitors are British colonies. Over 70 per cent. of the world's production of tin comes from within the British Empire, the bulk of it from the Malay States. Does Sir Roper Lethbridge mean to imply that we ought to stop the production of tin in our colonial possessions? If he does not mean this, then what does he mean?"

Now that is a fair and honourable challenge for open discussion, such as I am always longing to have with a really honest and intelligent Free Trader so earnestly do I believe that our system of Free Imports must kill our industries and ultimately starve our industrious working men, or force them to emigrate to countries where the fiscal system will give labour the fair chance that is, every day more and more, denied to it in our dear old England.

Well, sir, my first answer to the above statement is that the writer has forgotten the geography which I am sure he learnt carefully at school. One sentence from the report on our territories in the Malay Peninsula will show this quite clearly, and the writer will at once see that his whole argument is destroyed at a blow. The report states that:

'Tin ore to the value of £6,076,760 was exported from the colony during 1900, but none of this is produced in the colony itself, almost the whole of it being brought from the Federated Malay States.'

Now this is simply a splendid instance of the error that is invariably underlying the arguments of the Free Importers—though those arguments are often adduced in perfect good faith, as I am sure they were by the writer to whom I am replying. And it is also a splendid instance of the way that our existing fiscal system, idiotic at the present day, though well enough suited to the circumstances of fifty years ago, acts to the impoverishment of our working classes both at home and in the colonies, whilst it confers no benefit (or very little) on our richer classes, and only enriches the foreigner.

As an old Indian official, I have some knowledge of the working of this system in this particular case, and ask you permission briefly to state the facts about this foreign production of tin—produced by Chinese coolie labour of the lowest and cheapest type, and, being admitted to our ports, absolutely free, thus enabled, untaxed, to compete most unfairly with the production of our high-class Cornish labour, which certainly, directly or indirectly, pays its quota to the rates and taxes of the country.

The simple facts of the Malay tin industry are these:—

The rich tin deposits of the Malay Peninsula—chiefly alluvial, though a few mines of lode-tin like those of Cornwall have been discovered—are only found in the territories of the Sultans of the Malay States of Trengganu and Kelantan (the Sultan of Kelantan has a tin coinage), which are under the

protection of Siam; and in those of the Sultans of Pahang, Selangor, Perak, and Negri Sembilan, which are under the protection of Great Britain. Of course, not one of these Sultanats is in any sense a British Colony!—not one is included within the British Empire! And yet our beautiful "Free Trade" system enables these happy Malays to send all their tin into the British Colony of the Straits Settlements, and to export it thence over all the world—to the extent, as rightly stated above, of at least 70 per cent. of all the tin in the market—absolutely without one penny of fee, duty or royalty!

Of course, this liberality of our British system—to the foreigner—is most satisfactory to the Malay Sultans. It enables them to levy considerable export duties at the British frontier—these export duties on tin dumped on to us amount to just half the total revenues of the Sultans of Selangor and Perak!—simply because no duties at all are charged on the British side of the frontier—and still to undersell Cornish tin. In Selangor, in addition to the grand revenue obtained by the Sultan—it has risen from 115,000 dollars in 1875 to 6,303,000 dollars in 1900, owing to our benevolent fiscal system—nearly the whole Malay population are more or less maintained by the tin, the actual mining labour being largely done by Chinese coolies.

And much the same state of things obtains in other States, where Sultans and subjects alike are enriched by the coddling of our benevolent system; and meanwhile, when we hear of Cornish tin mines being shut down because they cannot compete with this protection of the foreigner, benevolent free importers like Mr. Lyulph Stanley suggest that it is well for Cornish miners to 'seek their fortune all over the world,' rather than tax the poor Sultans and proprietors of the Malay States. Now, in the circumstances I have described, I consider that suggestion a cruel one. A Cornishman—who is more than half-brother to a Devonshire man—has far too brave a heart to repine under fair competition. But just consider the real nature of this Malay competition. The tin of the Malay Sultans and their Malay subjects comes into our Colony, and thence into our home markets, subject to no Imperial taxation of any sort or kind. It is mainly produced by Chinese labour, which is subject to no sanitary or social restrictions of any sort, which is able to subsist on the merest pittance, and can be driven to any extent. It can undersell the Cornish tin, and yet enrich its Malay proprietors, not because its 'natural cost of production' is less than that of Cornish tin—for the remoteness and inaccessibility of the jungle-streams where it is found, the comparative untrustworthiness and inefficiency of the cheap labour by which it is worked, the profits of the numerous middlemen that handle it and the immense distances it has to be carried to market, more than make up for the depth and difficulty of the Cornish workings—but simply because of the protection that is afforded to it by our ridiculous fiscal system.

Lest I should be suspected of exaggerating the hard-heartedness of the free importers, in preferring that the Cornish miners should have to emigrate rather than that we should have to pay a fraction more for our Malay tin, I will here give the exact words of the Hon. Lyulph Stanley's letter on the subject. He wrote:—

'Some twenty years ago and more the copper and tin industries of Cornwall began to flag, partly by the reduced yield of the mines, partly by the competition of such districts as Lake Superior and the Malay Peninsula. In 1861 the population of Cornwall was 369,000; in 1871, 362,000; in 1881, 331,000; in 1891, 323,000; in 1901, 322,000. The Cornish miner had sought his fortune all over the world. Mr. Dorman apparently would have retained him in Cornwall by taxing foreign tin and copper. Surely he must see that the whole industry of the country as dependent on tin and copper is more important than the maintenance of Cornish miners in their country practically as annuitants at the cost of the whole community.'

I maintain that it is monstrous to pretend that the Cornish miners would be maintained 'practically as annuitants at the cost of the whole community.' If we were to impose such an import duty on foreign tin as would cause it to contribute to the taxation of the country just so much as, and no more than, Cornish tin indirectly contributes by the rates and taxes paid alike by owners and miners in Cornwall.

The paragraph to which I am replying fully admits 'the growing demands of the world for tin.' Should not Cornwall be allowed to supply that share of the 'growing demands' which she is well able to supply if we cease to protect the foreigner? That is the whole point of my complaint.

Again, the paragraph goes on:—'Does Sir Roper Lethbridge mean to imply that we ought to stop the production of tin in our Colonial possessions?' Certainly not. But let me give the exact figures:—In 1875, out of a total sale of 40,000 tons in the world, Cornwall and our Australian Colonies supplied more than half, or 21,000 tons, Cornwall 10,000 tons, Australasia 11,000 tons, while the foreigners supplied 19,000 tons only, of which 10,000 tons were supplied by the Malays. In 1900, after twenty-five years

of our free import system—I think I have shown above that it is simply ridiculous to describe it as Free Trade—out of a total sale of 75,000 tons, Cornwall and the Colonies combined (including Tasmania and New South Wales) supplied 10,000 tons—less than one-seventh—while the foreigners supplied 65,000 tons, or more than six-sevenths—including 46,000 tons supplied by the Malays, 11,000 tons by the Dutch from their eastern settlements, and 5,000 tons by the Bolivians! Why, if both the Colonies and Cornwall were allowed, by a change in our fiscal policy, to double their present production, even then, in relation to the long-protected foreigner we should be far behind what we were before our free imports encouraged all the world to flood our markets whilst protecting their own by prohibitive tariffs'

### Mining in the Philippines.

The Philippine Islands have had their full share of inspection and surveillance in the past five years and yet, strange as it may seem, have not yet been surveyed. That the United States Geological Survey might find a wide scope there for some of its activities and render welcome service to the people of the Philippines is a belief entertained by Mr. Henry Gannett, Geographer of the Survey, who has recently returned from the islands, where he has been engaged in taking the census.

In obtaining and compiling information regarding the mineral resources of the islands much valuable work might be done by the Survey. The Insular government maintains now a Bureau of Mines, which has been of conspicuous service in investigating mining titles and in examining several claims, including some coal properties, one of iron and one of copper. No attempt has been made by the Government to investigate or classify the minerals of the islands.

No statistics of production have been obtained. The output has, of course, been extremely limited, but the fact remains that the islands contain a considerable quantity of excellent coal, which is being used for fuel, and that in many a mountain stream Igorrotes are sifting the sands for gold. The hills are even dotted with prospectors who say that the yellow metal may be found there in quartz as well as in placer beds. It may be that the output does not warrant the outlay of time and money that a mineral canvass of the islands would necessitate. A report of that kind, even though the result be negative, would, however, have great interest for those who seek investment in the Philippines. It was formerly said that there was no production of minerals in Cuba or Porto Rico, but the Geological Survey investigated the subject in Cuba for the War Department and the Census Bureau inquired into the condition of things in Porto Rico, and though no astonishing figures of production have been the result in either case, yet the two inquiries have developed a mass of data that may prove interesting to the capitalist, the scientist, and the statistician.

### Coal Production of British India, 1902.

The report of Mr. G. A. Stonier, Chief Inspector of mines in India, for the year 1902, gives the following interesting figures and information concerning the coal mines of this extensive territory, of which comparatively so little is known on this side of the Atlantic:—

The record for 1902 shows an advance on the output for 1901. Coal is again of overwhelming importance and claims nearly 90 per cent. of the total value of the mineral output under the Act. The Bengal coalfields contribute 92 per cent. of the output of coal under the Act, and record an advance of 560,000 tons. At the latter end of the year there was a slackness in Bengal trade, which has continued to date. The Pench River and Chanda coalfields of the Central Provinces and two of the Upper Burma coalfields are being prospected. The following shows the output of coal under the Act according to area in the past two years:—

| Province and mineral area.  | 1902.<br>Tons. | 1901.<br>Tons. |
|-----------------------------|----------------|----------------|
| Assam . . . . .             | 220,640        | 253,162        |
| Baluchistan . . . . .       | 33,889         | 22,772         |
| Bengal:—                    |                |                |
| Daltonganj . . . . .        | 19,352         | 3,881          |
| Jharia . . . . .            | 2,420,021      | 2,076,155      |
| Girdih . . . . .            | 776,656        | 691,745        |
| Rajmahal . . . . .          | 219            | 407            |
| Raniganj . . . . .          | 3,053,046      | 2,931,688      |
| Burma . . . . .             | 13,304         | 12,466         |
| Central Provinces . . . . . | 197,007        | 191,516        |
| Punjab . . . . .            | 56,373         | 67,730         |
| Total . . . . .             | 6,790,507      | 6,251,522      |

Apart from the foregoing, 543,465 tons were raised in 1902 from coal-mines not under the Act, as against 597,727 tons in the preceding year. Altogether 7,433,972 tons of coal, valued at Rs. 2,19,54,424, were produced in India in 1902, as against 6,849,249 tons, valued at Rs. 1,98,50,741 in 1901. The advance of the industry has been wonderful—in 1880 only 1,019,793 tons were raised, and in 1895 3,540,019 tons. Bengal yielded 6,269,294 tons, or 84 per cent., and Hyderabad contributed 6 per cent. of the total output of 1902; 3,10,709 tons (a decrease of 27,515 tons) were won from the cretaceous and tertiary beds, and 7,093,263 (an increase of 612,238) from the Gondwana system. Of the two series in the latter, the Raniganj or Upper coal series yielded 2,217,071 tons and the Barakar or Lower coal series gave 4,876,192 tons. Four concerns contributed 32 per cent. of the total production—viz., Bengal Coal Company 656,611 tons, East Indian Railway Colliery 613,789 tons, the Hyderabad (Deccan) Company 455,424 tons, and the Bird and Company group of collieries 662,213 tons. In Bengal 5,089,004 tons came from European and 1,180,290 from Indian-owned collieries. The output of coke is derived almost entirely from the Bengal coalfields, and in 1902 reached a total of 1,47,827 tons (a decrease of 9,454 tons)—both hard and soft coke are included. From the figures given below some idea may be found of the marvelous growth of the industry :—

|                                                 | 1880.       | 1890.       | 1901.       | 1902.     |
|-------------------------------------------------|-------------|-------------|-------------|-----------|
|                                                 | Tons.       | Tons.       | Tons.       | Tons.     |
| Imports into India (coal, coke and patent fuel) | 729,058..   | 817,004..   | 237,622..   | 258,026   |
| Indian output.....                              | 1,019,793.. | 2,168,521.. | 6,849,249.. | 7,433,972 |
| Total .....                                     | 1,748,851.. | 2,985,525.. | 7,086,871.. | 7,691,998 |
| Export .....                                    | 53..        | 26,049.     | 5,7,871..   | 430,009   |

Consumption in India ..... 1,748,798.. 2,958,876.. 6,499,000.. 7,261,899

One-third of the output is consumed by railways.

The price of Indian coal in Calcutta varied from Rs 6-8 to 7-8 per ton f.o.b. according to quality; 1903 quotations are from Rs. 5-8 to 6-12 per ton.

The exports to foreign ports amounted to 430,099 tons of coal and coke, or a decrease of 157,772 tons; 428,901 tons, or 99 per cent. of the total were mined in Bengal and despatched from Calcutta.

### The Labor Crisis in the Transvaal and the Gold Output.

The Transvaal has been passing through a long period of unparalleled depression owing to a scarcity of native labor, which all the ingenuity of the mining houses and the Government has been unable to remedy. Ever since the war the mines and farms have failed to attract a sufficient supply of labor, and instead of the unprecedented "boom" which was expected to follow the declaration of peace, there has been one long, unbroken spell of industrial stagnation, until to-day the Transvaal, and more especially the Rand, is in a most unsatisfactory state. The mine owners some months ago began to let it be known that they would not continue indefinitely to await the pleasure of the lazy Kaffirs, and that, if labor could not be got in the country and got quickly, they would not hesitate to go outside the country for it. The Government appointed a Commission to go into the whole question of the native labor supply and requirements of the colony, and this Commission is now hearing evidence. In the meantime the mine owners' agitation in favor of the importation of Asiatic labor is being prosecuted with remarkable energy and public opinion, at first uncompromisingly hostile, is now veering round.

To-day competition for the native is very keen. A railway conference, composed of representatives from the Transvaal and the Orange River Colony, some time ago drew up a programme of railway construction in the two colonies, and the Chamber of Mines, which controls the recruiting of natives for the mines, agreed that the railways—which are owned by the Government—should have not more than 10,000 "boys" for construction work. Since then, however, the depression has become more acute, and a few days ago a deputation from the mining and commercial bodies waited upon the Acting High Commissioner and urged that, as this number could not be set apart for the railway except at grave injury to the economic welfare of the colony, all railway construction should be stopped. Sir Arthur Lawley replied that the Government could not agree to such a drastic course, but that they will reduce new work to the lowest limit, and endeavor, by the use of poor whites, burghers and Britons, and a maximum of machinery, to bring the quantity of native labor required to a minimum. The leaders of the mining industry warned the Government that stamps would have to be stopped should the railways insist upon being supplied with natives for

construction work, and the attitude of the leaders, consequent upon the Governor's reply, will be watched with interest and not without some concern.

Although peace was declared fifteen months ago, the gold output is still little more than half what it was immediately before the war. The following table shows the total output of gold from the whole of the Transvaal since the opening of the fields to the end of the first half of this year :

|                         |            |
|-------------------------|------------|
| 1881 .....              | £ 10,000   |
| 1885 .....              | 6,000      |
| 1885 .....              | 35,000     |
| 1887 .....              | 169,000    |
| 1888 .....              | 967,000    |
| 1889 .....              | 1,491,000  |
| 1890 .....              | 1,870,000  |
| 1891 .....              | 2,938,000  |
| 1892 .....              | 4,698,000  |
| 1893 .....              | 5,649,000  |
| 1894 .....              | 7,809,000  |
| 1895 .....              | 8,578,000  |
| 1896 .....              | 8,598,000  |
| 1897 .....              | 11,476,000 |
| 1898 .....              | 16,044,135 |
| 1899 .....              | 15,782,640 |
| 1900 .....              | 1,457,684  |
| 1901 .....              | 1,014,687  |
| 1902 .....              | 7,269,888  |
| 1903 (to June 30) ..... | 5,579,730  |

£101,442,764

The outputs of other industries during last month were: Coal, 219,690 tons, value £85,179; silver, 30,343 fine oz., value £3,133; diamonds, 16,793 carats, value £23,667. The diamond industry promises to develop enormously, a mine of reputed fabulous wealth, the Premier, having been discovered in the Pretoria district. In one month the value of diamonds produced in the colony rose from £2,000 to £15,000, and the industry is only in its infancy.—From DUN'S REVIEW, *International Edition*, for November.

### Mining Concessions in China.

The following note referring to the above mentioned subject is taken from a recent number of the British "Board of Trade Journal."

The development of the mineral resources of China is so important to the national prosperity of the country that the Commissioner of Customs at Wuhu deems it worthy of record in his report for 1902 that various mining concessions have been granted to foreign capitalists. In one case, in the district near Tatung, boring and pumping machinery has been introduced, and preliminary work has been going on for some months under the direction of a foreign expert in coal mining. In other cases, however, little or nothing has been done in the way of practically utilising concessions; and in order to prevent the obtaining of such concessions for purely speculative purposes, every concession should, in the opinion of the Commissioner, be accompanied by a proviso that if practical mining operations are not begun within a certain time limit, and carried on with a definite purpose to fully develop the mines concerned, the concession shall revert to the Government. [For information as to mining developments in China last year, reference should be made to a report (*Annual Series*, 3,092) by Mr. J. W. Jamieson, Commercial Attaché to H.M. Legation at Peking, recently issued by the Foreign Office.]

### New Zealand's Coal Output.

The New Zealand Minister of Mines in his annual report on the coal mining industry of that colony says that the returns from the coal mines show a steady increase, the production for the year 1902 being 1,365,040 tons, or 125,354 tons in excess of the previous year's output. The increases for the several districts are as follows: Northern district, 16,961 tons; west coast district, 84,281 tons; southern district, 24,112 tons; total, 125,354 tons. The total production for the colony during last year for the various classes of coals is as follows :—

|                                 | Tons.     |
|---------------------------------|-----------|
| Bituminous and semi-bituminous. |           |
| Coal.....                       | 845,046   |
| Pitch coal.....                 | 25,245    |
| Brown coal.....                 | 427,172   |
| Lignite.....                    | 65,239    |
| Oil shale.....                  | 2,338     |
| Total.....                      | 1,365,090 |

The gross recorded output of coal and lignite (including oil shale) now

exceeds 17,000,000 tons. The middle island is the chief source of the coal output of the colony, the west coast mining district affording the supply of bituminous coal. Here the collieries of the Westport Coal Co., Ltd., maintain their pre-eminence, and last year produced 520,086 tons. Brunner colliery had an output of 116,714 tons, and Blackball colliery 99,597 tons. The production at this latter place is limited to the capacity of the aerial tramway, by which the coal is transported to the railway; but when railway connection with the colliery is established there is every likelihood of an increased output. In the southern part of the middle island the collieries at Kaitangata still hold first place in point of magnitude.

### The Metal Trades.

Readjustment in prices of iron and steel has continued during the past month, the decline ceasing only when there was a general curtailment of production. The significance of this altered attitude on the part of producers to consumers abroad is readily perceived. When all plants in the United States were crowded with domestic business, and fancy premiums were charged for prompt delivery, there was no interest in export orders. Now that mills are laying off hands and seeking to curtail expenses, foreign business will not be declined. In fact, there is every reason to expect careful consideration of all offers, whether from home or abroad. During recent years of expansion the plants have extended facilities very largely, and it will be most desirable to keep machinery occupied so far as may be done without actual loss. A small return on the vast capital invested will be more satisfactory than closed mills, especially as it is never desirable to allow hands to seek other localities or a different class of work. There is no prospect of industrial depression in the United States, much new business being constantly offered, and a fairly good tonnage being constantly in sight but new methods and modern processes have been adopted to such an extent that an unprecedented amount of business could be handled at the most economical terms. Consequently, the export market is being sought for the first time in many years.

There can be no uncertainty regarding the situation. Dividends on the common stock of the United States Steel Corporation have been cut in half, and the securities of that company have almost continuously established new low record prices. Output of pig iron is reduced to the extent of a million tons for the last quarter of 1903, after rising well above all previous records. Steel mills at many points are idle or running part time, and still the new contracts are held back in expectation of better terms. Much business is now pending, and with any permanent settlement of the vexed labor problem in the building trades there should appear a healthy inquiry for structural steel.

### Imports of Mining Machinery.

The imports of free and dutiable mining and smelting machinery for the first nine months of the present year compared with 1902, are as follows:—

| MONTHS          | 1903      |          |          | 1902    |          |         |
|-----------------|-----------|----------|----------|---------|----------|---------|
|                 | Free      | Dutiable | Total    | Free    | Dutiable | Total   |
| January .....   | \$ 77,298 | \$ 7,676 | \$84,974 | 92,984  | 2,549    | 95,533  |
| February .....  | 30,106    | 1,587    | 31,693   | 43,123  | 2,380    | 45,503  |
| March .....     | 83,535    | 11,534   | 95,069   | 55,255  | 2,629    | 57,884  |
| April .....     | 104,967   | 4,638    | 109,605  | 61,227  | 5,087    | 66,314  |
| May .....       | 155,493   | 1,469    | 156,962  | 90,820  | 4,782    | 95,602  |
| June .....      | 155,387   | 6,707    | 162,094  | 77,270  | 5,293    | 82,563  |
| July .....      | 128,730   | 4,737    | 133,467  | 47,511  | 2,171    | 49,682  |
| August .....    | 105,838   | 4,083    | 109,921  | 90,798  | 1,139    | 91,937  |
| September ..... | 89,463    | 6,502    | 95,965   | 82,090  | 8,906    | 90,996  |
| Total .....     | 930,817   | 48,933   | 979,750  | 641,078 | 35,936   | 677,014 |

The principal sources from which this machinery has been imported during 1903 were:—

| MONTHS          | UNITED STATES |          | GREAT BRITAIN |          | Other Countries | TOTAL    |
|-----------------|---------------|----------|---------------|----------|-----------------|----------|
|                 | Free          | Dutiable | Free          | Dutiable |                 |          |
| January .....   | \$75,235      | \$ 7,676 | \$ 417        | —        | \$1,646         | \$84,974 |
| February .....  | 29,467        | 1,587    | 639           | —        | Nil             | 31,693   |
| March .....     | 82,680        | 11,534   | 158           | —        | 697             | 95,069   |
| April .....     | 104,902       | 4,638    | 65            | —        | Nil             | 109,605  |
| May .....       | 155,127       | 1,263    | 366           | 206      | "               | 156,962  |
| June .....      | 152,517       | 6,579    | 2,034         | 128      | 836             | 161,094  |
| July .....      | 105,899       | —        | 13,756        | 4,737    | 9,075           | 133,467  |
| August .....    | 100,942       | 3,119    | 4,756         | 964      | 140             | 109,921  |
| September ..... | 82,941        | 6,086    | 5,640         | 416      | 882             | 95,965   |
| Total .....     | 889,710       | 42,482   | 27,831        | 6,451    | 13,276          | 979,750  |

### Imports of Wire Rope.

The following table shows the imports of wire rope and cables for the nine months ending September 30th, 1903:—

| Month                        | From Great Britain |          | From U. S. |          | Total     |           |
|------------------------------|--------------------|----------|------------|----------|-----------|-----------|
|                              | Pounds             | Value    | Pounds     | Value    | Pounds    | Value     |
| January .....                | 115,646            | \$ 8,363 | 16,909     | \$ 2,210 | 132,555   | \$ 10,573 |
| February .....               | 152,813            | 9,504    | 30,172     | 2,683    | 182,985   | 12,187    |
| March .....                  | 151,408            | 9,038    | 46,602     | 2,607    | 198,010   | 11,645    |
| April .....                  | 148,276            | 8,663    | 20,199     | 2,640    | 168,475   | 11,303    |
| May .....                    | 132,564            | 9,174    | 59,994     | 5,395    | 192,558   | 14,569    |
| June .....                   | 320,882            | 20,047   | 49,312     | 4,028    | 370,194   | 24,075    |
| July .....                   | 192,756            | 12,176   | 68,857     | 6,861    | 261,613   | 19,037    |
| August .....                 | 104,315            | 6,145    | 38,634     | 2,997    | 142,949   | 9,142     |
| September .....              | 142,671            | 9,927    | 52,773     | 6,806    | 195,444   | 16,733    |
| Imports from other countries | 1,462,331          | 93,037   | 383,452    | 36,227   | 1,845,783 | 129,264   |
| Total .....                  |                    |          |            |          | 1,938,241 | 135,329   |

### Hints for Investors.

Before buying stock, investors should be convinced:—1. That the company whose stock is offered is legally organized. 2. Has a good title to valid mining claims. 3. That those claims contain a sufficient quantity of pay-ore to justify the expenditure of enough capital to equip the property with modern mills and appliances so as to assure dividends. 4. That the property is accessible by either railroad or steamer. 5. That the property is no longer a mere prospect, but that it has been sufficiently developed to satisfy a business man beyond a reasonable doubt that the mine, when operated, will be a producer; and 6. That the affairs of the company, both at the office and at the mine, are in the hands of competent and trustworthy officers and directors.—*Pacific Coast Miner.*

## NEW COMPANIES.

## ONTARIO.

**Belmont Gold Mine, Limited.**—Incorporated under the laws of the Imperial Parliament of the United Kingdom of Great Britain and Ireland, and licensed under the Statutes of Ontario, 9th October, 1903. Authorized capital for use in Ontario, £80,000. D. G. Kerr, C. & M. E., Cordova Ont., attorney. Formed to acquire the properties known as the "Belmont Gold Mine, Limited."

**Williams Iron Mines Company, Limited.**—Incorporated under the Statutes of Ontario, 14th October, 1903. Authorized capital, \$3,000,000, in 3,000,000 shares of \$1.00 each. Directors: J. E. Buchard, C. C. Williams, J. C. Buchard, M. W. Harden, D. D. Forbes, H. Hulbert, J. McKay. Head office, Sault Ste. Marie, Ont. Formed to acquire the properties known as the "Williams Iron Mines Company, Limited."

**The Bradley Torpedo and Oil Company, Limited.**—Incorporated under the Statutes of Ontario, 14th October, 1903. Authorized capital, \$30,000, in 300 shares of \$100 each. Directors: W. J. Bradley, J. Falconer, H. J. Daws. Head office, Petrolia, Ont. Formed to acquire the properties known as "The Bradley Torpedo and Oil Company, Limited."

**The Iron and Steel Company of Canada, Limited.**—Incorporated under the Statutes of Ontario, 21st August, 1903. Authorized capital, \$300,000, in 60,000 shares of \$5. Directors: C. E. Carbonneau, H. T. Wills, J. F. Wills. Head office, Belleville, Ont. Formed to acquire the properties known as "The Iron and Steel Company of Canada, Limited."

**The Black Cat Gold Mining Company, Limited.**—Incorporated under the Statutes of Ontario, 9th October, 1903. Authorized capital, \$2,000,000, in 2,000,000 shares of \$1. each. Directors: F. W. Whitaker, L. E. Ziegler, G. Kinsey S. P. Kineen, P. S. Briggs, O. M. Bake, F. C. Jones, H. W. Hughes, E. J. Gardner, F. J. Buller, R. C. Levesconte. Head office, Toronto, Ont. Formed to acquire the properties known as "The Black Cat Gold Mining Company, Limited."

**The Clifton Natural Gas Company, Limited.**—Incorporated under the Statutes of Ontario, 14th October, 1903. Authorized capital, \$40,000, in 400 shares of \$100 each. Directors: D. A. Coste, D. McGillivray, W. Marshall. Head office, Niagara Falls, Ont. Formed to acquire the properties known as "The Clifton Natural Gas Company, Limited."

**The Shakespeare Gold Mining Company, Limited.**—Incorporated under the Statutes of Ontario, 21st October, 1903. Authorized capital \$2,000,000, in 2,000,000 shares of \$1. each. Directors: W. E. Seelye, W. Wood, F. C. Bolin, R. J. Hartley, J. N. Nevers, J. Miller, A. Gowan. Head office, Township of Shakespeare, district of Algoma. Formed to acquire the properties known as "The Shakespeare Gold Mining Company, Limited."

## BRITISH COLUMBIA

**The Poplar Creek Gold Mines, Limited.**—Incorporated under the Statutes of British Columbia, 5th October, 1903. Authorized capital, \$150,000, in 1,500,000 shares of ten cents (10c.) each. Formed to acquire the properties known as "The Poplar Creek Gold Mines, Limited."

**The Monashee Gold Mines, Limited.**—Incorporated under the Statutes of British Columbia, 21st October, 1903. Authorized capital, \$1,000,000, in 1,000,000 shares of \$1. each. Formed to acquire the properties known as "The Monashee Gold Mines, Limited."

**Sharpless Mining and Milling Company, Limited.**—Incorporated under the Statutes of British Columbia, 16th October 1903. Authorized capital, \$300,000, in 300,000 shares of \$1. each. Formed to acquire the properties known as the "Sharpless Mining and Milling Company, Limited."

**The Associated Silver-Lead Mines of British Columbia, Limited.**—Incorporated under the Statutes of British Columbia, 7th October, 1903. Capital is unlimited to consist of shares of \$1. each. Provincial Directors: G. Alexander, W. E. Zwicky, W. S. Drewry, N. J. Cavanagh, L. Pratt, O. V. White, H. Giegerich. Head office, Sandon, B.C.

## COMPANY NOTES

**The Ymir Gold Mines.**—The mine manager reports the return for the month of September, 1903, as follows:—60 stamps ran 27 days, and crushed 4,600 tons (2,000 lb.) of ore, producing 910 oz. bullion. The estimated realisable value (gross) of the product is \$10,000; 260 tons of concentrates, shipped, gross estimated value, \$6,000; cyanide plant treated, 3,050 tons (2,000 lb.) of tailings producing bullion having estimated gross value of \$2,000; sundry revenue, \$1,140; total, \$19,140; working expenses, \$20,000; loss, \$860. There has been expended during month on development, \$5,000. The manager however states that increased working costs are likely to be only temporary and are caused by repairs.

**Hall Mining and Smelting Co.**—The report of the Hall Mining and Smelting Company, Ltd., for the year ended 30th June last, submitted at the meeting on the 29th ult., states that owing to various causes, but chiefly the closing down of many important silver-lead mines, which greatly restricted the supply of lead ore, it was found very difficult to keep on the average more than one furnace in blast and that, for the most part, at very low rates of treatment. While other smelters were entirely closed down for want, not only of ore, but also for want of fuel, the company was however, able to keep one furnace in blast. The Canadian Government having now granted a bounty on lead from ores mined and smelted in Canada, the prospects have much improved for both mines and smelters, and already many mines, which were forced to close down, have recommenced work. It is hoped, therefore, to keep both furnaces in operation profitably during the current year, the producing mines being enabled by the bounty to pay the smelters more adequate rates of treatment.

**Camp Bird.**—The mine manager, reporting for the month of September says: The mill ran 30 days, and crushed 5,608 tons of dry ore. Bullion sales, \$157,666; concentrates sales (331 tons), \$24,346; estimated deposit in cyanide mill, 3,560 tons, which has yielded bullion of an estimated value of \$12,098; total receipts, \$194,110. Working expenses and development (including transportation and treatment of product), \$56,905; balance, \$137,205 (equivalent to, say, £28,115). From this should be deducted the monthly expenses in London (including consulting engineer's fee) of about £700, leaving a profit for the month estimated at £27,415. During the month \$10,680 were expended on construction, making a total for the year commencing 1st May of \$17,092—say, £9,650. Feet of development work, 442."

**International Coal and Coke Co.**—The mining properties of the International Coal Co., a subsidiary organization of the Grandby interests, at the eastern end of the Crow's Nest Pass, are being developed, and the new town of Coleman, four miles west of Blairmore, Alberta, is a scene of great activity. Mines are being opened, tipples erected, side-tracks and switches constructed and work has begun on a battery of coke ovens. The Canadian Pacific Ry., on which line the operations are located, has contracted for 1,000 tons of coal per day, and when the mines are all in operation and the coking plant completed this will be one of the largest and most important mining camps in the Northwest.—*Coal Trade Journal*.

**Dominion Coal Company.**—Although over a dozen pumps have been working at Dominion No. 1 pit of the Dominion Coal Company for the past five months the colliery is only about half pumped out, and it will take a few months before it is dry. Mining operations, however, are being carried on simultaneously with the pumping. The output now being about 900 tons a day, which shortly will be increased to about 1,000.

**Tamarac Mine, Ymir Camp, B.C.**—For the past four months work has been in progress at the Tamarac mine, a small force of men being engaged on development in the deepest portion of the mine. The report is current that a fine body of good grade ore has been opened up and that the property is likely to resume its old standing as one of the most important propositions in the camp. That the interest of shareholders has been awakened and that some important steps are likely to be taken shortly is evidenced by the fact that S. S. Fowler, the well known mining engineer, was early in the month engaged for several days in making a thorough examination of the property.

**The Wilcox Mine, Ymir, B.C.**—At this mine, present development is showing up larger bodies of the high grade ore recently shipped. This ore which runs over \$60 per ton and is therefore too rich to pass through the mill, is now being found in such quantities that the average monthly product of the mine is likely to be more than doubled in value. Development on a larger scale has recently been started by which means the rich Fourth of July vein will be opened up at great depth with comparatively little dead work. The No. 2 tunnel on the Wilcox claim proper, which is already in on the No. 2 Wilcox vein about 400 feet is being run further, in such a direction as to tap the Fourth of July vein some 300 feet below the present workings the distance to be driven being less than 400 feet. Several shipments have already been made to the Hall mines smelter under the direction of the manager Mr. Phil White. Twenty-five men are at present working on the property and it is expected that they will be continuously employed throughout the coming winter. It is stated that everything about the mine is in excellent condition and the ore bodies from which the shipments are being made are showing up exceedingly well.

**The Consolidated Lake Superior Co.**—At the annual meeting of the shareholders of the Consolidated Lake Superior Co. which was held at New Haven, Conn., on the 26th ult., 329,000 shares were represented. Vice-President Sanborn, speaking for the holders of 250,000 shares of stock, thought it advisable to re-elect the same board. He said:—"As the company is in the hands of a receiver it would be unwise to make any change at present in the directorate. If the company is re-organized it will become a new corporation and a new directorate will be elected." The following board was then elected: Gordon Abbott, E. J. Berwind, F. H. Clergue, Cornelius Shields, Lynde Harrison, Horatio G. Lloyd, H. K. McHarg, Chas. Macdonald, Chas. E. Orvis, Geo. Philler, S. M. Prevost, Samuel Rea, T. C. Search, Jas. S. Swartz, and Charles H. Tweed. The meeting then adjourned to Nov. 24, to come together in the same city.

**Ore Shipments, Rossland Camp.**—Shipments from the Rossland camp for the week ending October 31st and for the year to date are as follows:

|                        | Week. | Year.   |
|------------------------|-------|---------|
| Le Roi.....            | 5,070 | 175,985 |
| Centre Star.....       | 1,440 | 66,976  |
| War Eagle.....         | 1,110 | 49,215  |
| Le Roi No. 2.....      | 220   | 22,075  |
| Jumbo.....             | 300   | 2,943   |
| Spitzee.....           |       | 300     |
| I. X. L. (milled)..... | 140   | 1,450   |
| Kootenay.....          | 180   | 5,914   |
| Giant.....             |       | 828     |
| Iron Horse.....        |       | 40      |
| Velvet.....            |       | 3,376   |
| White Bear.....        |       | 297     |
| O. K.....              |       | 25      |
| Homestake.....         |       | 90      |
| Totals.....            | 8,460 | 330,574 |

The shipments for the first half of November were as follows:—Le Roi, 4,980 tons; Centre Star, 1,290; Le Roi II, 650 tons; Le Roi II (milled), 350 tons; Jumbo, 250 tons; Spitzee, 30 tons; I. X. L. (milled), 140 tons; Kootenay, 80 tons; War Eagle, 1,200 tons; total for the week, 8,970 tons; year to date, 349,190 tons.

**Le Roi Mine.**—For the month of September the Le Roi mine shows a profit of \$22,500. It is significant however that the ore raised from underground gives three times the profit of that shipped from the dump. Manager S. F. Parrish has cabled to London the following report.—"Shipped from

the mine to the Northport smelter during the past month, 11,583 tons of ore, containing 5,561 ounces of gold, 5,015 ounces of silver and 232,750 pounds of copper. The estimated profit on the ore is \$17,000. Shipped from the dump to the Northport smelter during the past month, 6,277 tons of ore, containing 1,733 ounces of gold, 1,650 ounces of silver, 70,912 pounds of copper; estimated profit on this ore, \$5,250.

The Pall Mall Gazette, referring to the loss of \$20,000 during October, as compared with an estimated profit in September of \$17,000 in the operations of the Le Roi mine, says that the water is low. McMillan is expected to return immediately and he will be able to give an explanation as to the unexpected loss. The management should have learned to be careful from past experience of considerable fluctuations in metallic values resulting from low water.

**Bruce Copper Mines, Limited.**—Calumet, Mich., despatch of Nov. 11, says. The International Nickel Company which is the reorganized Canada Copper Company, has purchased the famous Bruce mine, which has been one of the best known mines of the west for half a century. The price paid was \$600,000. The mine has been idle for a year or so after a short resumption of operations under Lord Sholto Douglas, before which it was idle 20 years.

**The Wilcox Mine, Ymir, B.C.** The output of the Wilcox mine for the month of October is again in excess of any previous month. The amount saved on the plates is represented by a gold brick weighing 325 ounces and of an approximative value of \$2,000. In addition to this amount two and a half carloads of rich galena ore have been shipped to the Nelson smelter, the net proceeds on which amount to approximately \$2,500. Concentrates shipped amount further to over \$500 net value, making the total output of the mine over \$7,000 for the month. The running expenses are in the neighborhood of \$2,000 per month so that the company is making a profit of \$5,000 on the month's run.—Nelson Miner.

**Boundary Ore Shipments.**—The combined output of ore for October from Boundary mines is in excess of 70,000 tons, against 63,000 tons for the month of September. The shipments were made up as follows:—

| MINE.             | Tons.  |
|-------------------|--------|
| Granby Mines      | 39,398 |
| Snowshoe          | 9,480  |
| Mother Lode       | 12,665 |
| Sunset            | 8,5    |
| Morrison          | 500    |
| Emma              | 2,320  |
| Wimpey            | 990    |
| Oro Denoro        | 3,215  |
| Athelstan-Jackpot | \$20   |

Total for October..... 70,284

**Granby Consolidated.**—The announcement has been made that the Granby Consolidated Mining & Smelting Company has practically decided to pay a dividend of not less than 4 per cent. per annum on the par value of the stock which is \$10 per share. As the stock is now selling at \$4 a share such a dividend would be at the rate of 10 per cent. on the selling price of the stock.

**Crow's Nest Pass Coal Co.**—The output for the Crow's Nest Pass Coal collieries for the week ending Nov. 13 was 16,734 tons; Coal Creek, 6,404 tons; Michel, 6,421 tons; Morrissey, 3,909 tons; total output for the week 16,734 tons; average daily output, 2,789 tons; total output for corresponding week last year, 6,686 tons; average daily output for corresponding week last year, 1,114 tons.

**Dominion Coal Co.**—A Boston correspondent says:—"The purpose of Dominion Coal Company to open up additional properties entails capital expenditure. Engineers are already surveying the out-crops on property in order to locate the best available localities upon which to open up three additional mines, all three of which it is proposed to operate by slopes and to be equipped with most modern machinery. The opening up of new mines is the only way in which the output of the company can be materially increased, and it is figured the opening up of such mines will increase the output 40 p.c. which would bring production up to about 4,200,000 tons per annum. It will take two or three years, however, to complete this work, entailing an expenditure of several million dollars. President Ross has in mind an adjustment of the capitalization of the Dominion Coal Co., and when financial conditions enable the carrying of his plans into effect the capital of Dominion Coal Company will be made large enough to meet all immediate and future needs.

The total shipments of coal by Dominion Coal Company for ten months ending Nov. 1 were 2,356,633 tons, as compared with 2,436,367 tons for the corresponding period last year. The decline is accounted for by the fire at the mine.

**The Mollie Gibson Mine, B.C.**—No word has yet arrived from the east regarding the resumption of work on the Mollie Gibson mine, and it is feared now that nothing is likely to be done this season, as the snow is on the ground at the mine, and is not likely to go off again till next spring. All the mine buildings were destroyed in the snowslide last Christmas night, and owing to the location of the workings, which are above the timber line, the erection of new buildings after the snow once comes is very difficult.

**The Oil Business.**—The New Brunswick Petroleum Company, Ltd., of Moncton, whose property is at Memramcook, will shortly begin the erection of a refinery. A Bradford, Penn., man is now on the property, along with the secretary of the company, looking into the details preparatory to the construction of the refinery. Work will be begun in the near future. Sufficient oil is now being obtained to warrant the provision of this establishment. The refinery will be capable of refining 300 barrels of crude oil per day. These oil fields give promise of becoming a most important industry in New Brunswick.

**The Arlington Mine, Erie, B.C.**—During the month of October the Hastings (British Columbia) Exploration Syndicate, Ltd., shipped 130 tons of ore from the above mine to the Hall Mines smelter at Nelson. The net smelter returns were \$5,395.98 and the expenses in British Columbia were \$3,487.27 leaving a profit of \$1,908.71.

## PERSONAL MENTION.

Mr. W. Farwell, general manager of the Eastern Townships Bank, of Sherbrooke, Que., has been elected president of the Mollie Gibson Mining Company vice Col. S. W. Ray, of Port Arthur, Ont., who has resigned.

"The Dawson Daily News announces that ex-Governor William Ogilvie has left the Stewart river, for the outside. Mr. Ogilvie has been in charge of the Ogilvie dredge in a river concession of which he is manager. Mr. Morley Ogilvie, son of the ex-governor, left some weeks ago, and it is presumed he has gone to prepare the plans for these dredges. The company is keeping the results of its operations on the Stewart this year a secret."

[Editor Note] Mr. Wm. Ogilvie is at present in Texas on a visit while Mr. Morley Ogilvie has been in Ottawa for some weeks.—

Mr. David Stewart has been appointed to the position of assistant to the general manager of the Cumberland Railway and Coal Co., with headquarters at Springhill, N.S. Mr. Stewart also retains pro tem the office of general sales and purchasing agent.

The London Times of a recent date in a two-column article, headed "Hudson's Bay an Ocean Route", incidentally has the following complimentary note in reference to Mr. Albert P. Low of the Geological Survey of Canada, the officer in charge—"Low who commands the expedition, enjoys an enviable reputation among the scientists of the world".

Mr. C. F. McGill has resigned the position of mechanical superintendent of the Canadian General Electric Company's works, at Peterboro, to go to Pittsburg, where he has accepted a similar position with the Westinghouse Company, at a largely increased salary.

Mr. Cornelius Shields, president and general manager of the Consolidated Lake Superior Co., was in Montreal recently en route to Newfoundland. He said that he had every hope that the organization plan would be carried out. There is a large amount on hand for the pulp and veneer mills and he had advised the directors that these mills should be re-opened and the material used as soon as possible.

A recent guest at the King Edward Hotel, Toronto, was Mr. Graham Fraser, of Sydney Mines, N.S., general manager of the Nova Scotia Steel and Coal Company. Mr. Fraser is one of the provisional directors of the new Alliance Bank of Halifax, and his visit revives the rumor of an amalgamation of large financial interests, including the Alliance, the People's Bank of Halifax, the People's Bank of New Brunswick, and the Metropolitan Bank of Toronto, the object being to take over the Gibson lumber interests at Marysville, N.B., on the Miramichi River, and eventually to secure control of the Dominion Iron and Steel Company.

Mr. James Ross announces that Austen King, of Pittsburg, one of the leading coal experts in the United States, has been appointed superintendent of the Dominion Coal Company's mines.

Mr. Irving H. Reynolds will shortly retire from the Allis-Chalmers Company, and the duties of Chief Engineer will be assumed by the engineers in charge of the various departments, these engineers availing themselves of the advice of Mr. Edwin Reynolds, Consulting Engineer of the Company.

Mr. W. F. Robertson, of Victoria, Provincial Mineralogist of British Columbia is on a visit to the east, and will spend some time in Montreal, New York and other cities. On his return to the west he will be accompanied by Mrs. Robertson, who has been for some months visiting friends in Eastern Canada and the United States.

Mr. James Ross of Montreal, President of the Dominion Coal Company, recently paid a visit to the companies properties in Cape Breton. In company with Austin King of Philadelphia, G. H. Duggan, 3rd Vice-Pres., Hiram Donkin, consulting engineer of the N. S. Steel Co. and C. D. O'Dell, the company's engineer. Mr. Ross made a thorough inspection of the colliery system of the company lasting several days.

An Associated Press despatch from London to the Canadian papers dated Nov. 17th, reads.—B. T. A. Bell, of Ottawa, sails for Canada today on the Bavarian. He says that British capital is much interested in the development of the Yukon. With the hydraulic power that is going into the Yukon the gold output next season will be 25 per cent. greater than this season.

Mr. George S. Waterlow, of London, England, vice-chairman of the Snowshoe Gold and Copper Mines, Ltd., in the Phoenix camp, as well as one of the directors of the Le Roi mine at Rossland has lately been on a visit to British Columbia to look after the various properties in which he is interested. He was accompanied by Mr. Anthony J. McMillan a fellow director in the Snowshoe Company.

Mr. J. Burr Tyrrell, formerly of the Geological Survey here, but now practicing his profession in the Yukon as a geological expert, has just won the libel suit brought against him by W. A. Beddoe, editor of the Dawson News. The action arose over the publication in the News of an affidavit over Mr. Tyrrell's signature, of a highly sensational nature, in which the accusation was made that the editorial attacks in the News written by Mr. Beddoe and directed against the Bronson & Ray concession, of which the defendant is the resident agent, could be avoided if the latter would consent to "do a little business," give him a certain claim within the boundaries of the concession which he had long desired. Mr. Beddoe indignantly denied the allegation that he could be bribed into changing the attitude of the News towards concessions and the Bronson & Ray concession in particular, and immediately took steps to make Mr. Tyrrell prove his assertion. According to the verdict of the jury Mr. Tyrrell proved it.

Mr. N. A. D. Armstrong, manager of the Yukon Goldfields, Limited, Dawson, is now in England attending the annual meeting of his company.

Among the Canadian members who attended the meeting of the American Institute of Mining Engineers in New York recently were: Mr. P. Kirkegaard, of the Canadian Goldfields, Ltd., Deloro, Ont. Mr. Robert G. Leckie International Nickel Co., Sudbury, and Mr. Wm. J. Sutton, of Victoria, B.C.

Mr. O. E. Prud'homme, of the Geological Survey Department, has just returned from a two month trip to Europe during which he visited the principal art galleries of the continent, including the Louvre in Paris, and other celebrated collections in Milan and Venice.

Mr. Roscoe R. Leslie, formerly superintendent of the Le Roi mine at Rossland, B.C., has left for California, to spend the winter, accompanied by his mother who is in poor health.

It is understood said a recent despatch from Grand Forks, B.C., that A. T. Goodell, manager of the Montreal and Boston Copper Co's smelter at Boundary Falls, has resigned. Mr. Goodell will spend the next three months in Spokane prior to accepting an important position in Colorado. He has directed the affairs of the Boundary Falls plant with marked success during the past year and a half. Mr. Goodell is regarded as a leading American metallurgist, having had over fifteen years experience at various smelting plants in the south western states.

## CONCENTRATES.

A case involving the entire aluminum industry was recently decided in New York when the United States Court of Appeals handed down a decision upholding the validity of the so-called Bradley patent for smelting by the use of electricity. The suit was bought by the Electric Smelting and Aluminum Company, of Cleveland, against the Pittsburg Reduction Company, the only concern manufacturing aluminum in the United States, with plants at Niagara Falls and Massena, N.Y.

A Renter's message from Peshawur states that a coal deposit has been discovered in Koorokh, in the Jagdalak mountains, by employes of the Ameer, who have sent to Kabul many camel loads of coal which, after being subjected to various tests, was found to be particularly useful for fuel in workshops and machine sheds. A number of expert miners and four companies of sappers and miners, under the command of a colonel, with 400 camels, have been sent to the scene of the discovery. It may be recalled that an investigation of coal deposits at Ladda was recently carried out on behalf of the Indian Government, the results of which have not as yet been disclosed.

The Mayor of Dawson, in an interview with the "Vancouver Province" recently said:—In my opinion the production of placer gold in the Klondyke will remain near the \$10,000,000 mark for the next ten years to come, and it may possibly increase through the discovery of new fields and the development of districts now being prospected. Not long ago I was up on the Stewart River, where ex-Commissioner Ogilvie is operating a river dredge. Report on the river had it that Mr. Ogilvie was making good money with his river dredge, but he did not care to make any statement as to his returns. He is prospecting the river, and I do not think he has yet settled down to actual production. The Stewart river district is bound to come to the front within the next year or so.

A mineral survey of Ceylon, restricted to minerals of probable economic value, is at present being conducted at the request of the Government of Ceylon, with the co-operation of the Scientific and Technical Department of the Imperial Institute. Mr. A. K. Coomaraswamy, B.Sc., (Lond.), and Mr. James Parsons, B.Sc., (Lond.), have been despatched to the colony for this purpose.

At Hanley, England, on Oct. 12th, a fire test of uranite was carried out in the presence of a number of members of the North Staffordshire Institute of Mining and Mechanical Engineers. The test consisted of an ordinary partition constructed of timber protected by uranite slabs, against which a pile of wood soaked in petroleum was erected and set fire to. The temperature to which one side of this partition was subjected at times reached 1,350 degrees, whilst the other side of the partition remained at atmospheric temperature. In the middle of the fire was also placed a deed box constructed of timber and uranite. Inside this box paraffin wax, fusible metal and sulphur, and a bundle of papers were placed. When the fire was extinguished, and the box opened, the contents were found unharmed.

WORLD'S PRODUCTION AND CONSUMPTION OF METALS.—The figures below show the total world's production and consumption of copper, tin, spelter, lead, nickel, and aluminum in 1901 and 1902. They are compiled from statistics published by the Metallgesellschaft and the Metallurgische Gesellschaft A.G., Frankfort-on-Main, Germany:—

|          | Production<br>in metric tons. | Consumption<br>in metric tons. |
|----------|-------------------------------|--------------------------------|
| Copper   | { 1901..... 517,550           | 536,341                        |
|          | { 1902..... 532,700           | 555,628                        |
| Tin      | { 1901..... 86,598            | 76,263                         |
|          | { 1902..... 88,280            | 87,284                         |
| Spelter  | { 1901..... 507,448           | 506,792                        |
|          | { 1902..... 545,349           | 558,929                        |
| Lead     | { 1901..... 839,000           | 832,721                        |
|          | { 1902..... 863,100           | 859,026                        |
| Nickel   | { 1901..... 8,810             | not given                      |
|          | { 1902..... 8,335             | not given                      |
| Aluminum | { 1901..... 7,810             | not given                      |
|          | { 1902..... 8,110             | not given                      |

COAL IN AMOY.—In the early part of last year a British syndicate formed in Hong Kong, acquired from the original native concessionaires certain mining and prospecting rights in the district of Au Chi. This and the adjoining district of Lung Yen appear to be rich in iron and coal of excellent quality. The mines are only some 60 miles inland, but under present conditions the cost of carriage is quite prohibitive, owing to the absence of all transport facilities. The difficulties are not insuperable, and it is in this direction that the introduction of foreign capital and consequent development of industrial activity should be able to rescue the Chinese of this region from their poverty and enable the trade of the port to emerge from its present stagnation and dull monotony.

A Vancouver, B.C. despatch dated Nov. 5 says:—"The full court sat yesterday on a case where the cause of action is remarkable. Andrew Ferguson staked a claim in the Slocan, which proved to be located on a glacier. The glacier, in the course of time, moved down a hill, taking the mining claim with it, until it overlapped the claim of Ole Sanberb, and now these two claims have come together and got all mixed up. The supreme court judges are now trying to decide who owns the combination claim."

Iron and manganese ores to the value of \$1,776,300 were shipped in 1902 from the Province of Santiago de Cuba, from mines which have been in operation many years.

An English despatch to the "Ottawa Citizen" dated Nov. 17th says.—"A director of three large iron-producing companies which together make one-tenth of the total amount of British pig iron writes a strong letter to the Chronicle calling the government to prohibit the importation of Canadian bounty-fed pig iron. He quotes figures to show that Canada dumped into England in the years 1901-02 nearly as much iron as Germany, Holland, Belgium and America put together. The figures are Germany, Holland, Belgium 78,000 tons; America, 45,000; Canada, 103,000 tons. The article concludes "This is dumping with a vengeance."

Toronto, Nov. 14th.—Charles L. Bailey, the Canadian manager of the great English steel firm William Jessop & Sons, of Sheffield, left to-day for England to confer with the members of the company in regard to the establishment of a plant in Canada. The concern has decided to build a branch in this country, and would prefer Toronto as a location if satisfactory arrangements can be made with the civic authorities. As the concern would employ about 2,000 hands, it is believed that every encouragement will be offered to secure the industry for Toronto.

Very important discoveries of nickel have been made along the line of the government Temiscaming railway. As a result the government has reserved a strip of land along the line ten miles on either side from the north limit of Widdifield township to New Liskeard. The nickel so far discovered is about five miles from Haleybury. Some of the deposits show as rich as 44 per cent. of nickel which is far away more valuable than the Sudbury deposit which runs about 3 per cent. Rich silver deposits have also been found within a short distance. Prof. Miller, who is in the district, reports finding one silver lump as big as his hand.

The strike in the slate quarries at Port Penrhyn, North Wales, which has been maintained for the last three years, entailing great expense and suffering upon the families of the workmen, has collapsed early in the present month, the men voting to return to work without having obtained a single concession from the owner, Lord Penrhyn. The strike has been a subject of national interest and was brought up at the last session of Parliament in the hope of settlement, but without avail.

Mr. W. E. H. Carter, of the Bureau of Mines, has just returned from a visit to Copper Cliff, where he inspected the new nickel plant which the Canadian Copper Co. has installed. Formerly the company used to convert the ore to a 30 per cent. matte at its works, and then convey it to the Ontario Smelting Works, a mile away, where it was raised to seventy-five per cent. grade. Now the entire process is done by two furnaces, each with a capacity of 550 tons per day, and the matte is raised to a grade of about eighty per cent. The balance of the refining will still be done in the United States.

A despatch from Sidney, N.S. Wales, dated Nov. 15, says:—The mining warden at Bulong, near Kalgoorlie, West Australia, reports the discovery of telluride ore at Mulgabbie at a depth of 60 feet. The seam is a foot wide, and samples are assaying four hundred ounces of gold to the ton. The warden is preparing for a great rush. For two miles along the seam the ground is already pegged out. It appears that two men working in the shaft have for weeks been throwing the telluride away in ignorance of its value.

It is estimated that the mining companies operating in the Kootenays, British Columbia, have paid \$7,500,000 in dividends to date. The Payne mine in the Slocan district is at the head of the list with \$1,420,000 to its credit, and the Le Roi at Rossland is a close second with a record of \$1,305,000. None of the others have paid to exceed \$550,000.—*Pacific Coast Miner.*

An order in council has been passed recently by the Dominion Government permitting the entry into Canada free of duty, of orange mineral, dry white lead and dry red lead, made from lead produced from Canadian ores. In the refining process the substances mentioned are extracted, and it is felt only proper that Canadian products of this kind should be allowed to come into the country again free, as there is no refinery in the Dominion.

### The World's Estimated Production of Pig Lead, 1902.

From Julius Matton's (London) Report for Nov., 1903:—

|                 |         |               |
|-----------------|---------|---------------|
| Spain           | 174,936 | English tons. |
| United States   | 259,781 | "             |
| Germany         | 136,703 | "             |
| Australia       | 104,000 | "             |
| Mexico          | 95,000  | "             |
| England         | 25,504  | "             |
| Italy           | 25,897  | "             |
| Greece          | 14,000  | "             |
| Belgium         | 18,929  | "             |
| Austria-Hungary | 13,464  | "             |
| France          | 20,000  | "             |
| Japan           | 4,000   | "             |
| Sweden          | 826     | "             |
| Russia          | 400     | "             |
| Canada          | 8,335   | "             |
| South America   | 225     | "             |
| Total           | 902,000 | "             |

### Australia as a Copper Producer.

West Australia promises to become in the near future a great producer of copper, says a correspondent of the *Inspector*. Many payable deposits are known to exist on the northwest fields, but until a railroad to the Wilbarra fields is constructed expenses of transportation are too heavy, though many leases are being taken up with a view of securing same before the coming rush, as the railway will undoubtedly be made soon. Nearer to the coast and situated close to the Midland Railway, are some very extensive deposits, which are now being taken in hand by a powerful syndicate connected with the Mount Lyell mines of Tasmania. The copper is in the form of carbonates, and can be easily treated by lixiviation. The formation is traced by prospecting shafts for half a mile, and is about 300 feet wide, and is estimated to average 7 per cent copper. Fifty thousand pounds worth of ore is in sight. The Phillips River copper and gold fields are also very promising, but at present are a little difficult of access, situated on the extreme southern coast and far from any means of cheap transportation. A good deal of ore of the richer kind has been shipped to Laetters in South Australia from here, but pending the erection of local smelters, the government is arranging to assist the owners of leases by purchasing ores on the spot at a valuation.

### Mineral Production of Cuba.

The following particulars relating to mining operations in Cuba are extracted from a report on the mineral resources of that island in 1901, prepared by the Division of Mining and Mineral Resources, under the direction of the United States Geological Survey, and inserted in General Wood's civil report of 1902:—

The commercial production of metals in 1901, was confined to the Province of Santiago de Cuba and included only iron and manganese. Three companies in Santiago de Cuba produced the iron mined in the island last year, and one company in Santiago de Cuba produced all the manganese taken from Cuba, with the exception of two small special shipments of a few hundred tons each. There was no production of copper save that of a few hundred tons shipped as samples from the Provinces of Santiago de Cuba, Puerto Principe, and Matanzas. Asphalt was produced on a commer-

cial scale in the four Provinces of Habana, Matanzas, Santa Clara, and Puerto Principe. Each of the six provinces contributed to the total production of brick, stone and lime.

The following table shows the quantity and value of minerals produced in 1901:—

|                |                    | Quantity.  | Value.      |
|----------------|--------------------|------------|-------------|
| Iron           | Tons of 2,240 lbs  | 555,177    | \$1,240,555 |
| Manganese      | "                  | 24,104     | 96,791      |
| Copper         | "                  | 608        | 120,354     |
| Asphalt        | "                  | 4,554      | 38,950      |
| Stone          | Cubic metres.      | 461,025    | 847,781     |
| Lime           | Tons of 2,240 lbs. | 115,991    | 340,791     |
| Brick and Tile | Number.            | 34,114,595 | 464,756     |
| Cement         | Tons of 2,240 lbs. | 10,000     | 130,000     |

Total value..... \$3,279,978

The report adds that, although the results of this canvass of the island's mineral resources seem insignificant, the investigation is interesting as showing that, under reasonable promise of political and industrial peace, numerous enterprises will be established for the further development of Cuba's mineral wealth.

The New Brunswick Government has leased the Grand Falls water-power for thirty years to the Electro Manganese Co. for manufacturing purposes. The company manufactures ferro-manganese from wad and bog ores, and has a large plant in operation at Shawinigan Falls, Que.

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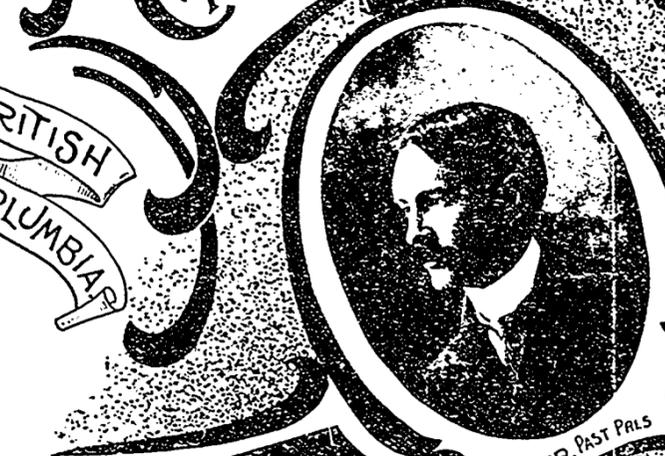
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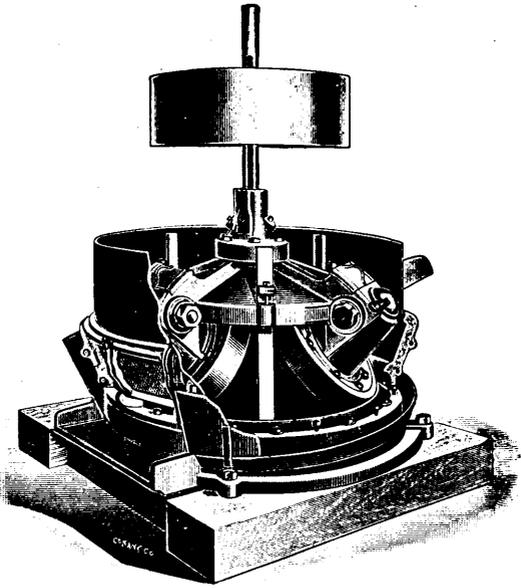


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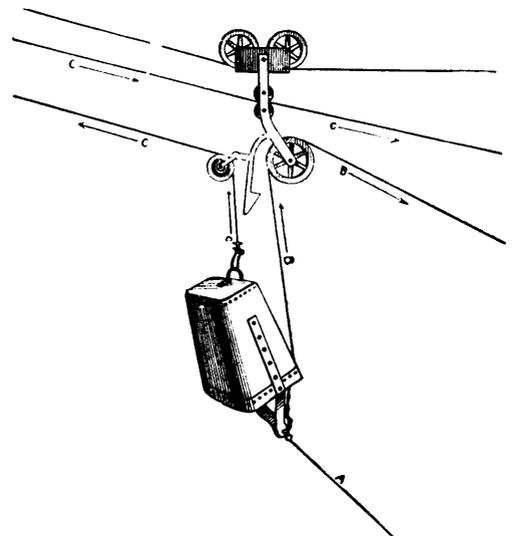
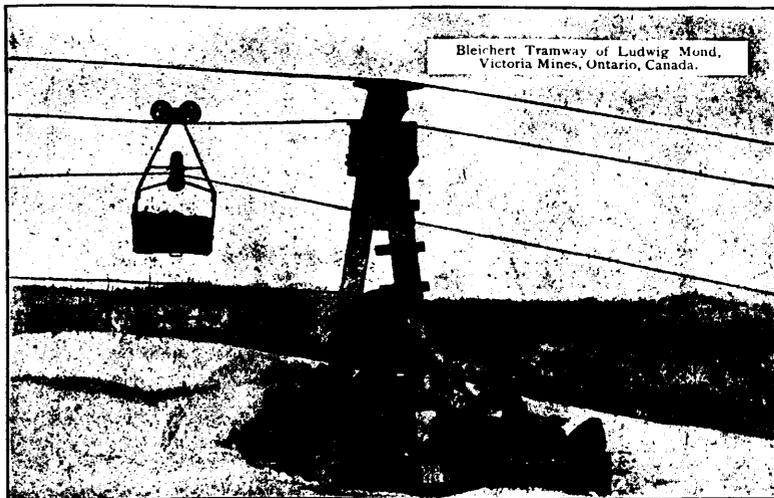
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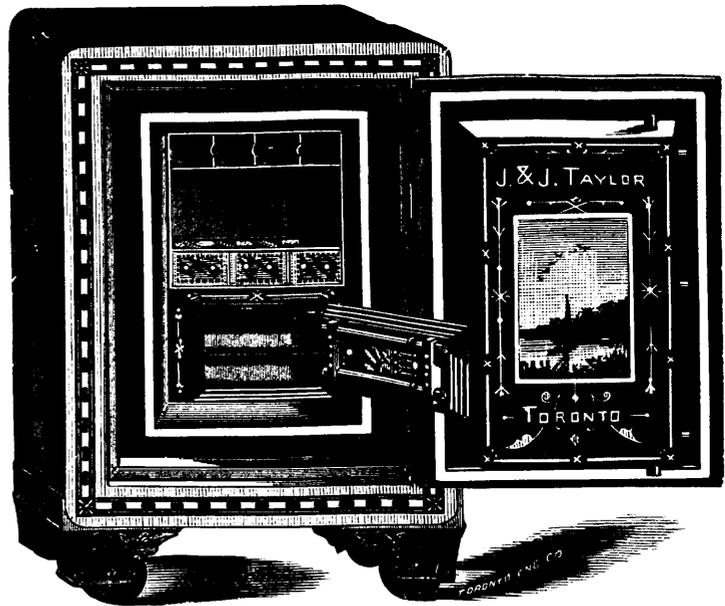
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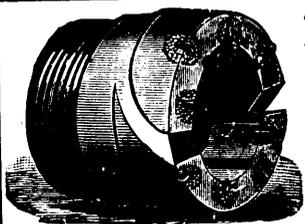
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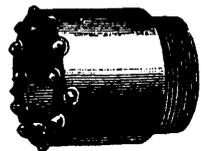
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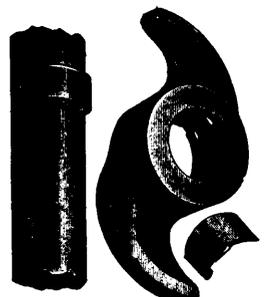
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# DOMINION OF CANADA

## 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 \$10.00 per acre for soft coal, and \$20.00 for anthracite. Not more than 320 acres can be acquired by one individual or company. Royalty at such rate as may from time to time be specified by Order-in-Council 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 \$10.00 per annum for an individual, and from \$50.00 to \$100.00 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 of the line of the lode or vein.

The claim shall be recorded within fifteen 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 \$5.00.

At least \$100.00 must be expended on the claim each year or paid to the Mining Recorder in lieu thereof. When \$500.00 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 per 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 exceeding 160 acres.

The patent for a mining location shall provide for the payment of royalty on the sales not exceeding five per cent.

#### PLACER MINING, MANITOBA AND THE N.W.T., EXCEPTING THE YUKON TERRITORY.

Placer mining claims generally are 100 feet square; entry fee, \$5.00, 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 \$10.00 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 \$10,000.00.

#### 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 rivers 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, \$100.00 per mile for first year, and \$10.00 per mile for each subsequent year. Royalty ten per cent on the output in excess of \$15,000.00.

#### 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 obtained 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 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 \$15.00. Royalty at the rate of 2½ per cent. on the value of the gold shipped from the 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 \$2.00. 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 \$200.00, or in lieu of work payment may be made to the Mining Recorder each year for the first three years of \$200.00, and after that \$400.00 for each year.

A certificate that work has been done or fee paid 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*.

#### HYDRAULIC MINING, YUKON TERRITORY.

Locations suitable for hydraulic mining, having a frontage of from one to five miles, and a depth of one mile or more, may be leased for twenty years, provided the ground has been prospected by the applicant or his agent; is found to be unsuitable for placer mining; and does not include within its boundaries any mining claims already granted. A rental of \$150.00 for each mile of frontage, at the rate of 2½ per cent. on the value of the gold shipped from the Territory. Operations must be commenced within one year from the date of the lease, and not less than \$5,000.00 must be expended annually. The lease excludes all base metals, quartz, and coal, and provides for the withdrawal of unoperated land for agricultural or building purposes.

#### PETROLEUM.

All unappropriated Dominion Lands shall, after the first of July, 1901, be open to prospecting for petroleum. Should the prospector discover oil in paying quantities he may acquire 640 acres of available land, including and surrounding his discovery, at the rate of \$1.00 an acre, subject to royalty at such rate as may be specified by Order in Council.

**JAMES A. SMART,**

Deputy of the Minister of the Interior.

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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 ores.

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 unsurveyed 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.

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# Ontario's Mining Lands.

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

Iron in large bodies of magnetite and hematite ; copper in sulphide and native form ; gold, mostly in free milling quartz ; silver, native and sulphides ; zinblend, 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 1900 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.



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—AND—  
**PRECIOUS STONES.**

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**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

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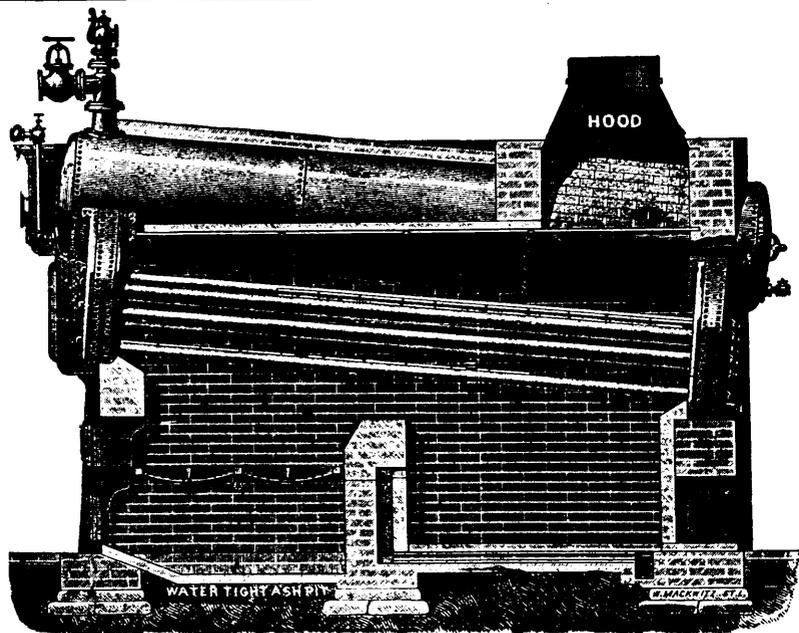
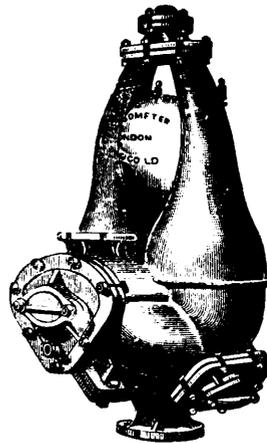
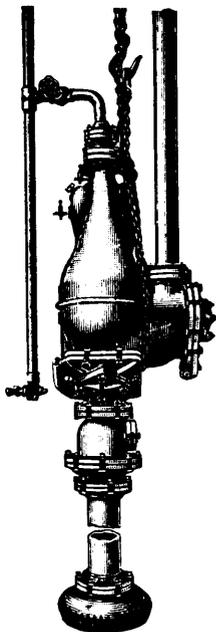
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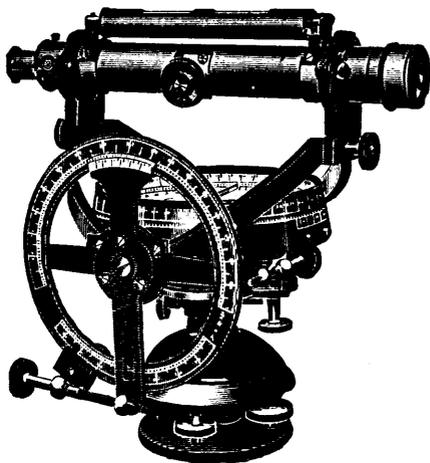


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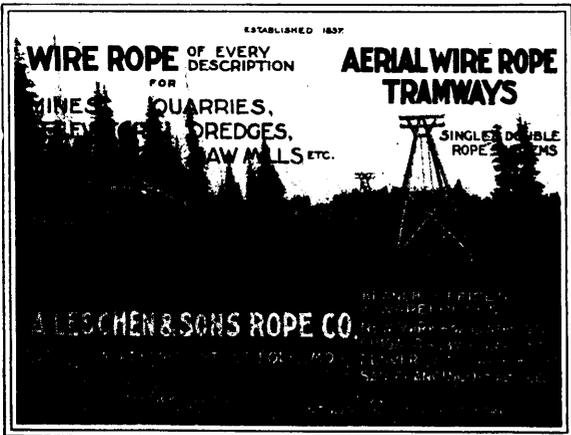
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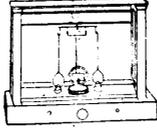
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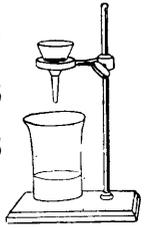
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(Signed) DAVID BAKER, General Manager,  
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