# THE CANADIAN MINING JOURNAL

VOL. XXXIII. TORONTO, May 15, 1912. No. 10

## The Canadian Mining Journal

With which is incorporated the
"CANADIAN MINING REVIEW"
Devoted to Mining, Metallurgy and Allied Industries in Canada.

Published fortnightly by the

MINES PUBLISHING CO., LIMITED

*Head Office* - Room 36, Canadian Birkbeck Building, 10 Adelaide Street East, Toronto.
*Branch Office* - - - - - - - - Montreal, 425 Coristine Building
*London Office* - - - Walter R. Skinner, 11-12 Clement's Lane London, E.C.
*U. S. A. Office* - Ward & Smith, 931 Tribune Building, New York

*Editor*
J. C. MURRAY. B.A., B.Sc.

SUBSCRIPTIONS—Payable in advance, $2.00 a year of 24 numbers, including postage in Canada. In all other countries, including postage, $3.00 a year.

Advertising copy should reach the Toronto Office by the 8th, for issues of the 15th of each month, and by the 23rd for the issues of the first of the following month. If proof is required, the copy should be sent so that the accepted proof will reach the Toronto Office by the above dates.

CIRCULATION.

"Entered as second-class matter April 23rd, 1908, at the post office at Buffalo, N.Y., under the Act of Congress of March 3rd, 1879."

Page.

CONTENTS.

| | Page |
|---|---|
| Editorials | 325 |
| Mining and Water-Powers of Nova Scotia | 325 |
| Amendments to the Yukon Placer Mining Act | 326 |
| Aleph Anrep | 326 |
| Progress at Porcupine | 327 |
| Detecting Carbon Monoxide | 327 |
| Haileybury Captures the Prize | 327 |
| A Summer's Campaign | 327 |
| The Electric Furnace | 327 |
| The Alaska-Treadwell | 328 |
| Editorial Notes | 328 |
| Some Rand Developments in 1911 | 329 |
| Personal and General | 330 |
| Yukon Mining Legislation | 331 |
| Remarks on Gold Deposits of Ontario, by F. Hille | 332 |
| Special Correspondence from Quebec | 333 |
| Geology of Nanaimo, B.C., by E. Jacobs | 334 |
| Bear River Coal Field, B.C., by C. J. F. Galloway | 335 |
| The Electric Furnace Process, by H. G. A. Stedman | 337 |
| Ernest Adolf Sjostedt, by S. Groves | 343 |
| The Domes of Nova Scotia (concluded), by T. A. Rickard | 345 |
| Special Correspondence, etc. | 348 |

## MINING AND WATER-POWERS OF NOVA SCOTIA

The exploitation of water-powers is one of the principal, if not the principal, factors in Canada's industrial development. Of British Columbia, Ontario, and Quebec this is particularly true. And of the whole Canadian mining industry it may be said that its growth corresponds roughly to the decreasing cost of power, and cheap power in mining regions is almost solely obtainable from our water-sheds.

The Canadian Commission of Conservation has issued no report more instructive than that entitled "Water-powers of Canada." From it have been gathered the facts on which this editorial is based.

According to estimates made in 1910, the total water-power developed in Canada for all purposes was equivalent to 1,016,521 h.p. The figures for each Province are:—

| | H.P. |
|---|---|
| Ontario | 532,266 |
| Quebec | 300,153 |
| Nova Scotia | 15,272 |
| New Brunswick | 9,765 |
| Prince Edward Island | 500 |
| Manitoba | 48,300 |
| Saskatchewan | 45 |
| Alberta | 7,300 |
| British Columbia | 100,920 |
| Yukon | 2,000 |
| | 1,016,521 |

This total is, of course, but a small proportion of the available power. Sufficient information is not yet secured to form a reliable basis for computing the undeveloped water-powers. One estimate, places them at 17,000,000 h.p. This, however, lacks authority. As regards the bearing of these powers upon mining, a brief glance at one Province will serve as a bird's-eye view of the subject.

Turning then to Nova Scotia, it may be stated without fear of contradiction, that there is scarcely a mine or a prospect (and here we are not considering coal mines) that is not within range of an adequate water-power. It is a fact that the pater-powers are relatively small. But they are abundantly able to meet any possible demands that are likely to be made on them for mining, and they are well distributed. The annual precipitation is large, and there are innumerable lakes to afford storage.

Along the coast of Nova Scotia, eastward from Halifax, there lies a large tract of gold-mining country. Such historic mines as the Dufferin, the Richard-

son, the Waverly group, and so on, are situated within a few miles of the shore of the Atlantic, while numerous other mines, most of them closed, are sprinkled through the districts inland. In this region there are scores of possible sites for power development. The low-water minimum horse-powers range from nominal figures to 1,100 h.p., the majority being over 100 h.p.

The mainland west of Halifax is even more bountifully supplied, there being well over 100 falls and chutes where, in each instance, from 100 h.p. to 4,000 h.p. can be guaranteed as a minimum.

When it is remembered that coal costs from $5 to $6 per ton delivered at many mining localities, that cordwood, of which the supply is none to plentiful, costs from $3 to $4 per cord, the advantages of hydro-electric power are easily discernible.

It has been mentioned that water-powers to the extent of about 15,000 h.p., have been developed in Nova Scotia. This total could be brought up to, say, 100,000 h.p. without undue outlay. The mining industry would utilize but part of this new source of power. Other industries, industries that the country needs, would participate most largely in the boon of cheap power. One does not need the vision of a prophet to imagine the growth that would follow the gradual placing at the disposal of the mining investor a reliable cheap and plentiful source of energy.

Some such idea has long been contemplated by the Nova Scotian Department of Mines, of course on a small scale. But it is an idea that the Provincial Government could well consider on the largest practicable scale. It is by no means an unrealizable dream. The example has already been set by Ontario.

## AMENDMENTS TO THE YUKON PLACER MINING ACT.

Certain important amendments have been recently added to the Yukon Placer Mining Act. The full text of these amendments appears on another page. A brief summary of the changes is appropriate here.

The first amendment covers the performance of work by owners of adjoining claims. To any person or persons owning adjoining claims, not exceeding ten in number, the Mining Recorder may grant permission, for a term not exceeding five years, to perform on any one or more of the claims all the work required to entitle the owner or owners to a renewal grant for each claim held. Where, however, the application is made by more than one person, the applicants must file with the Recorder a deed of partnership creating a joint liability between the owners of the claims for the joint working thereof.

Similar permission may be granted for the working of more than ten placer claims, even when they are not contiguous, providing the Gold Commissioner is satisfied that they are to be properly worked upon a large scale. This amendment probably gives too wide a discretionary power to the Commissioner. While right in principle, it is loosely worded.

Water and boundary disputes are to be submitted to a Board of Arbitrators. The arbitrators are to be selected by the parties to the dispute, or, failing that, the Commissioner is empowered to appoint them.

Damage or injury to claims by the dumping of refuse or by the drainage of water is specifically forbidden. In cases of dispute the Gold Commissioner is authorized to have the value and size of the dumping ground determined by arbitrators who will also fix a proper price to be paid for such ground.

## ALEPH ANREP.

There appears in the Journal of the Canadian Peat Society, February, 1912, an appreciation of the late Aleph Anrep, who did more than any other individual to develop the European peat industry.

Anrep was born in Stockholm in the year 1845. At the age of 18 he graduated from Upsala University. While still a very young man he began investigating the problems that surround the manufacture of peat. During the period 1875-1880, he was employed by the Russian Iron and Steel Institute, and, amongst other duties, studied the German peat industry.

From 1881 till 1900, Anrep made Moscow his home. There, as expert for the Iron and Steel Institute, he constructed his first peat machine, and there he gradually improved his device in detail after detail. Two large factories, one near Moscow and one near Orel, turned out scores of the machines yearly. In the year 1901, there were more than 1,000 Anrep peat machine producing annually an aggregate of about 4,000,000 tons of air-dried peat fuel. Cotton and sugar manufacturers, foundries and private railways were then using the Anrep peat extensively.

But illness had overtaken Anrep in 1896. He found it impossible to prevent infringement upon his patents. His private fortune and a part of income were swept away. For five years he was confined to his bed. Not until the year 1900 was he able even to use a wheel-chair.

However, the Russian authorities were not slow to recognize the invaluable service that Anrep had rendered to the nation. In 1897, Alexander III. granted him a life pension. Three years ago the present Czar bestowed upon him another annuity.

Anrep died on December 29th, 1911. Seventeen years a helpless invalid, he never lost for a moment the fine enthusiasm that carried over difficulties that would have been considered insuperable obstacles by smaller men. His claim to fame is undisputed. Apart from the unquestionable merit of his inventions, he possessed an almost unique combination of qualities. He was not only an inventor, but a business man.

## PROGRESS AT PORCUPINE.

We commend to the attention of our readers the letter of our special correspondent, Mr. Ben Hughes, wherein is summed up briefly the salient features of Porcupine's progress.

With only part of the Dome mill in commission, two gold bars, aggregating about 3,800 ounces, have been produced, while about 1,200 ounces have been sent out from the McIntyre mill.

At the latter mine, according to Mr. Hughes, there appears to be a probability that a large body of medium-grade ore will be put in sight by the end of the year. About 5,000 feet of work has been completed, and 15 drills are being employed.

Similarly cheerful news comes from the McEaneny, the Plenaurum, and other such mines.

It is evident that Porcupine is entering upon a quite new phase of existence. The actual production of gold from the stamp mills has not caused any sensational flurry. This is significant. In a camp that was not well-balanced, the appearance of substantial gold bars would have been the signal for all kinds of financial pyrotechnics.

House-cleaning is proceeding consistently in several of the companies that have showed signs of mismanagement.

In the main, it is safe to conclude that Porcupine has struck her pace and that the period of childish fevers is done with.

---

## DETECTING CARBON MONOXIDE.

The use of birds or mice in detecting the presence of carbon monoxide in collieries is declared by Mr. George A. Burrell, of the United States Bureau of Mines, to be superior to any chemical tests. One-tenth of one per cent. of carbon monoxide in the air induces symptoms of distress in a man at rest in about two hours. A mouse becomes affected in ten minutes. Larger percentages of gas, say 0.6 per cent., prove fatal to mice and birds in two or three minutes; whereas a human being is apparently unaffected after breathing the mixture for ten minutes. Canaries, on the other hand, are even more susceptible than mice, and their symptoms are much more pronounced.

It may sometimes be the case that a mine atmosphere may be so deficient in oxygen that a lamp flame will be extinguished. But there may be no carbon monoxide present, nor may the absence of the normal percentage of oxygen affect either man or bird. In these cases the lack of any signs of distress on the part of the birds is proof that carbon monoxide is not present.

Mr. Burrell urges the more general use of canaries as indicators of poisonous atmospheres. By their use the element of personal error is removed.

## HAILEYBURY CAPTURES THE PRIZE.

No more will long-distance justice be administered in the north. After a long and arduous campaign the citizens of Haileybury have succeeded in inducing the Ontario Government to make Haileybury the judicial centre of Temiscaming. The announcement was hilariously celebrated by loyal Haileyburians. Not only will the mining man be saved very serious expense, but the local real estate owner will be placed in a less insecure position.

---

## A SUMMER'S CAMPAIGN.

Arrangements have been made and are now being carried into effect whereby special representatives of The Canadian Mining Journal will visit during the coming summer all the leading mining districts of Canada.

Thoroughly qualified writers are being engaged for suitable periods to gather material for special issues. While our plans are not yet complete, yet we feel that a preliminary word is not out of place.

It is our intention to cover not only the prosperous mining regions that are already in the public eye, but also to pay marked attention to those struggling districts that have not heretofore received sufficient advertisement.

That much good will result from this effort we are convinced. The possibilities of neglected fields and their immediate needs will be fully expounded. Much misapprehension as regards their mining history will be cleared away. And their claims will be brought fully and fairly before the public.

Naturally, the established camps will not be neglected. Carefully written articles on mining and milling practice, on transportation facilities and requirements, and, indeed, on every important phase of the industry, will appear.

Throughout the summer, then, The Canadian Mining Journal will collect and publish in the form of special issues, copiously illustrated, a series of articles that will embody the latest news and views of the whole Canadian mining industry. In this effort we count upon the constant co-operation of Boards of Trade and other organizations. Particularly, also, do we desire suggestions from local mining men.

In all probability our first special issue will appear in June.

---

## THE ELECTRIC FURNACE.

In this issue we publish a paper dealing with the electric furnace and its relation to steel. Our readers will notice that the English writer, Mr. Stedman, dwells particularly upon the manufacture of high-grade of special steels by the electric process, and predicts that, although this branch will remain for some time in the hands of the Sheffield crucible-steel maker, the suprem-

acy of the electric process is bound before long to be acknowledged.

The crucible process entails an expenditure, for melting alone, of from $15 to $17.50 in fuel per ton of steel produced. The original metal must be commercially pure. As a contrast, the electric furnace will melt and refine cheap scrap, and produce excellent tool steel, at a cost not exceeding $8 per ton.

The explanation of this very marked difference must be referred to other factors than prejudice and established custom. With all due respect to Mr. Stedman, whose facts we accept without demur, there must yet be some inherent defects to be overcome in the electric process. Otherwise a revolutionary change in the steel trade would be inevitable. Fortunately for all of us, change is a process.

However, it is written that the archaic crucible cannot hold its own any more than the "ordinary" bicycle, or the sailing vessel, or the hand-printed book.

It is not out of place to refer here to the Evans-Stansfield electric furnace, a Canadian invention, often mentioned in these columns. The experimental demonstrations with that furnace, producing the highest quality of tool steel, direct from titaniferous ores, have been uniformly successful. But prophets are without honour in their own country—otherwise we should all attain fame.

## THE ALASKA-TREADWELL.

Running a 240-stamp mill for 30¼ days, and a 300-stamp mill for 19 days, the Alaska-Treadwell Company in March crushed 64,120 tons of ore. The total yield of gold was $160,000, or less than $2.50 per ton. The net profit was $64,000, practically $1 per ton. How many false hopes have been nurtured, and how many glittering prospectuses based upon the Alaska-Treadwell!

Several correspondents have asked us questions about this famous mine. To satisfy their legitimate curiosity, and to refresh the memory of others, we may repeat that Alaska-Treadwell mine is situated on Douglas Island, opposite Juneau, Alaska. The present company, whose capitalization is $5,000,000, was organized in 1890, since when regular dividends have been paid.

The ore bodies are irregular and enormous. The average gold content runs from about $2.15 to $3.15 per ton, and the total cost of extraction rarely exceeds $1.55 per ton. About 775,000 tons are milled during the year. The ore reserves in 1911, exceeded 6,500,000 tons.

These few facts give some vague idea of the size of the oft-quoted Alaska-Treadwell.

## EDITORIAL NOTES.

The Mesaba range has yielded nearly 250,000,000 tons of iron ore during the last 20 years. Just 20 years ago, Mr. H. V. Winchell, then assistant State geologist of Minnesota, gave it as his opinion that ore of the newly-discovered range would average 60 per cent. metallic iron and would be largely within the Bessemer phosphorus limit. Last year's shipments fluctuated between 63.56 per cent. and 52 per cent. iron, the great majority being nearer 60 per cent. than 55 per cent. The phosphorus percentage is still almost uniformly within the Bessemer limit.

---

The annual average New York price of tin was 13.24 cents in the year 1896. With few downward fluctuations and irregularities the average price has gone up until the peak was reached in 1911, when the figure for the year was 42.68 cents. The highest price, for a short period, was reached in 1906, when tin sold for 50 cents. The lowest recorded price in the period 1896-1911, was marked in the year 1896. It was 12.62½ cents.

---

Vanadium is being produced in considerable quantities in Colorado. That State is beginning to rank as one of the world's chief sources of supply.

---

In a very thoughtful article in the May number of the Engineering Magazine, Prof. Frank P. McKibben compares "obstructive" and "constructive" conservation, and demonstrates the absurdity of restrictive legislation in respect to Alaskan coal lands. The article is a practical and sane presentation of the case for Alaska.

---

The new British Columbia forest fire regulations, promulgated by the Railway Commission, are looked upon as a decided menace to the coal mining industry. The matter is to be threshed out at Ottawa.

---

Our enterprising contemporary, The Colliery Guardian (London, England), has brought out under date April 17, a special Canadian issue in which appears an excellent account of the last meeting of the Canadian Mining Institute. Various official articles on Canada's coalfields are reprinted.

---

To put an air-lift pump in operation requires a greater air pressure than is necessary for ordinary working. In its own field, that of deep shaft pumping, the air-lift pump is most efficient. The action is nearly continuous, and the volume of discharge is limited only by the cost. Stoppages and breakdowns are unusual.

---

An enormous sum of money, roughly, $55,000,000, was spent in buying mining machinery and supplies for Rand mines last year. A comparison with Canadian expenditure would be interesting, but such a comparison is not now practicable on account of our imperfect statistics.

## SOME RAND DEVELOPMENTS IN 1911.

The reports for the final quarter of 1911 of the properties in which the Rand Mines is interested have been issued. As these companies number ten, and their areas are distributed over quite two-thirds the length of the Rand—that is to say, from the Modder B on the east to the Bantjes Consolidated on the west—they may be said to be fairly representative of the whole.

Taking the companies in their order along the Rand from east to west, the Modder B first calls for notice. Development during the latter portion of the past year has been more or less a secondary consideration, the commencement of milling having demanded the preparation of the stopes for extraction of the ore. In spite of this, however, nearly 7,500 feet of main reef was disclosed, and averaged 26.6 dwts. over 12 inches, contrasting with 11,295 feet, assaying 32.7 dwts. over 11.83 inches. Compared by inch-dwts. the average for the latest period is 319.2, against 395. With respect to the neighbouring New Modderfontein, the position is as follows. During 1911 some 16,698 feet of reef was disclosed of an average value of 47 dwts. over 9.1 inches, as compared with 20,009 feet, averaging 60 dwts. over 8.5 inches for the preceding year. Tested by the inch-dwt the averages for 1911 and 1910 were 428 and 510 respectively.

Moving further westward, the Rose Deep has now to be dealt with. The reef disclosures during the past year represent a considerable improvement upon those of 1910, the better tendency continuing down to the close of the year. The greatest advance is in respect of the south reef. Of this gold carrier 3,187 feet were opened up, in contrast with 2,619 feet during 1910, and the average result was 9.3 dwts over 23 inches, as compared with 6.5 dwts over 19 inches; 4,079 feet of main reef leader was opened up, worth 11.7 dwts over 17.4 inches, in contrast with 3,169 feet, worth 9.3 dwts over 20 inches, but in regard to the main reef the result was not quite so satisfactory, 3,496 feet being disclosed for a value of 8.4 dwts over 24.3 inches, in contrast with 5,434 feet, value 8.4 dwts over 20 inches. The improvement in respect of the two first-mentioned reefs, however, more than counterbalances the shrinkage in width of the last. On the Village Deep, development work during the past year has been most successful. The actual footage of reef exposed—14,119 feet—is 1,430 feet below the total for 1910, but there is a great improvement in value. The main reef leader for the 8,202 feet exposed, assayed 16.0 dwts over 26.8 inches, as compared with 9.6 dwts over 32 inches; gauged by dwt-inches, the result for the former period is 408, against 307. As regards the south reef, the assay value was 13.1 dwts over 20 inches, as compared with 10.6 dwts over 26 inches.

In regard to the City Deep some leeway appears to have been made up. During 1910 the average assay value dropped from 24.27 dwts to 22.8 dwts and the width from 21.9 inches to 18.35 inches. The grade last year further shrunk, this time to 20.5 dwts, but the width was increased to 23 inches, which was sufficient to bring the inch-dwt average for the year up to 471½, in contrast with 418 in respect of 1910. In regard to the Crown Mines, upon which the enormous amount of 71,000 feet of work was performed, the values obtained during the year ruled lower; there has, however, been some compensation in the shape of improvement in width. In fact, the increased size of the main reef leader raised the inch-dwt. slightly above the 1910 figure of 401. In regard to the south reef, however, the expansion in width was insufficient to offset decline in grade, the ratio being 333 inch-dwts, in contrast with 384 inch-dwts. A favourable point is that the developments of the final quarter of the year were better than those of the three preceding periods.

On the Geldenhuis Deep results have been disappointing. This applies to all three reefs, but particularly to the two most important ore bodies. Reports show a drop of 3 dwts in the value and a shrinkage of 1 inch in the width of the leader, whilst the drop in the value of the south reef is 1.6 dwts and the shrinkage in the width 1.5 inch. Concerning the Ferreira Deep, work on the main reef leader during the year opened up ore of uniform but lower value. As to the south reef, despite considerable fluctuation, in the end the average for the year—namely, 21.1 dwts—is practically the same as for the preceding period, while there was a small increase in width. The Nourse Mines has not done so well, the grade of both the main reef leader and south reef, while fluctuating, being lower on balance. There was a little compensation in higher values in the main reef disclosed, although this was accompanied by shrinkage in width. With regard to the Durban Roodepoort Deep, the feature is the much greater amount of work performed on the main reef, 5,332 feet of reef being disclosed, against 2,172 feet; the net result was, however, rather disappointing, the value being 12 dwts over 26 inches, in contrast with 13.2 dwts over the same width. In regard to the south reef little change is shown, the assay value being 33.6 dwts over 10.9 inches, in contrast with 36.7 dwts over 10 inches, the inch-dwt for the latest period being 366, as against 367 inch dwts. On the Bantjes Consolidated work has been practically confined to the south reef, and nothing like the same amount of reef was exposed, the total being 7,440 feet, against 14,955 feet. The width at 11.3 inches represents a decline of 3.7 inches, but the value rose from 18.7 dwts to 20.7 dwts.

---

## ROCK-DRILL DUST COLLECTOR.

Two mechanics in the employ of the De Beers Consolidated Mines have invented and patented a device for collecting the dust produced by rock drilling and preventing its diffusion into the atmosphere. According to the "South African Mining Journal," the contrivance has been tried at De Beers under working conditions, and has answered the tests. "The apparatus consists chiefly of a steel casing, small in diameter and cylindrical in form and weighing about 5 lbs. This is meant to surround the drill at the working face. It opens in two—the halves being connected by hinges—so that the drill may easily be changed or adjusted. Each half of the casing has a dust collecting chamber, which can be fitted either with a lid or a removable bag. The device can, therefore, be used no matter what may be the angle at which the drill is being worked. Running round the front of the casing is a groove into which rubber is fitted for the purpose of pressing against the rock face, and thus preventing any escape of dust between the rock and the casing. In consequence of this, the dust, it is claimed, passes back into the cylinder and falls into the dust collecting chamber. The casing is supported on telescopic piping, which is fastened to the cradle of the drilling machine by means of a clamp. The outer piping is perforated, so that by the use of a pin the inner tubing can be adjusted to the length of the drill in operation."

# PERSONAL AND GENERAL

Mr. J. B. Woodworth, mining engineer, Lyndhurst avenue, Toronto, has returned from a professional visit to Arizona.

Mr. S. N. Graham, mining engineer, a gratuate of Kingston School of Mining, who has had experience both in Mexico and Canada, is taking an office in Toronto. His temporary address is in care of the Canadian Mining Journal.

Toronto, March 9.

Mr. W. J. Loring, of Messrs. Bewick, Moreing & Co., visited California in March in connection with the development of the Plymouth Consolidated Mine.

Colonel John Carson and Mr. Samuel W. Cohen, president and general manager, respectively, of the Crown Reserve Mining Company, Limited, Cobalt, have gone to Europe for two months on business for the company.

Mr. W. E. Duncan, consulting engineer, formerly of Merritt, B.C., has removed his office to Vancouver, where he proposes to undertake mining engineering work.

Mr. C. F. J. Galloway, consulting mining engineer, Vancouver, B.C., who contributes an article to this number of The Journal, is a son of Professor W. Galloway, of Cardiff, Wales.

Mr. John Hays Hammond has sailed for Europe.

Mr. Ellis Thomson, a graduate in science of Toronto University, and of Freiberg, will accompany Mr. J. B. Tyrrell during the coming summer on the Ontario-Manitoba Boundary Expedition.

Mr. Walter Henry Weed announces that the firm of Weed & Probert has been dissolved by mutual consent. Mr. Weed has taken offices at 42 Broadway, New York, where he will continue in practice as consulting engineer and mining geologist.

The Roberts & Schaefer Company, Chicago, consulting engineers and contractors for coal washeries, etc., have moved to new offices on the top floor of the McCormick Building.

Mr. Clifford E. Smith, mining engineer, Brockville, is to make Toronto his headquarters hereafter.

Mr. Edward G. Warren, acting general manager of the British Columbia Copper Company, has returned to Greenwood, Boundary district, B.C., from a business visit to St. Paul, Minn.

Mr. Lorne A. Campbell, formerly of Rossland, B.C., manager of the West Kootenay Power and Light Company, is on a visit to Great Britain. At the recent provincial elections Mr. Campbell was elected to represent Rossland district in the Legislative Assembly of British Columbia. It is stated he intends building a residence in Victoria and removing to that city.

Mr. W. Gus Smith, of Corbin, Crow's Nest district, British Columbia, has returned to Southeast Kootenay, where he has for years been resident engineer for the Corbin Coal and Coke Company, operating a coal mine in that district. During his temporary absence he visited a number of coal mines in the United States.

Mr. John Kiddie, elder son of Mr. Thomas Kiddie, of Vancouver, a matallurgist well known in British Columbia, Southeast Alaska, and the State of Washington, has been appointed assistant superintendent at the Arizona Copper Company's mines at Morenci, Arizona, where for some time he has been the company's geologist and mining engineer.

Mr. Fred. M. Wells, of Vancouver, B.C., recently returned from that city to Surf Inlet, Princess Royal Island, where he is supervising the development of a gold mine for the Surf Inlet Gold Mines, Ltd. The outlook for this enterprise is stated to be promising.

Mr. H. E. Croasdaile, formerly of Nelson, B.C., where for some time he was general manager for the British company that then owned and operated the Silver King mine and smeltery, is reported to intend to shortly return to the Nelson district to reside, after having been in England for several years.

Mr. Alexander Sharp will spend the ensuing summer at Mr. P. Burns' coal mines in Alberta, where development work will be continued. At present Mr. Sharp makes Vancouver, B.C., his headquarters.

Mr. Robert R. Hedley, of Vancouver, B.C., manager of the Canadian Mining Operators, Limited, of that city, has been appointed president, pro tem., of the Vancouver Mining Club, recently organized there. Those present at the meeting for organization, which was presided over by the Mayor of Vancouver, were "very optimistic regarding the mineral resources of British Columbia."

## WORLD'S PRODUCT OF TUNGSTEN ORE.

(Quantities in tons of 2,000 pounds.)

| | 1910 | 1909 |
|---|---|---|
| South Africa | ... | 16 |
| Federated Malay States | 105 | 99 |
| French-Indo China | 19 | ... |
| British India | 23 | 7 |
| New South Wales | 413 | 431 |
| Northern Territory | 78 | 49 |
| Queensland | 1,145 | 679 |
| Tasmania | 75 | 20 |
| Victoria | 31 | 15 |
| Western Australia | 47 | 6 |
| Dutch East Indies, Billiton | 21 | 12 |
| Dutch East Indies, Singkep | 12 | 12 |
| Austro-Hungary | 54 | 43 |
| Great Britain | 307 | 421 |
| France | ... | 55 |
| Germany (Saxony) | 105 | 106 |
| Portugal | 1,132 | 609 |
| Spain | ... | 142 |
| New Zealand | 187 | 78 |
| Nova Scotia | 83 | ... |
| United States | 1,821 | 1,619 |
| Argentina | 1,061 | 900 |
| Bolivia | 232 | 168 |
| Other countries | 549 | 513 |
| Totals | 7,500 | 6,000 |

## MINING COSTS.

The several factors which make for low mining costs are width of the ore body, the free milling nature of the ore, extraction of the ore by means of adits and freedom from the cost of pumping water. If, in addition to the above-mentioned favourable factors, there were abundant water-power available for all the requiments of the operations, then costs would be reduced to a very low level, especially when operations were carried out upon a large scale. It is the presence or absence of these factors which make it so difficult to compare the costs of one mine with another.

# YUKON MINING LEGISLATION

Bill No. 181.

An Act to amend the Yukon Placer Mining Act.

(Assented to 1st April, 1912.)

His Majesty, by and with the advice and consent of the Senate and House of Commons of Canada, enacts as follows:—

1. Section 22 of chapter 77 of the statutes of 1908 is repealed and the following is enacted as section 51 of the Yukon Placer Mining Act, chapter 64 of the Revised Statutes, 1906, hereinafter called "the principal Act":—

"51. Upon application being made to him by any person or persons owning adjoining claims not exceeding ten in number, the Mining Recorder may grant permission, for a term not exceeding five years, to any such person or persons to perform on any one or more of such claims all the work required to entitle him or them to a renewal grant for each claim so held by him or them: Provided that, where the application is made by more than one person, the applicants shall file with the Mining Recorder a deed of partnership creating a joint liability between the owners of the claims for the joint working thereof.

"2. If, however, application is made for permission to include in one group more than ten placer mining claims owned by one individual, company or group of individuals included in a registered partnership, and if upon the report of the Mining Inspector it is shown to the satisfaction of the Gold Commissioner that such claims are to be operated by a system of mining on a large scale, which has a direct bearing upon all of the claims affected, and renders a considerable area necessary to successful operation by the system proposed, the permission provided for by this section may be granted for a period of not more than five years, with the approval of the Commissioner, with respect to such claims, notwithstanding that they are more than ten in number and not all contiguous; such permission, however, to be subject to cancellation at any time by the Gold Commissioner, after sixty days' notice to the persons interested, in case it appears from the evidence contained in the application for the renewal of the claims affected, or from the report of the Mining Inspector, that the system of mining contemplated when the permission to group was granted is not being installed or operated with reasonable diligence."

2. Section 74 of the principal Act, and section 29 of the statutes of 1908, are repealed and the following is enacted as section 74 of the principal Act:—

"74. In the event of any dispute between owners of claims or lessees of locations with respect to the distribution of water or the boundaries of claims or to dumping or any other matter referred to in the next following section, such dispute may be heard and determined by a board of arbitrators to be appointed as follows: The Gold Commissioner, upon the request of any such owner or lessee for the appointment of a board of arbitrators and upon being furnished with a statement of the matter complained of clearly expressed in writing, shall notify each owner and lessee specified in such request to appoint an arbitrator, and in case such owner or lessee refuses or neglects to appoint an arbitrator within thirty days from the date of such notification the Gold Commissioner, upon being requested so to do by the arbitrator or arbitrators appointed, or by any interested owner or lessee, shall appoint such arbitrator or arbitrators. In the event of the total number of arbitrators so appointed being an even number, an additional arbitrator shall be appointed by such arbitrators.

"2. In the event of the arbitrators so appointed being an even number, and being unable to agree upon the additional arbitrator, or failing to do so within five days from the date upon which the last arbitrator was appointed, the Gold Commissioner, upon being requested so to do by the arbitrators so appointed or by any interested owner or lessee, shall appoint the additional arbitrator.

"3. The arbitrators shall be entitled to be paid a per diem allowance of ten dollars, together with necessary travelling and living expenses, while actually engaged in the arbitration, and the costs of such arbitration, including the cost of any examination of the property which may be found necessary, shall be borne by such owners or lessees as are parties to the dispute, and in the proportion set out in the award of the arbitrators.

"4. The procedure in all cases before a board of arbitrators under this Act shall be in accordance with rules prepared by the Gold Commissioner and approved by the Commissioner."

3. Section 75 of the principal Act is repealed and the following is substituted therefor:—

"75. Except as hereinafter provided, no person mining upon any claim shall cause damage or injury to the holder of any claim other than his own by throwing earth, clay, stones or other material upon such other claim, or by causing or allowing water which may be pumped or bailed or may flow from his own claim, to flow into or upon such other claim.

"2. If the owner of a claim wishes to deposit the leavings, deads, waste or tailings therefrom on any adjacent claim, or on any other adjacent mining property, whether the same was acquired under the provisions of this Act or any other Act, order in council or regulation governing mining in the Yukon Territory, which claim or mining property is of not less than five years' standing, or if such owner wishes to cause or allow water which may be pumped or bailed or may flow from his own claim to flow into or upon such other claim or mining property, he may give one month's notice of such desire in writing to the owner or lessee of such adjacent claim or property, and if, at the expiration of the month the owner giving the said notice and the owner or lessee of the said adjacent claim or mining property has not been able to arrive at an agreement as to the price to be paid for the dumping ground or for damages caused by such flow of water, the owner giving notice may apply to the Gold Commissioner to have the value and size of the dumping ground determined by the said board of arbitrators, and the said board shall have power to permit so much of the said adjacent claim or property to be used for dumping and at such a price as the said board of arbitrators deems just."

## FROM THE FORTHCOMING ANNUAL REPORT OF THE DIRECTOR OF THE UNITED STATES BUREAU OF MINES, FOR THE FISCAL YEAR ENDING JUNE 30, 1911.

### Explosives Used in Coal Mines.

During the year a number of explosives have been thoroughly tested and have been designated as "permissible" explosives for use in dusty and gaseous mines under the conditions prescribed by the bureau. These "permissible" explosives give a short, quick, and relatively cool flame that is less likely to ignite inflammable gas or coal dust than is the flame of dynamite or that of black powder. Up to July 1, 1911, 88 explosives had passed the tests required by the bureau and had been placed on its list of permissible explosives.

In its endeavour to reduce the dangers attending the use of explosives in coal mining the bureau is meeting with the heartiest co-operation of manufacturers of explosives, who are steadily endeavouring to produce new explosives that will meet the increasing rigid demands the bureau makes in behalf of safety. So many requests have been received for tests of these new explosives that the testing work is now nearly a year in arrears. But although the bureau is anxious to test these explosives promptly, in the belief that they may be superior to those already tested, it is unable to bring the work up to date without increasing the force of engineers and chemists engaged in making these tests, and the funds available for conducting the investigations are not sufficient to meet such increase. In testing and analyzing the explosives examined during the year nearly 10,000 tests, analyses, and determinations were made.

The chemical investigations, like the physical tests, of explosives, have been carried on at the Pittsburg station of the bureau. In addition to routine chemical analyses and tests, several improved methods of testing have been devised.

---

# A FEW REMARKS ON SOME OF THE GOLD DEPOSITS OF ONTARIO

F. Hille, M. E.*

The Canadian people present the characteristic that they can be stampeded politically, economically, and otherwise with the greatest ease from one extreme to another, that one day they can be led to anticipate harvesting fortunes from a certain enterprise, be it a mine or newly discovered mineral region, and the next are frightened into a panic, imagining that they either have lost or might lose all that had been put in. Today they are booming with the most enticing songs a gold discovery; to-morrow they are deep in the dumps, bewailing a few dollars foolishly spent.

Knowing these characteristics, persons who try to pose as advisers to the public should be slow in arousing it from slumber. Therefore, mining booms should proceed by natural growth, or should only be permitted when they are justified. On our continent, however, they seem to be a necessity, in order to awaken the public to the fact that a mineral industry is not only necessary, but that it is as legitimate, and, when rightly undertaken and conducted, as remunerative as any other industry.

However, if we have a mining boom, and there is some justification for it, let us not disturb it without warrant. Scare-crowing, for whatever motive done, will neither benefit the camp, as long as it is not sufficiently developed, nor will it benefit the investor, as long as it cannot be proved that his money is being sunk in an illegitimate scheme. I have seen prospective investors frightened away from mines and mineral prospects which turned out later to be highly remunerative enterprises. Let the public learn that it is advisable, if it desires to make money out of any undertaking, either to understand something about it, or to take experts' advice on the subject. To argue that it is humanitarian to save people from squandering their money and to guard the camp from getting a bad reputation, is a mistaken idea. The quicker the public learns the A.B.C. of industrial pursuits the better for it. Do not try to teach babes to walk with a "walking chair"; let them find their equilibrium in a natural way.

In reading the copious advice given to the public by newspapers, mineral land owners, by learned and non-learned professors, since the Porcupine gold fields were discovered, I was astonished to find so great an amount of innocence and ignorance displayed by most of the writers or speakers, especially in their critiques on the gold deposits of this province in general, throwing, as they do, the numerous gold camps into one pot and from that serving up a hash, the result being an absolutely indigestible product, which is dished up to the poor, unsophisticated public. For instance, in what relation does the Porcupine camp stand to the Madoc, the Island Falls to the Manitou, or the Sturgeon Lake to the Lake of the Woods or Rainy Lake? What good purpose does it serve to make public utterance to the effect that "none of these localities is of promise," yes, "that they were absolutely disappointing," when such assertions are entirely wide of the mark?

The mania for going before the public with a subject insufficiently digested, merely for the purpose of either posing as a humanitarian, or parading in an expert capacity, shows neither a sound spirit of benevolence nor a sufficient knowledge of professional ethics of professionalism, and it will commonly, as a logical sequence, produce just the opposite of the effect desired.

The only reasonable article dealing with the Porcupine that I have read lately is one by Ingalls, in a recent number of the Engineering and Mining Journal, in which the writer neither condemns nor exaggerates, but gives credit where credit belongs.

Porcupine is still wearing its first baby shoes, and will wear them for some time to come. Why, then, treat it like a full-grown individual, and allow cobblers to descend on it with all kinds of boots, fashioned in a manner altogether ridiculous? Only thoughtless critics will claim that among the thousands of claims

*Mining Engineer and Chemist, Port Arthur, Ont.

taken up in that country, "it would be questionable whether there would be more than one or two mines produced from them," and point sarcastically at that other, older gold mining camp in Western Ontario. Let me inform my readers that these people do not know what they are talking about, because, for the development of a mining camp, there is needed time, money, knowledge, skill, perseverance and honesty.

The Porcupine camp has not yet had time to show its full possibilities. Let us examine it again in three or four years, and, if in that time it has been thoroughly proved, we will be better able to sit in judgment. What has so far been done and been shown up speaks well for its future.

Now, as to the older gold-mining camps in Ontario, in particular those in the Thunder Bay and Rainy River Districts, I would class them as being just as promising as the newer camp. I might even venture to say that neither Porcupine nor any other locality has produced anything that would equal in richness and extent some of the mines in the Rainy River District. I have in mind particularly one mine which is really phenomenal, while a large number of the gold deposits which exist here, will hold their own with those of any other gold-producing area on the continent.

The failure of these camps to produce flourishing mines would be easily understood by those who wish to follow the history of gold mining here, if they had witnessed the amount of ignorance dumped into these camps, had seen how mines and prospects were used as milking cows by owners and promoters, who sold shares and pocketed the proceeds, instead of putting it into the mine, and had noted what kind of persons acted as managers and superintendents, men who had no more knowledge of the business they were supposed to be conducting than the man in our satellite, and, last, but not least, had seen men reporting favourably on prospects which did not deserve the name of "deposit" or "vein," while others again were reporting unfavourably, notwithstanding the fact that they were treading upon free gold sticking out of the quartz which represented the filling of the finest and truest fissure vein that one could wish to see. Even yet I lately read an official report in which it was claimed that in a certain district the fillings of the veins—gold, pyrites, quartz and everything else—were derived from the country rock by lateral segregation. This one assertion, if true, would condemn the entire district, but, fortunately, nature has been kinder to mankind than was admitted by the writer's knowledge of economic geology.

Picture a vein, deposited in a fault-fissure, with a surface outcrop eight feet in width and gradually widening out towards depth, until, at the present lowest level, now at 500 feet, it attained a width of 25 feet, assaying, with some heavy visible gold streaks, several hundred dollars, and without these stringers, nearly $16 on an average, which for nearly 200 vertical feet, has produced lumps and nuggets of gold, sometimes three inches in diameter, imbedded in a quartz gangue well-defined throughout a zone of sheared altered schist!

It would lead me too far, were I to try and give here a comprehensive account of the various gold deposits occurring in our two districts. Only this I may say, that the greater number of them are situated in fault-fissures, in sheared zones of different rocks, some in discission—and others in contact-fissures.

The ores are usually of very simple composition, either free-milling or partly so, in the latter being suphides, of which iron pyrites predominates: of other minerals we occasionally find galena, blende and pyrrhotite, rarely, however, in large quantities. In two instances only have I found gold combined with tellurium, otherwise the treatment of our ores offers no difficulty.

When any individual possessed of intimate knowledge of every feature of our ore deposits has to read statements made by people who either have no personal knowledge or only the most casual acquaintance with them, and has to observe how injustice is thereby done first, to our mineral industry; second, to the localities, third, to the province, and, fourth, to the owners, is it to be wondered at that he should resent such imprudent utterances?

There cannot be the slightest doubt that, in a few years, we will see mines opened up and profitably worked in a number of localities; this, however, will only be possible when people have learned more about the nature of our ore deposits, how to open them, how to win the ores and how to treat them, and when they have also learned the further lesson that, for the making of a mine, money is needed as well as knowledge, patience as well as right judgment, constant attention as well as honesty.

---

## SPECIAL CORRESPONDENCE FROM QUEBEC.

### THETFORD MINES, QUEBEC.

May 3, 1912.

The past winter has been one of the quietest in the history of the asbestos industry. Broughton and Robertson and their seven mines were idle. Black Lake, with its population of 5,000, had its working force reduced to 30 men; while Thetford itself was enlivened only by the activities of the Bell, Jacobs, and Johnson Companies, and the greatly reduced forces of the Amalgamated. This is a sorry experience for such an industry—an industry whose healthy growth has been paralysed in order that a few capitalists and promoters might advance their personal schemes.

It can only be sincerely hoped that those who depend upon the asbestos industry for a living will in the future be ready to protest against any combination of interests that openly threatens its stability. There was no just reason for the organization of the Amalgamated, as there is not a mining industry in America to-day where conditions are more favourable for the building up of an increasingly profitable trade, giving steady employment to labour. Had the industry not been tampered with, the condition of labour would have been immensely improved, and the asbestos securities themselves would have been as valuable as those of our best railways.

At Thetford the new Martin-Bennett mine is in full operation and employing about 200 men. All the other mines are increasing their operations to the usual summer scale.

At Robertson the Berlin and B. & A. mines are resuming operations, and it is expected that their mills will start operations shortly.

In addition to the development of placer mining in Beauce, which was carried on last year and will be again this summer, Mr. Walter Raleigh Kerr has secured mining rights on 1,800 acres of gold-bearing quartz and placer property about fifteen miles from Sherbrooke on the Quebec Central Railway. Here he

intends to prospect thoroughly this summer. Mr. Kerr, it is stated, has ample financial backing from Montreal and will thoroughly investigate the value of the showings. Work done last autumn gave some satisfactory assays. It will be remembered that Mr. Kerr promoted and organized the British Canadian Asbestos Company at Black Lake, and the Jacobs Asbestos Company at Thetford Mines, both of which have been successful.

The copper mines opened up during the past two years at Weedon are now shipping regularly, and encouraging reports are being sent out.

Mr. Edward Slade, former consulting engineer and sales agent for the Consolidated Asbestos Mines of Black Lake, has resigned this position, and is now engaged in cement manufacture near Quebec City.

Mr. W. J. Woolsey, mining engineer, has recently returned from an eight months' business trip to Europe.

## CANADIAN GOLD FIELDS SYNDICATE, LIMITED

On April 25 the Toronto Globe published the following information relative to a mining company that at one time was operating in British Columbia:—

"Canadian Gold Fields Syndicate shares were traded in yesterday as a part of the movement in Canadian Smelters, which rose to $56 a share at the close. The Gold Fields Syndicate, a holding corporation, owns 4,200 Smelters, which are about all of its assets of more than neligible value. When the Syndicate was paying dividends practically all of its revenue was obtained from Smelters, and as the prospects of the latter company improve, Gold Fields naturally benefit in the market. At recent prices 10,000 shares of Gold Fields are equal to seven shares of Smelter, and some keen buyers have found a better bargain could be secured by buying Gold Fields. There is very little Smelter stock on the market and apparently the Western supply has been pretty well cleaned up."

On April 20 the Globe said: "Bids on Canadian Smelters were off to 55, a point lower than the close on the day before, but Canadian Gold Fields was brisk enough to keep the price at four or better. The leading interests in the company say that there will be no dividend announcement immediately, but it looks as if it might not be out of the way to expect one before the end of the company's fiscal year in June. About 17,000 shares of Gold Fields were purchased on this hypothesis."

Canadian Smelters, it may be explained for the information of those not familiar with the fact, is the name by which the shares of the Consolidated Mining and Smelting Company of Canada, Limited, are usually referred to in the financial section of the Globe newspaper.

The Canadian Gold Fields Syndicate, Ltd., was registered in British Columbia in December, 1896, with an authorized capital of $1,000,000, in shares of a par value of ten cents each. Of the 10,000,000 shares thus provided for there were, at the date of the last balance sheet accessible at present to the writer (namely, that to the end of 1905), 6,000,000 subscribed for. The first mining property it owned was the Sunset No. 2, situated near Rossland, B.C., and on this claim up to April 1, 1898, some 1,300 feet of undergound development work was done by the company. The Gold Hunter and Alabama, adjoining the Sunset No. 2, were purchased and in the directors' report for 1898 it was stated that "the syndicate now owns the largest solid block of any mining company in the mineral belt at Rossland." It was stated, further, that "at different points on all three of the veins, high-grade pay ore has been disclosed, assaying from $36 to $66 per ton in all values." Prior to October, 1899, a shaft to explore No. 1 vein had been sunk 446 feet, and in 1899 a shaft was sunk 110 feet near the intersection of Nos. 2 and 3 veins, but in neither case was any considerable quantity of good ore found. Meanwhile the company had acquired the Lake Shore group of claims, near the St. Eugene mine, East Kootenay, and a 7-drill compressor plant—the first machine drill plant in East Kootenay—was put in, and work was commenced in August, 1899. Within three months fully 20,000 tons of lead-silver ore was blocked out. Then followed a consolidation of the four adjoining groups of claims—the St. Eugene, Moyie, Queen of the Hills, and Lake Shore, and the organization of the St. Eugene Consolidated Mining Company, Limited, with an authorized capital of $3,500,000 in shares of a par value of $1. Of these shares the Canadian Gold Fields Syndicate received 640,000, fully paid up, in exchange for the Lake Shore group. Under the terms of the consolidation, Mr. George Gooderham, of Toronto, for himself and associates, purchased more than 1,000,000 shares of the Canadian Gold Fields Syndicate.

About 1900 the syndicate acquired the Jennie claim, near Rossland, and bonded the Sunset, near Whitewater, but the latter did not come up to expectations, so was not purchased. The Eldon claim was also secured. Then, in 1901, work was done on the Commonwealth group, in Lardeau district, and on the True Blue, near Kaslo, in the respective companies owning which the syndicate acquired large share interests. In this year the syndicate received from the St. Eugene Company, as its share of two dividends paid, $38,400, out of which it declared two three per cent. dividends, together, $35,746.

In 1902, owing to unsatisfactory market conditions for lead, no production was made by the St. Eugene Company, nor was any work done on the Commonwealth property or the Sunset group. Some 60 tons of ore, averaging 9 per cent. copper, was shipped from the True Blue, but cost of sacking, rawhiding, freight and treatment was too high to leave a margin of profit, so operations were stopped. Since then the syndicate has not done much mining on any of the properties under its control.

In 1905 the Canadian Consolidated Mines, Ltd., was formed, and this company acquired the Centre Star-War Eagle group of mines, Rossland; St. Eugene Consolidated group, Moyie, and the lead and copper smelting works at Trail. As an outcome of the adjustment of the several interests, the Canadian Gold Fields Syndicate received 4,260 shares of Consolidated Co.'s stock. Later the name of the larger company was changed to that it now bears, namely, the Consolidated Mining and Smelting Company of Canada, Limited. So long as the Consolidated Company paid dividends, which was until near the close of 1907, the syndicate was enabled to do the same, but since then it has been practically inoperative and non-dividend paying.

## GEOLOGY OF NANAIMO, B.C., COAL DISTRICT.

(Reported by E. Jacobs, Victoria, B.C.)

Among the papers read at the Annual Meeting of the Canadian Mining Institute, held in Toronto, in March,

last, was one by Mr. Chas. H. Clapp, of the Geological Survey of Canada, Ottawa, on "The Geology of the Nanaimo Coal District, British Columbia." This subject, as dealt with by Mr. Clapp, related to the Nanaimo district as far north as Departure Bay, south to Ladysmith, and west to the crystalline rocks about and south of Mount Benson.

### Points of Geological Interest.

The chief points of geological interest brought out in the paper were (1) that the sediments were deposited on a very uneven surface, having elevations of at least 2,000 feet or more, and on this account conditions of deposition were local and varied, which explains the extreme rapid lateral and vertical gradation of the sediments, and (2) that the coal seams and measures as a whole have been subjected to more or less movement when some of the sediments and at least the cleaner coal of the seams were in a plastic condition. This caused the coal seams to be variable in thickness and quality, which is the chief cause of the great difficulties and expense of mining in that district.

These two chief points were elaborated, and reasons were given for both conclusions; further, comparisons were made with similar variations met with elsewhere. Incidentally, Mr. Clapp expressed the opinion that Mr. H. Foster Bain, who submitted a paper on the "Fuel Problems of the Pacific," had made an extremely shrewd guess in placing the cost of mining coal in the district under notice at $3.50 per ton.

### Other Observations on Nanaimo District.

In course of conversation with Mr. W. J. Dick, mining engineer, to the Canadian Commission of Conservation, the following information was obtained by the writer of these notes: The coal measures of this part of Vancouver Island extend from Departure Bay as far south as Duncans, and comprises an area of about 400 square miles, but the productive area is limited to about 65 square miles. This productive area is situated in the northern part of the field—that is in the vicinity of Nanaimo—while in the southern portion the rocks had been badly disturbed and are not clearly differentiated with regard to their proper classification. The coal measures were laid down on the uneven floor of the volcanics, which are known as the Vancouver series and are probably Jurassic in age.

The sediments consist chiefly of conglomerates, sandstones, and shales, and are of Lower Cretaceous age. The general attitude of the sediments is a syncline dipping gently towards the sea. There are four seams of coal. The lowest is called the Wellington seam and ranges from 5 to 9 feet in thickness; this has been worked extensively by the Wellington Colliery Company—now the Canadian Collieries (Dunsmuir), Limited—at Wellington and Extension. The next in ascending order is the No. 2 Wellington, situated a short distance above the Wellington; this is a comparatively thin seam—from 20 in. to 3 ft.—and it has been worked in places. The next seam is the Douglas, which is separated from the Wellington by 850 to 1,000 feet of measures; this seam has been worked extensively by the Western Fuel Company at Nanaimo, and by the Pacific Coal Company at South Wellington. The No. 2 Douglas, or Newcastle, seam is situated at from 50 to 100 feet below the Douglas seam; much work has been done on this by the Western Fuel Company at its No. 1 and Brechin mines.

### Discussion of Mr. Clapp's Paper.

In the course of a short discussion that followed the reading of Mr. Clapp's paper, Mr. Dick said: "I have listened with a great deal of pleasure to this paper, in which Mr. Clapp brought out a number of points of considerable importance to the miner.

"The first point is that the coal beds were laid on a very uneven floor on the volcanics. This is especially marked in the Comox field, which is situated about 60 miles to the north of Nanaimo. There, at certain places in No. 5 mine, the coal seam rests directly on the volcanic. There is usually a small thickness of measures beneath the coal seam at Comox, while in the Nanaimo district there is a considerable thickness of blue shales between the coal and the volcanic.

"The next point touched on is the fact that in the different coal seams 'wants' are found; also that movement took place at the time the coal was deposited. This is shown by the slickensided rash and by the silt deposited between the coal in the seams. There was also movement subsequent to the deposition of the coal, as shown by a fault extending from the old No. 5 mine toward the powder works. The downthrow of this fault is about 160 feet. The Baynes sound fault, in the Comox district, has a downthrow of at least 300 feet.

"In this field 'wants' and good coal are often found very close together. For example; in the Alexandria mine 21 feet of good coal is found on the south side, while a short distance away on the north side much thinner coal is found.

"From these facts it can be seen that mining is made rather difficult; also, how impossible it is to have the same schedule of wages on a tonnage basis in all parts of the mine, let alone in different mines. If a man happen to be working in a good place with high coal he would necessarily make larger wages, while in the case of a man working in a district or place where 'wants' are frequently encountered it might be necessary to make up his wages from a yardage, or a yardage and a tonnage basis."

---

# BEAR RIVER COAL FIELD, B.C.

*By C. F. J. Galloway, B.Sc.*

This promising field is situated in the famous Cariboo district of British Columbia, about 45 miles due east of Fort George, and 80 miles north of Barkerville.

The Bear River (not to be confused with Bear River, Portland Canal, and numerous other rivers of the same name), flows through the field in a northwesterly direction in its course from near Barkerville to the Fraser.

The coal measures lie in a flat basin surrounded by hills consisting of crystalline rock, which define its limits in certain directions, but its actual extent cannot be definitely determined except by extensive drilling, as the ground is entirely covered by alluvial sand, gravel and clay, and bedrock is only exposed in a few places in the bed and banks of the river.

*Written for the Canadian Mining Journal.

Igneous intrusions occur in a few places, locally disturbing the measures, but the greater part of the area seems to be entirely free from such disturbance.

An area of fourteen sections of one square mile each is held by Mr. A. E. Hepburn, of Vancouver, B.C., and within this area ten and a half square miles is probably underlain by the coal measures in an undisturbed condition.

A very limited section of the measures is exposed, but at one place three workable seams outcrop in the bank of the river.

Some development work has been done on these, proving them to have the following sections:—

| | Total Thickness. | Total Coal. |
|---|---|---|
| Upper seam .. | 10 ft. 4 in.+ | 9 ft. 2 in.+ |
| Middle seam .. | 5 ft. 0¾ in. | 4 ft. 2¼ in. |
| Lower seam .. | 11 ft. 11½ in. | 7 ft. 8¾ in. |
| Total coal ..... | | 21 ft. 1 in.+ |

The two lower seams, and the lower portion of the upper one, are to a certain extent interbedded with sandstone and shale, as is seen from the above sections, but the upper seven feet of the upper seam contains only one band of four inches of sandstone. A further thickness of three or four feet of clean coal is reported as existing in this seam above that measured. This the writer could not see, the open cut in which it was exposed being filled with mud, and being so little above the level of the river that the mud could not be removed. This additional thickness must, therefore, be added to that given above, which represents the measurements actually made by the writer.

In the measures immediately below these, numerous thin seams of coal occur, up to three feet in thickness, separated by thin bands of shale and sandstone, and it is quite possible that some of these will come together, forming workable seams under portions of the area. Other thin seams appear elsewhere, apparently on a slightly higher horizon.

Taking the thickness of workable coal in the three seams exposed, the area controlled by Mr. Hepburn may be estimated to contain on a very conservative basis 150 million tons of coal.

The coal is bituminous, bright and fairly hard, and, in the crucible assay, yielded an excellent, hard and firm coke.

The following analyses were made by Mr. J. O'Sullivan, F.C.S., of Vancouver:—

| | "A." | "B." | No. 1. | No. 2. |
|---|---|---|---|---|
| Hygroscopic water ..... | 3.5 | 3.5 | 6.0 | 4.0 |
| Volatile comb. matter... | 37.5 | 40.8 | 37.3 | 44.4 |
| Fixed carbon ..... | 54.0 | 48.3 | 54.3 | 46.9 |
| Ash. ..... | 4.0 | 6.0 | 1.0 | 3.5 |
| Sulphur ..... | 1.0 | 1.4 | 1.4 | 1.2 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

At the point where the three workable seams are exposed the measures dip at an angle of about 43 degrees, but this appears to be on the flank of an anticlinal roll, and the dip moderates towards the northeast, so that the measures may reasonably be expected to lie comparatively flat under the greater part of the area.

As the ground underlain by the coal measures is all flat bench land, the coal will have to be worked entirely from shafts, practically none being above drainage level.

The ground is well timbered with black pine and spruce suitable for mining purposes.

An inexhaustible supply of water is furnished at all seasons by the Bear River.

This coalfield lies within about fourteen miles of the line of the Grand Trunk Pacific Railway in the valley of the Fraser, above the canyon, being separated from it by Seymour Pass, a low divide, only some 300 feet higher than the coal exposures, the construction of a railway over which will offer no difficulties.

A still shorter line, over an equally easy divide, would connect the coal area with the line of the Cariboo, Barkerville and Willow River Railway in the valley of Willow River.

This line, having recently been granted a subsidy of $6,400 per mile by the Dominion Government, and a bridge allowance of $95,000, will likely be built as soon as materials can be taken in.

(To be Continued.)

## MERRILL FILTER PRESSES.

In place of the usual zinc boxes for precipitating the gold from solution, the Merrill process has been adopted at the Brakpan mine. Zinc dust is introduced by a feeding device into a cone, in which it is emulsified with cyanide solution. The zinc emulsion is then fed through a pipe to the suction of the pump, which delivers the solution to the Merrill filter presses. The installation comprises three presses, each having a capacity of 1,000 tons of solution per diem. The gold precipitate is collected in the filter presses, which are cleaned up periodically and the bullion recovered by the usual methods. The Merrill presses are installed in the recovery house, which also contains the smelting and refining plant and amalgamating tables. Thus all the gold recovery processes are conducted under the supervision of one staff in one building. The progress of the Merrill process is growing rapidly in favour in Mexico and throughout the United States of America. It is used at the Homestake, in Cripple Creek, in Nevada, and in many of the mines in Mexico, particularly at the El Oro group.

## BOOK REVIEWS.

**TEXT BOOK of Cyanide Practice—By H. W. MacFarren—291 pages—Illustrated with half-tones and diagrams—Price $3 net—McGraw-Hill Book Company, New York—Canadian Mining Journal, Book Department, Toronto, 1912.**

Not in our time will the last word in cyanide practice be written. As a branch of practical science, the cyanide process has made astonishing strides in the last few years, particularly in the invention of new mechanical devices, and the application of simple mechanical principles.

Mr. MacFarren's new book, like his recent work on stamp-milling, is primarily a working guide. It is not an elaborate exposition of theory. Beginning with a consideration of the nature and properties of cyanide, he follows logically through the solution of gold and silver, the range of amenable ores, the principal chemical data, ore testing, mechanical treatment, precipitation, cleaning-up, etc. An exceptionally comprehensive bibliography, covering 57 pages, and a long series of tables add to the value of the book. The bibliography is a very well-conceived addition.

While, possibly, we may not fully concur in Mr. MacFarren's allotment of pages to the different departments of his subject, yet his book is certainly a readable and careful resume of cyanide practice.

# THE ELECTRIC FURNACE PROCESS AS APPLIED TO THE METALLURGY OF STEELS

By Harold G. Ade Stedman, A.M., Inst. E.E.*

### Introductory.

Now that electricity has become almost universally adopted where energy in a flexible form, capable of perfect control, is required, and the economies which can be effected by its use having been fully demonstrated, no excuse can be advanced by us for neglecting to give due consideration to its claims as a thermal agent, particularly in metallurgy.

That the use of electricity for metallurgical purposes is now an established commercial process abroad cannot be denied; the total number of electric furnaces in existence is not far short of 1,000, these being mainly employed in the manufacture of steel, iron and non-ferrous metals.

In some respects the progress made has been rapid, in fact more so than that of most of the important processes recently developed. Accurate statistics are not published except by a few countries, but such as are available show, that between 1908 and 1910 the output of electrically-refined steel, for example, has increased four-fold, over 30 per cent. of the high class steel trade having been absorbed.

### Cheap Sources of Supply.

In case it should be thought that financial success is only possible where water power is available, it may be stated emphatically that this is not so. On the Continent the refining of steel not only for the best qualities, but for intermediate purposes, and even rails is carried on as a commercial proposition with current costing 45d. per unit, while in the Sheffield district prices up to 65d. are paid. If we except Scandinavia and perhaps Canada, there is nowhere else in the world where current can be obtained so cheaply as on this North East Coast. This being so, there appears to be no reason why much better results should not be obtainable where conditions are so favourable as they are here. A market is opening up for these high class electrically refined products, and it remains to be seen who will have the courage and initiative to supply it.

### Object of Paper.

The object of this paper is to place before members some of the main principles which govern the correct design and proportioning of electric furnaces, and their auxiliary apparatus with particular reference to the all-important question of continuous running and low operation costs. In addition, by special request, some of the chief metallurgical and chemical advantages claimed for the process have been outlined, but we must bear in mind, that in the reactions detailed, the electric current must be considered solely as a non-contaminating source of heat, devoid of any inherent chemical properties. It cannot be too strongly urged that the development of this latest heating agent has not nearly reached finality. In the opinion of those best able to judge, much improvement is possible, and when the expert steel-makers of this country really take the matter in earnest, considerable advances in method and efficiency may be expected. It may be safely said that the results now obtained with the Bessemer and open-hearth processes were not thought possible in the earlier days, and those who are tempted to criticise too seriously the somewhat inconsistent results of the first attempts to introduce electric melting, should reflect on this; particularly as most of the pioneering work has been accomplished by electrical men rather than metallurgists. At the present time it is possible by experienced and skilful furnacemanship to produce electrically refined steel, of any required grade and analysis, better than it can be done by any other process. At the time of writing, there are no electric furnaces in commercial operation on Tees-side, and this is to be regretted, but when once a new method is adopted hereabouts, it is usually on a large scale. For instance, in 1907 there was not a single electric rolling mill running in Cleveland, whereas now there are no less than eight with an aggregate horse power of 25,000. Others will, no doubt, follow.

*Abstract of paper read before the Cleveland (England) Institution of Engineers.

### Essential Forms of Furnace.

Those who have followed the subject will agree that, although a great number of different furnaces have been patented, the number of distinct types in commercial use is comparatively small. Plate No. 1 gives purely in diagrammatic form, the principal types which have been evolved.

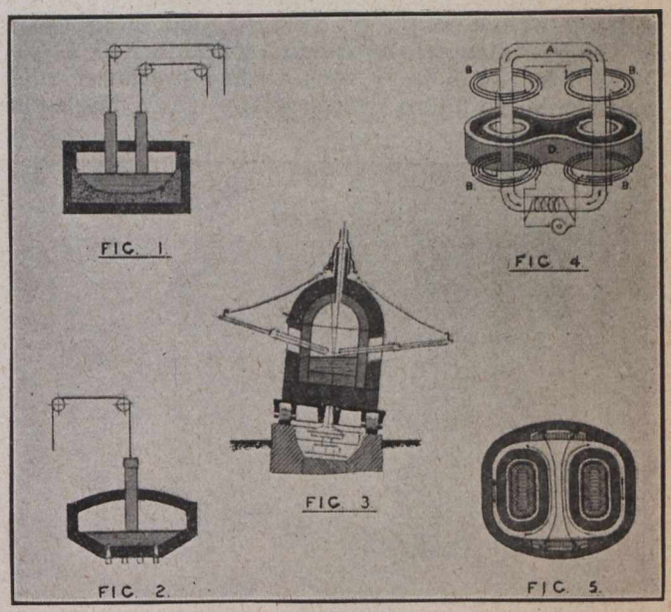
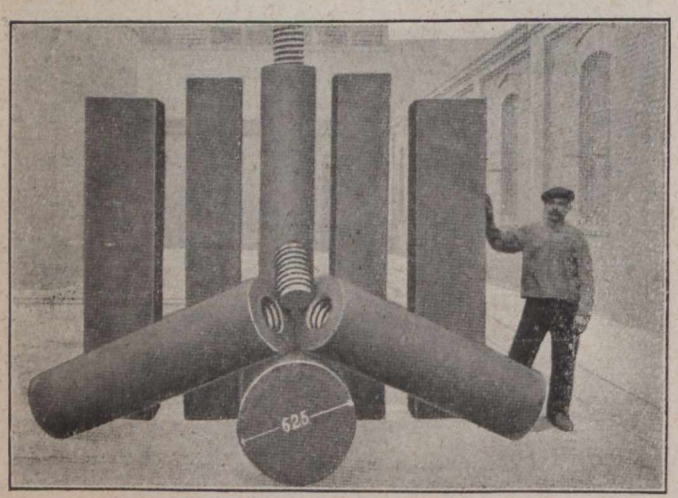



Diagram of Furnace Types.

Figure 1 shows a form which is remarkable for its simplicity no less than for the successful results which have been attained with it since its introduction in 1900. You will observe that a striking similarity exists between it and an ordinary open hearth steel furnace, the chief difference being that instead of the usual gas ports at each end there are openings in the roof through which the electrodes enter and dip into the bath. Two of these are shown in the sketch and single-phase current will be required. The larger sizes of furnaces are arranged for three-phase, and consequently have three electrodes passing through the roof, which is scarcely practicable in the small sizes, as the roof would be too much weakened.

One of the features possessed by this type is the absence of electrodes embedded in the hearth, which fact would probably appeal to most steel makers who are accustomed to ordinary practice. Several modifications of this principle differing only in detail are being used in practical steel melting and refining. In order that the atmosphere of a furnace may be under full control, it is important that as little air as possible be admitted through the electrode openings and charging doors. That the roof is protected by using large electrodes from the direct radiation of the arcs is a possible advantage, but the claim sometimes made that heat losses are reduced thereby is fallacious; it is also doubtful if an increased area of electrode appreciably affects the current density of the arcs on the slag. Those who have watched the behaviour of the arc, even in a large furnace using heavy currents, will have observed that it is always focussed on a comparatively small area which travels about over the surface of the electrode in a very irregular manner. In the single-phase form, with two arcs in series on a thin slag layer, heavy fluctuations of current occur; as owing to the large amount of power passing over a distance of say 1 inch or 2 inches, and within a comparatively small area, the gases in this space are highly super-heated and expand violently, thus setting up a commotion which causes the metal to jump up and touch the electrodes. With three electrodes only there is some difficulty in perfectly balancing the phases.

Figure 2 is really an improvement, adapted for steel refining, of the simple pit furnace used so extensively in the manufacture of calcium carbide and ferro-alloys; it has been made broader and shallower with a roof similar to figure 1. Essentially it is a single-phase



GROUP OF MODERN ELECTRODES MADE BY THE PLATNIA COMPANY. (NOTE THE METHOD OF JOINTING BY SCREWED COUPLING.

furnace, but different designers have succeeded in producing two and three-phase modifications. In the figure one or more carbon electrodes, having the same polarity, pass through the roof and dip into the bath while the return circuit is completed through the metal itself by means of mild steel electrodes passing through the bottom. These electrodes are water-cooled on the outside, and spaced evenly so that the current divides equally between them. For use with two-phase currents two electrodes can be passed through the roof while the bottom is connected to the common return. It is claimed that by this means current fluctuations are reduced by one half as the arcs are not in series, and a very good circulation of the metal is obtained due to currents set up by the horizontal and vertical components of the two-phase circuit. Yet a third variation has been evolved using three-phase current, and in this form there are three electrodes of carbon passing through the roof and three of metal embedded in the lining. Both top and bottom electrodes can be used separately or together. By their simultaneous use the slag is heated from above as in the form shown by figure 1, and at the same time the metal is kept hot and circulated from below. Unfortunately, no definite results are yet available as to the behaviour of this latter design, hence much comment would be premature. It is claimed among other things that the size of carbon electrodes is reduced by half, thereby considerably lowering the cost of same, also that the final de-gasifying can be accomplished by heating the metal from below only.

Figure 3 illustrates an interesting though more complicated form of furnace well adapted for special work. In this type the carbon electrodes do not come into contact with the charge at all, and the heating is affected by radiation alone. The diagram shows that these electrodes enter the sides inclined at a small angle from the horizontal, an arc being struck just above the bath. Three-phase current is now generally used with three electrodes, which are water-cooled on the outside. In order to obtain efficient circulation of the bath, the whole furnace can be mounted on a circular plane inclined about seven degrees from the vertical, which enables it to be continuously rotated during the melting and refining operations. In order to convey the current to the electrodes, slip rings are provided; in this particular diagram they are shown at the top. Comparatively small electrodes are used. From a thermal point of view this design is efficient, and steel having a very low carbon content can be easily produced; as no contact with the electrodes is made. The fact that both roof and sides are subject to direct radiation from the arcs is, however, a possible drawback.

Figure 4 is different in principle, as well as in appearance, from those previously described, inasmuch as the metal to be heated forms the closed secondary of a static transformer of special design. Following the diagram: "A" is the core built up of the usual thin sheet iron stampings bolted together. "B" shows the primary windings which are connected to the source of supply and provide the necessary magnetic flux whereby heavy low-voltage currents are induced in the melting-rings, "C" when they contain metal. "D" is the refractory material composing the hearth proper. In this manner a fairly high voltage can be used, and the use of energy-absorbing electrodes and heavy copper conductors is avoided.

The practical development of this principle has to a great extent been handicapped by the awkward shape necessary and the extreme difficulty of getting the primary turns near enough to the secondary or metal bath, the result being that a considerable leakage of the magnetic flux takes place, causing what is known as a low power factor.

This form of furnace possesses the advantage of very steady load demand and good efficiency, and as a simple melter of high class materials has given good results. The most successful method of improving the power factor and increasing its suitability for more general work is shown in figure 5, which is a plan view of a similar arrangement to figure 4, except that

the primary windings are on the inside of the hearth and an auxiliary set of windings, connected to steel electrodes embedded in the linings, are provided. Currents pass as shown by the arrows. The effect of this arrangement is to reduce the stray field or magnetic leakage and enables the furnace to be operated on systems of normal frequency. The proportion of total current carried by the electrodes is about 30 per cent.

### No Best Type of Furnace.

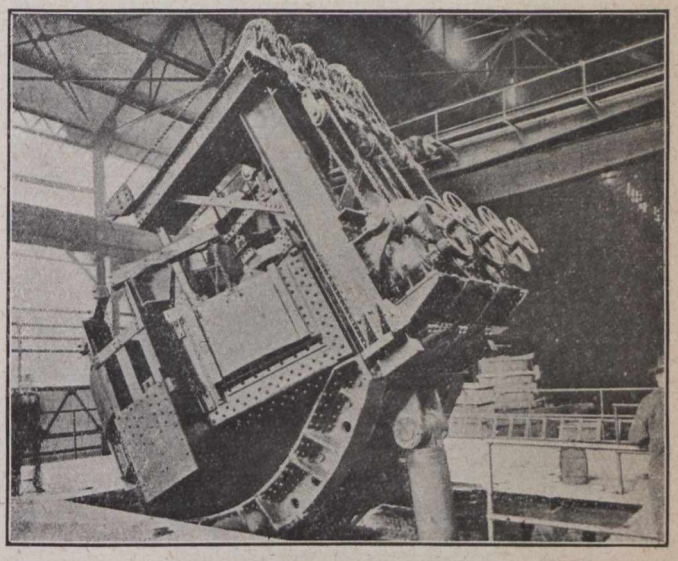
Having by the aid of simple diagrams, pointed out the essential forms of furnace at present in use, we can proceed to examine in detail some of the more important points concerning their construction, efficiency in operation and general suitability for the particular object in view.

As a general proposition it may be stated that there is no one make of furnace which has made good its claim to be the best for all purposes.

### Furnace Electrodes and Clamping Devices.

The question of electrodes is of vital importance, both from the electrical and metallurgical points of view, and as most of the literature on the subject is not only vague, but contradictory, we shall endeavour to review the subject so far as it affects us here. The manufacturing details are naturally kept as secret as possible, but approach very nearly to ceramic procedure. With the latter a plastic clay is employed as binding material, whereas tar residues are used in the manufacture of electrodes. Essentially the plant consists of crushers for treating the raw material, viz.: Retort carbon, anthracite, charcoal, paraffin-coke, graphite, and soot. Mixers for working the materials up in suitable proportions with the binding medium. Hydraulic presses of large size for moulding and compressing the material into the desired shapes. Gas-fired ring ovens for final baking.

The raw materials are subjected to a preliminary heating for the elimination of gases and oils. They are then masticated with the binder and pressed into shape. The blocks thus formed then go through a burning and shrinking process in the gas-fired ring ovens, from which air is excluded, at temperatures up to 1,500 deg. or 1,600 deg. C. The time taken varies from 6 to 10 days with smaller sizes and up to 16 days for the large electrodes. Heating must be gradual and evenly applied, otherwise tension is produced within the material which may lead to cracks and flaws. After cooling down the product is ready for use. The principle of this method must be attributed to the Frenchman, M. Carre, although his investigations related to carbons for arc lamps. The difficulty of obtaining reliable electrodes has been considerable in the past, but now a material of excellent quality can be obtained. As a result the consumption of electrodes has been reduced by 50 per cent. Since the electrodes only form avenues through which current is introduced to the charge, it is important that they should neither contaminate the charge nor cause undue waste of energy. For this reason carbon, in the amorphous state, is now almost exclusively used for all electrodes except those which pass through or are embedded in the bottom linings as shown in figures 2 and 5, these being made of mild steel. Graphite has been used, but is much more expensive than amorphous carbon, while the consumption is about the same. In furnaces such as shown in figure 1, where the whole current is carried by two or more roof electrodes, the consumption of electrodes varies from 6 pounds to 12 pounds for refining only, and from 14 pounds to 35 pounds for melting and refining cold charges. Energy losses in the carbon work out at about 8 per cent. of the total input, and where cooling water is used this may account for another 3 per cent. When the current is fed into the end of the electrodes as in carbide and ferro-alloy furnaces, the connections are applied by means of head sockets, whereby they are firmly attached once for all. The other method is to use clamps, which permit of the electrode being passed through them and whose clutches are merely pressed tightly against the smooth hard surface of the electrode. These latter are mostly adopted in steel furnaces. All current carrying parts are usually of copper or bronze, the main posts and supports being of steel. The dimensions of the contacts assume a current density of 20 to 30 amps. per square inch, and as it is extremely important to make sure of getting good contact the surfaces of the electrodes should be as smooth and hard as possible, while a few layers of copper gauze between it and the clamps is an excellent precaution to take. Unsatisfactory connection will cause the carbon to glow in places about the clamps, and sometimes results in breakages; in any case it is detrimental to the life of the electrode. This evil is aggravated in that carbon conducts better, the hotter it is, hence the current will increase in the hot parts and make matters worse. Water cooling the holders is usually, though not always, applied. An important question is the choice of a suitable sectional area. The permissible current density for each material can, for the present, only be determined by empirical rules. Generally the best possible electric and worst possible thermal conductivity is desirable in order to reduce the generation of heat to the electrode itself and the transfer of heat from the charge. It is found that small electrodes can be loaded up more than large ones; possibly owing to the greater closeness with which the particles are packed. In view of this, modern factories have adopted increasingly larger presses in order to reduce this discrepancy and improve the larger sizes. Again, for the same composition, the specific resistance of round electrodes is much less than that of square sections. As to the ultimate sizes which could be produced, little can be said, but whereas up to a year or so ago the largest electrodes of sound quality on the market were 400 mm. diameter, it is now possible to get them up to 625 mm. without



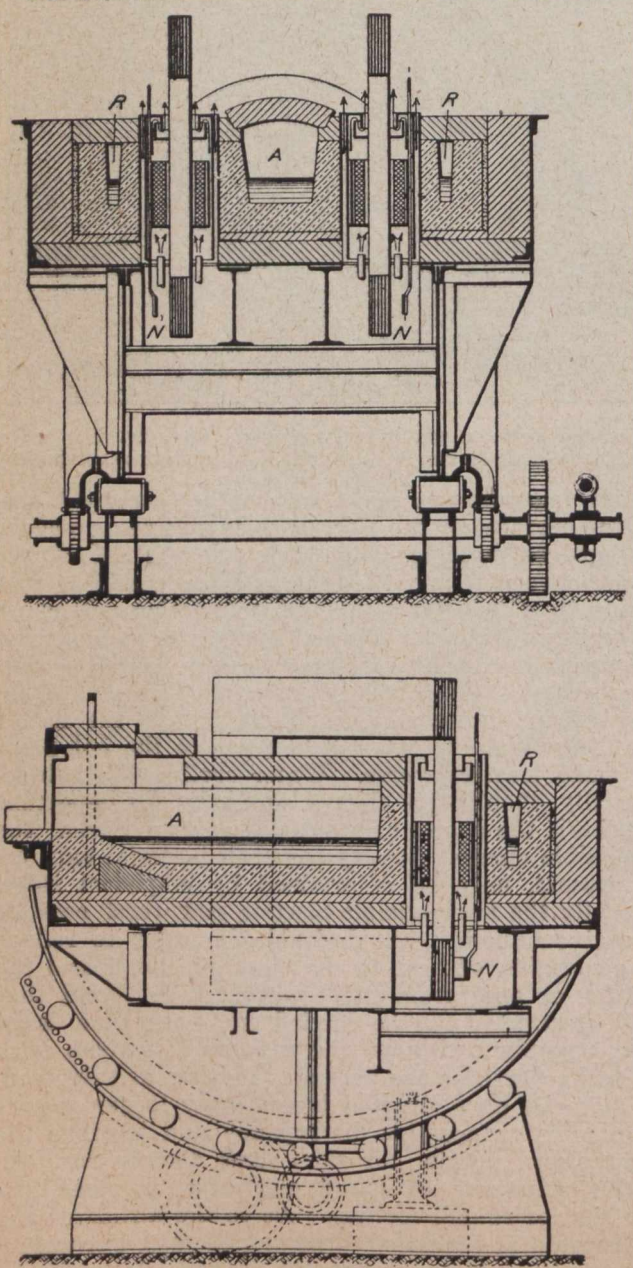
HEROULT FURNACE FOR REFINING STEEL. CAPACITY 15 TONS. (THE MOTORS SEEN ON THE REAR PLATFORM OPERATE THE ELECTRODES)

difficulty. Nevertheless it may be doubted if sizes will go on increasing since the specific conductivity tends to decrease, as well as the mechanical strength, while difficulties of handling increase. Attempts are now being made to increase the conductivity of electrodes by introducing metal, such as pure iron, with the carbon material whilst it is being moulded. The resistance of electrodes thus formed can easily be reduced to one half the ordinary value with comparatively little metal. The process, which is of special interest in connection with the employment of long unbroken electrodes, would also provide means of introducing certain physics to the charge, and may lead to important developments in the near future. In present practice it is usual to make the feeding up of fresh electrodes a continuous process, connecting each new length to the previous one by nipples moulded with a screw thread out of the same material as the electrodes. A certain amount of loss takes place at these joints, varying from 2 to 2½ volts per connection with current densities of 30 amps. per square inch, and the saving in electrode material and time has to be balanced against these losses.

The raising and lowering mechanism, for regulating the electrodes, whether hand or motor operated, must work smoothly and evenly; and as the current conductors usually move over the same range, they must be sufficiently flexible to prevent any risk of abrasion or fracture.

Other requirements are — strong and workmanlike construction, with no parts likely to suffer damage due to the rough usage of a steel works, or to be affected by high temperatures; firm and solid clamps or sockets which will not only grip the electrode properly, but also possess low ohmic resistance and easy means of rapidly releasing or tightening up on same when compensating for consumption of carbon.

THE ROECHLING-RODENHAUSER ELECTRIC FURNACE.




A.—CENTRAL PORTION WHERE REACTIONS TAKE PLACE.
R.—MELTING RINGS IN ELEVATION.

### The Electric Process in the Steel Foundry.

The production of steel castings by ordinary methods leaves much to be desired, the metal is frequently spongy, unequal in appearance, and of varying composition; requiring time to be spent in filling up blowholes, flaws, and generally making the castings look presentable. Now the production of steel castings by the electric process has been both technically and commercially successful from the very commencement, and not only so, but the improved quality of material produced has more than fulfilled the most sanguine expectations. Moreover, the ease with which an electric furnace can be manipulated compares most favourably with either open-hearth or converter methods, and is, except under most exceptional circumstances, a vast improvement on crucible melting in this respect. In the manufacture of small and intricate castings full advantage can be taken of the perfect thermal control, combined with thorough "killing" of the metal, which is obtainable. Not only can clean, sharp castings be produced of any size and composition, but their behaviour under mechanical tests is altogether in favour of the electrical method. It is quite easy to obtain castings of definite grades having tensile strengths up to 44 tons per square inch, and, owing to their being homogeneous throughout, the work of machining is facilitated with considerable reduction of wasters. This is of general interest and of particular interest to makers of railway, motor car, marine, and electrical machinery castings; where the ability of the electric furnace to give larger casts with cheaper and cleaner melting is most valuable.

Based on the most recent figures it should be possible in this district to produce metal in the ladle for steel castings of the finest quality, with sulphur and phosphorus reduced to traces, at approximately £6 per ton if scrap is used, or £5 when finishing molten metal from converters. With cheaper metal there would naturally be less temptation to cut down the weight of gits and runners. It may be urged that few foundries are so situated that a supply of molten metal is available and even where a steelworks exists within a short distance, the difficulties of transport and subsequent transfer to the electric furnace are considerable owing to the rapidity with which the metal freezes. As a possible solution of this difficulty the author would suggest that it might be practicable to construct a furnace somewhat on the lines of a Dewhurst ladle, having a closely fitting roof of silica brick built into a frame with apertures through which the electrodes could be introduced. This could be charged from,

say, a Bessemer converter and then shunted down to the adjacent steel foundry, there to be placed or run under a special mechanism carrying electrodes and gear for controlling same. Slagging material and flux could be added when charging and serve the additional purpose of reducing heat losses during transit. As soon as possible the current would be turned on and a refining temperature regained, after which, de-oxidising and dead-melting would follow. When the finished steel had been teemed into ladles for casting it would probably be necessary to do some fettling, whereupon the cycle of operations could be repeated before the temperature fell too low. As an alternative molten pig might be used instead, but the refining would take longer. That some such method would result in notable economies is self evident, and development along these lines may be anticipated in the near future.

In contemplating in what directions development may occur, it would appear that such works as shipyards, machine shops and engineering works generally promise a wide sphere of usefulness for the small electric furnace of from one ton upwards, producing castings from the waste material available such as scrap, trimmings, turnings, borings, etc. In melting light scrap by ordinary methods it is quite usual to lose from 20 per cent. to 40 per cent. of the metal by oxidation, whereas there is only a few per cent. loss in the electric furnace. With regard to the most suitable form of furnace equipment for producing castings, much might be said. As a matter of fact, all the types shown on our first diagram have been used for this purpose under slightly varying conditions. With full data available as to the requirements of a prospective user, and the conditions under which he will operate, it is not a difficult matter for an experienced electro-metallurgist so to advise that success will be assured.

### The Electric Process for High Grade Tool Steel.

Only in the case of firms who require to make special steels, differing considerably in composition, a few pounds at a time, can the costly and troublesome crucible remain in the field much longer. For the present, perhaps, this trade will remain in the hands of the Sheffield melter, but unless some re-adjustment occurs there, resulting in the adoption of modern methods, the bulk of it is likely to pass into other hands. At the present time there are only three or four electric furnaces in operation at Sheffield. With the passing of the crucible, other districts, including Middlesbrough, will have no technical reason for not competing with America and the Continent for a share of the tool steel trade. As to the relative costs of the two methods, it may be stated generally that the more fuel necessary for carrying out any steel making process, the better will electric heating compete with that process, hence it should be pre-eminently suitable for replacing the crucible which requires an expenditure of from 60/- to 70/- per ton on coke alone for melting, whereas a well designed electric furnace will, in this district, both melt and refine, such scrap material as rail-heads at a cost not exceeding 24/- per ton. This is a marvellous difference in itself, to say nothing of the additional saving as between the cost of pure iron and common steel scrap.

The destructive criticism levelled against the earlier electric steels by makers whose trades were dependent upon the continuance of older methods, proves that they considered its rivalry serious. Just now a demand for large ingots of crucible quality is rapidly growing, and in making such casts the use of crucibles presents great difficulties, which are increased by the fact that the melter has to teem a number of pots simultaneously with risk of variations in quality. A two-ton electric furnace cast is easier to make than a 50 or 60 pound crucible cast, and the metal is more homogeneous and less brittle for a given carbon content; hence it can safely carry more carbon than crucible steel.

### The Electric Process for Intermediate Steel.

Turning now from castings and tool-steel, in the manufacture of which the electric process is admittedly unrivalled, we find that in the intermediate class between them and ordinary constructional steel, some doubts still exist in certain quarters as to the economic advantages to be gained by giving steel, intended for rails, shafting, wire, special boiler plates, tubes, etc., a refining or finishing treatment in the electric

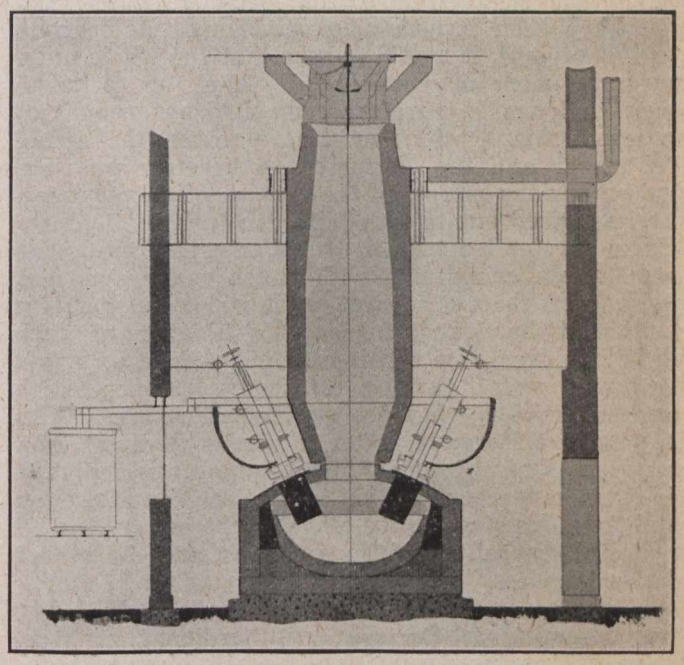


Diagram 1.—General Arrangement of Furnace.

The Electric Iron-ore Reduction Furnace as developed in Scandinavia.

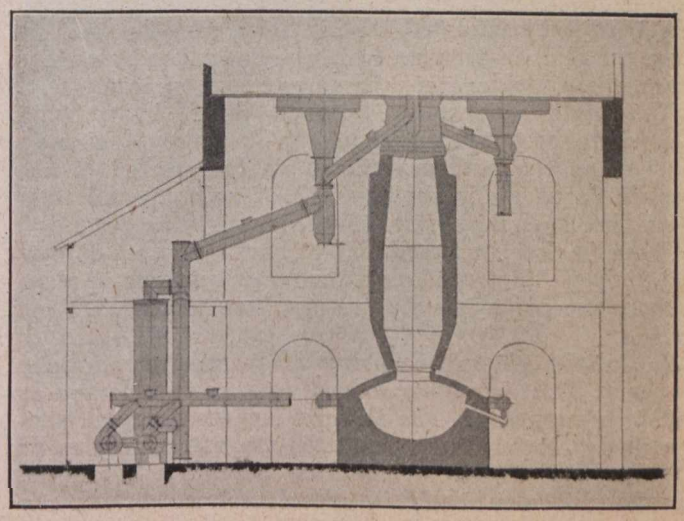


Diagram 2.—Gas-Circulating System.

furnace. Much emphasis has been laid on what are termed the limitations of the electric process, and many arguments have been used in an attempt to prove that, for the above purposes, steel as at present made is sufficiently good. Probably few who are really familiar with the subject will deny that steel, which has been so finished, compares most favourably with the very best products of the open-hearth furnace. The superiority of electrically refined steel over other steels depends chiefly on the reducing conditions obtainable without sacrificing temperature. The chief points of improvement are greater tensile strength, increased durability, much greater resistance to corrosion, and less liability to segregation in various forms. These features depend not so much on the lowness of phosphorus and sulphur, as on the freedom of the metal from oxides, occluded gases, and what have been termed slag emulsions. As matters stand at present, it would appear that the whole question turns more on commercial than on technical points, and one is therefore compelled on account of the many complications existing between the actual steel maker and the consumer, to preserve an open mind on various aspects of the case which might otherwise be argued out to a definite conclusion.

Assuming for the moment that a demand should arise for materials, complying with much more stringent specifications than at present, as it will arise, then the adoption of the electric furnace for this class of work will become inevitable. This need not necessarily imply any scrapping of existing converters or open-hearth furnaces, provided they are working efficiently. With cheap current, it may be better to take metal direct from the mixer. One objection which has been urged against this extra refining stage, viz.:—the transfer of molten metal from one stage to the other, might be surmounted by careful disposition of the furnaces, and the use of suitable launders.

Another aspect of the case arises out of the heavy losses occurring in the slag, with ordinary methods, which can be reduced to a few per cent. of iron with the electric furnace. In an open-hearth furnace, owing to the limitations of temperature, it is apparently necessary to retain some oxide of iron to ensure a fluid slag, whereas the high temperature of the electric arc enables a fluid slag to be maintained practically free from oxide. Mr. Harbord has stated that in some samples of slags from the electric furnace, which he had taken at various times, there was no more than 1 per cent. of iron.

Yet another possibility presents itself; by working in conjunction with an open-hearth furnace, the charge, as soon as the carbon is down, is transferred to the electric furnace for the removal of sulphur and final de-oxidizing; thus substantially increasing the output.

There is also the possibility of saving in cost of raw materials, as the use of pig from local ironstone in place of more expensive foreign ores may save several shillings per ton.

Again, the electric finishing of metal from a basic Bessemer plant is neither so costly nor so troublesome as might be supposed. The electric furnace occupies comparatively little room, and the transformers can, if necessary, be placed in chambers beneath. Therefore, no great difficulty should be experienced in working one or more of these in tandem with the existing converters, and without involving either starving or choking the mills. The added cost to the price of finished material, such as rails, need not exceed 4 per cent. including cost of current, repairs and interest. Why adopt the policy of scrapping existing converters and replacing them by fixed open-hearth furnaces? The need for such a change surely implies that furnaces having a wider range are essential to modern conditions. Why then not instal electric furnaces and obtain the maximum of flexibility without clearing out the converters and their auxiliary plant? The actual labour item is exceedingly low.

### The Electric Process for Ferro-Alloys.

In most metallurgical processes connected with steel the part played by the various ferro-alloys is becoming more and more conspicuous; and it is therefore gratifying to find that all of them can be and most are, made by the electric process. In fact the production of alloys such as high-grade ferro-silicon, ferro-chrome, and ferro-tungsten, is only made possible by the electric furnace. That a considerable impetus was given to this industry by the carbide slump a few years ago is beyond doubt; some outlet for plant and power available being a necessity. The open-pit furnace is in pretty general use for this work and is similar in construction to the small furnace on the table, which was designed by the author for experiemental work in connection with ferro-alloys, except that it does not tilt, and therefore, has to be tapped at the bottom.

An interesting development is in connection with the difficulty reducible titanium alloys which are now very largely used in America for de-oxidizing purposes, where it also claimed that owing to the well known affinity possessed by titanium for nitrogen it is able to remove nitrides which are unaffected by manganese and silicon.

Ferro silicons of all grades up to 75 per cent. Si. are made commercially; also ternary and quaternary alloys which are now in considerable demand for the special steels. By the electric process the carbon content can be kept very low, which point is of considerable importance. An extraordinary amount of attention is being devoted to this branch of metallurgy just now.

### The Electric Process for Pig Iron.

At present much interest centres round the use of electric heating for the direct reduction of iron from its ores and the elaborate experiments which have been carried out in Sweden and California have proved definitely that, given a plentiful supply of very cheap power, it is not only possible, but probable, that extensive developments will occur in the near future. Assuming this very cheap power, the two most important features of the process consist in (a) saving all that part of the carbon required for heating purposes only (about two-thirds), and (b) utilization of vast deposits of ore which are not suitable for use in the blast furnace. Its application in this district for some time to come is improbable. As a matter of interest, however, views of the latest forms of furnace are shown on the screen from which it will be seen that in shape and general arrangements some similarity exists between them and the blast furnace. The furnace in operation at Trollhattan and the method of working was fully explained to the author by the courtesy of the engineer in charge. Three-phase current is received and transformed to two-phase by Scott connected transformers which supply the four electrodes spaced evenly round the hearth. The nominal rating is 2,000 kw.; actually the energy required varies between 1,500 and 1,800 kw., but is very steady. The thermal efficiency was given as over 80 per cent., which compares favourably with that of an ordinary blast furnace, which is supposed to be about 70 per cent. On the occasion mentioned the charge was rich in iron, and both iron and slag were being tapped

together, the slag running off to one side. The reducing agent used is charcoal, and various grades of ore have been dealt with. Notable success has been achieved in the smelting of magnetic concentrates; a charge containing 65 per cent. of this material is stated to have caused no inconvenience in working, although the design of shaft is not the best possible for this purpose. The constructors believe, that with special design, all fine concentrates could be used. When calculating the burden the quantity of charcoal is kept constant, and the amounts of ore and limestone varied to produce the desired grade of iron. A typical charge was given as:—

| | |
|---|---|
| Magnetite .. .. .. | 266 kg. |
| Concentrate .. .. | 133 " |
| Mill cinder .. .. .. | 11 " |
| Limestone .. .. .. | 32 " |
| Charcoal .. .. .. | 100 " |

This is all added together and charged at one raising of the bell, and tappings are made every 18 charges or four times per 24 hours. The maximum output is obtained when making white iron—a small piece of which is on the table together with a micro-section. An approximate analysis is given:—

| c.c. | g.c. | s.i. | s. | p. | m. |
|---|---|---|---|---|---|
| 3.76 | Traces | .33 | .036 | .01 | .35 |

One characteristic of the iron, apart from absence of graphite carbon and low silicon, is its freedom from oxides.

An important feature is the gas circulating system which is shown on the screen. There is, of course, no air blast. Power consumption is around 1,800 units per ton of pig produced.

Theoretically the electric reduction furnace needs only be about one-twelfth the size of an ordinary blast furnace for the same output.

### Conclusion.

In conclusion one may perhaps be pardoned for again laying emphasis on certain fundamental points which cannot be overlooked if success is to be attained. These points have either been forced upon one's attention when visiting or studying the lay-out of existing works, or else have formed the subject of discussion with practical experts in electro-metallurgy. They may be tabulated somewhat as follows:—

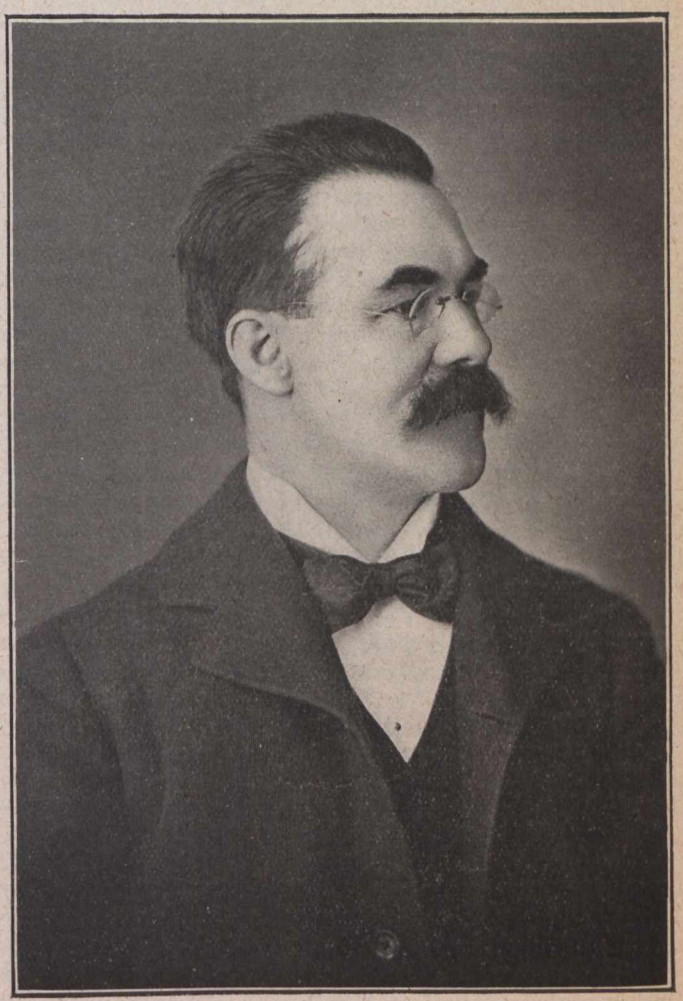
1. Obtain unbiased expert advice before deciding on the form of equipment to adopt for the particular purpose in view.
2. Avoid unnecessary elaboration when first commencing, and on no account overburden with capital.
3. Proceed slowly with well-tried plant, and, if possible, leave the generation of the necessary current to those who give their whole time to it.
4. See that the electrical equipment is of the best and make provision for varying the voltage at the furnace terminals so as to ensure full thermal control.
5. Carefully compare the terms offered by different makers in connection with royalty charges. These are generally devised on a sliding scale and vary according to nature and scope of manufacture. They might be based on tonnage of finished product, tonnage of metal in ladle, or even on the amount of electrical energy consumed. On no account must they be allowed to cripple a process financially.
6. Bear in mind that the electric furnace is not an automatic machine and needs, like most other engineering processes, trained men and skilful supervision.
7. Do not allow enthusiastic advocates of electrical methods to give you the impression that the steel industry is merely a good dumping ground for electric furnaces. Electric furnaces are made for steelworks—not steelworks for electric furnaces.

---

## ERNEST ADOLF SJOSTEDT
### (Deceased.)

Mining and Metallurgical Engineer.
Written for The Canadian Mining Journal by S. Groves.*

In the list of those who went down with the ill-fated White Star liner S.S. "Titanic," April 15, 1912, was the able mining engineer and metallurgist whose portrait appears above. Mr. Sjöstedt was returning from Europe, where he had been investigating the economic treatment of the low-grade copper ores of Norway and



Sweden—under commission by the Lake Superior Corporation. This expert technical knowledge was to have been applied to the production of ferro-nickel pig in a proposed electric furnace plant of magnitude at Sault Ste. Marie. He was also under commission by Dr. Eugene Haanel, Director of the Mines Branch of the Department of Mines, to investigate the latest processes and machinery applicable to the concentration of low grade copper ores; to make such a study of the ores of Norway and Sweden, as would enable the

*Editor the Publications of the Department of Mines, Ottawa. This article was secured through the courtesy of Dr. Eugene Haanel, Director of the Mines Branch.

technical experts of the Government to compare the ores and their economic treatment with the ores and conditions prevailing in Canada; and to report on the advance made in, and the present status of, the electric furnace, pig-iron industry in Northern Europe. All this invaluable information has been lost, and the investigation will have to begin over again.

Mr. Sjöstedt is a typical example of the many capable technical experts who are giving Canada the benefit of their practical training in the great industries of Europe: thus enabling this country to begin where Northern Europe leaves off. In view of this fact, a biographical sketch of Mr. Sjöstedt's technical career, will, no doubt, be of special interest to the readers of The Canadian Mining Journal. Before doing so, however, it will be as well to set forth the latest phase of the lamented metallurgist's work in Canada: gathered as an abstract of notes prepared by Mr. R. Turnbull, of Welland, revised.

Mr. Sjöstedt as chief metallurgist to the Lake Superior Corporation,—who own two pyrrhotite ore mines in the Sudbury district—made a special study of the character of these ores, and became quite an enthusiast as to the possibilities of obtaining a ferro-nickel pig-iron by direct smelting from the ore, thereby saving not only the iron in the ore, which by present methods employed in Sudbury, has to be slagged off and thereby lost, but obtaining the nickel itself at a lower cost.

Mr. Sjöstedt's argument was, that since in the present manufacture of nickel steel, nickel, in its pure form, has to be added to the steel in the open-hearth furnace, there is always a danger of nickel being unequally mixed with the steel; thereby producing in some parts of the bath a steel of high nickel content, and in other parts steel with little or no nickel. By the use of pig iron containing the nickel, a more homogeneous bath would result, and the cost be lessened, as compared with steel where the pure metal was employed.

The main difficulty which confronted him was the presence of sulphur in the ore, as even after a good roasting, the ore still contained from 1½ per cent. to 3 per cent. of this impurity, thus rendering its use impossible in blast furnace practice. The wonderful energy of Mr. Sjöstedt, however, solved the problem, and it is to his credit and renown that, without any practical knowledge of electricity, and with very inadequate apparatus, he constructed an electric furnace, which probable expert electro-furnacemen of to-day would call a freak, but from which he managed to produce a nickel-pig containing over 4 per cent. nickel, about 1½ per cent. copper, and with the sulphur as low as 0.010 per cent.—a remarkable result!

From this time, to the day of his untimely death, Mr. Sjöstedt became a thorough believer in the possibilities of the electric furnace. It was, therefore, one of the pleasures of life when he witnessed the successful government experiments at Sault Ste. Marie in the winter of 1905-6: the making of 55 tons of pig-iron from titaniferous, nickeliferous, ferro-pyrrhotite, sulphurous, magnetic ores, by the electro-thermic process, on a practically commercial scale: thus confirming the crude experiments made with his miniature electric furnace—operated with 110 volts.

At the conclusion of these Government experiments conducted by Dr. Eugene Haanel, the experimental plant was taken over by the Lake Superior Corporation, and Mr. Sjöstedt—as metallurgist to the company—produced, during four months' operation, about 200 tons of ferro-nickel pig, of which the sulphur contents were kept on an average, below 0.015 per cent.

During the last five or six years Mr. Sjöstedt devoted a large part of his time to the study of the ferro-nickel problem, and perceived the great possibilities of the process, which would put Canada with her unlimited supply of pyrrhotite ores in the Sudbury district, and her numerous water powers, at the head of all nations as a producer of nickel-steel. There is no doubt, but that he acquired during his trip to Europe this year, valuable information on the latest electric furnace practice in the production of pig-iron: data which would have been of immense service to those who sent him to Europe, in their endeavours to solve the problem of producing ferro-nickel pig, as proposed by Mr. Sjöstedt.

The man has gone, but his work remains, and let us hope that the day is not far distant when Mr. Sjöstedt's prophecies as regards the future treatment of the Sudbury pyrrhotite ores, will become an established fact. There could not be a better or more suitable monument erected to the memory of one who may be considered as one of Canada's most eminent metallurgists, than to see all nickel-steel in the future, made from ferro-nickel pig, from the ores of the Sudbury mines, and all in the electric furnace, as advocated by Mr. Sjöstedt.

Ernest Adolf Sjöstedt was born in Sweden, and educated at the High School Skara, and Royal School of Mines, Stockholm, graduating in 1876. In 1877 he was engaged as metallurgical chemist at the famous Le Creusof Works, France. From there, in the same year, he migrated to the United States, and was employed as assistant chemist in the works of the Bethlehem Steel Co., Pennsylvania, under John Fritz. In 1879, he conducted experiments in the roasting of ores at Katahdin, Me.; and for five years was in charge of the charcoal iron furnaces at Shelby, Alabama, and Cherokee, Georgia, 1880-85. Inability to stand the southern climate, however, constrained him to move north, and he was re-engaged by the Shelby Iron Works Co.; re-built their furnace plant, and remained as works manager until 1890. In 1890 he visited Sweden, then re-crossed the Atlantic, landed in Canada, and built ore roasters at Bristol, Quebec. He then organized the Pictou Charcoal Iron Co., and built the furnace plant at Bridgville, Pictou County, N.S., remaining there for six years as general manager. After another trip across the Atlantic—investigating the mines and metal works of Northern Europe, for the purpose of writing a series of descriptive articles for the Iron Age: on the iron and steel exhibit at the Stockholm Exhibition, he returned to Canada, and established a chemical laboratory, and consulting mining engineers' office, in Montreal—1897: making a specialty of designing refractory ore roasting furnaces and gas producers. The reputation thus made, led in 1898 to his engagement by Mr. F. H. Clergue, as chief metallurgist to the Lake Superior Power Co. at Sault Ste. Marie; remaining in this important position for one year, then was sent to Europe to study the water gas industry, and kindred processes. Upon his return he designed and built, the "Soo' water gas plant, reduction plant, sulphide roaster, the charcoal plant—since taken over by the Standard Chemical Co.

Mr. Sjöstedt was the inventor of the Sjöstedt sulphide roaster; the Sjöstedt electric smelting furnace; and the Sjöstedt-James electrolytic process for the separation of copper and nickel, etc.

He was elected a member of the Canadian Mining Institute in 1890; American Institute of Mining Engineers, 1893; and the American Electro-Chemical Society, 1903.

He leaves behind a wife—Jessie Kathleen, daughter of J. C. Winslow, Q.C., Woodstock, N.B., a lineal descendant of Edward Winslow, one of the Mayflower Pilgrims, and first Governor of New England, and a daughter, Mrs. McAdams, of Toronto. He was a Protectionist in politics, and a Lutheran in religion.

# THE DOMES OF NOVA SCOTIA

By T. A. Rickard.

(Continued from last issue.)

PART II.

### Alfred R. C. Selwyn.

In the following year, 1871, Alfred R. C. Selwyn, famous as an Australian geologist, published his "Notes and Observations on the Gold Fields of Quebec and Nova Scotia." He expressed disagreement with Hunt and Hind, and quoted with approval the generalizations of Lieber (Geological Survey of South Carolina, 1856). Selwyn repudiates the idea of contemporaneity as between the quartz and the sedimentary rocks. He says:

"All veins are younger than the country; and hence it is without any reason that many writers regard those only as veins which dip or strike unconformably with the country-rocks, for it is evidently quite immaterial what peculiar relative position is occupied by the two as concerns the origin or the general characters of the veins. Crevices may be formed in any direction, and it is but reasonable to suppose that the planes of stratification, being possessed of less cohesion, will at least as readily present themselves for the formation of cracks or fractures as those planes which traverse the more compact and less fragile portions of the rock."

In other words, the origin of an ore deposit cannot be inferred from its shape, because the shape is dependent upon structural conditions in the country-rock. The ore in veins occupies fractures that follow lines of least resistance, and those lines may be identical with the stratification. Selwyn continues: "In order to substantiate their origin by contemporaneous deposition at the surface, it would likewise require to be explained in a more satisfactory manner than has yet been done, why they are always found in close connection with anticlinal axes, and never at the outcrops of the main synclinal folds, or associated with strata which have not been subjected either to metamorphic agencies, or to folding or faulting." To which I may add that if the quartz had been deposited in a sheet-like layer, sandwiched between silt and sand, at the bottom of the ocean, or even in the flat discs characteristic of sedimentation, it would now be found wherever the quartzite and slate outcrop. Nor would we expect to find it particularly at the crest of the folds, for the pressure incidental to folding would have bent the beds in places where the least quartz offered the least opposition to plication, and not the places where the hard layer of quartz was thickest. But you would rather hear what else Selwyn has to say; he continues thus:

"The vein-like character of the quartz, the comparatively limited distances through which the layers have been traced, their more or less lenticular form, the evidences of motion in the enclosing rocks, the constant connection with anticlinal axes, and the absence of corresponding quartz layers through great thicknesses of strata which do not present evidences of such disturbance and corrugation, are circumstances, all of which are strongly opposed to the theory of contemporaneous deposits and as strongly in favour of the opposite conclusion."

As regards the granite of the Nova Scotian gold-mining region, Selwyn observes:

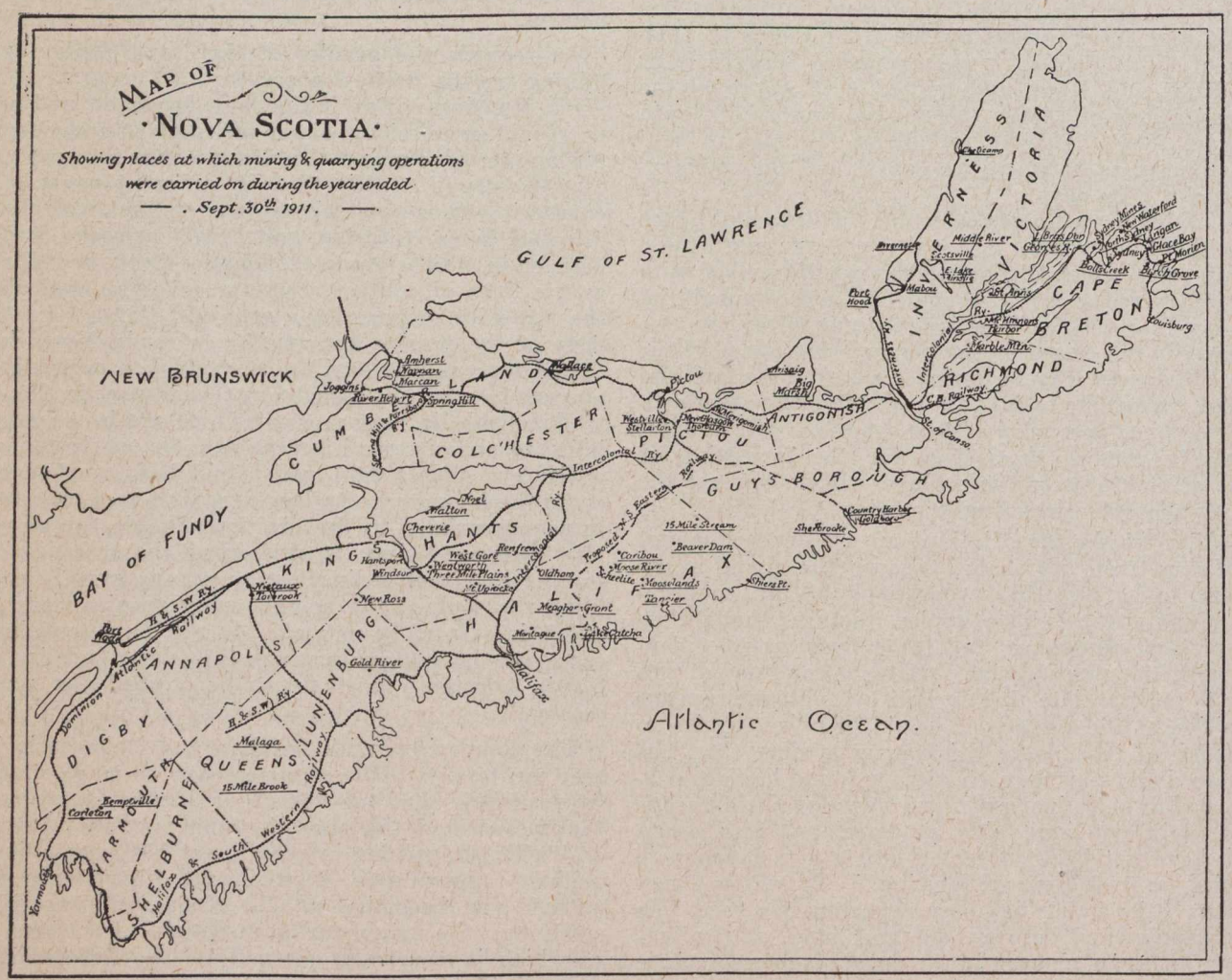
"It is strictly of an indigenous character, and neither an old granitoid gneissic series of Laurentian age, nor an intrusive mass. Dr. Dawson has shown ("Acadian Geology," 1868) that in different parts of its course it comes successively into contact with Lower Silurian, Upper Silurian, and Devonian rocks, and the manner in which these sedimentary strata are affected at the lines of contact scarcely leaves room to doubt the posterior origin of the granite. . . . The relations of the granite and kneissic rocks in Nova Scotia to the surrounding auriferous strata, are perfectly analogous to what is observed in this respect in the Australian gold districts, most of which are in close proximity to similar granitic centres. In one instance an auriferous quartz vein, which had been worked close up to the boundary of a large granitic area, was found to pass graudally, by the addition of feldspar and mica, into granite, losing its auriferous character and becoming a vein of ordinary grey granite exactly resembling the rock of the neighbouring granite mass, into which it eventually merged. It will be interesting to trace out the manner in which the quartz beds in Nova Scotia terminate in their strike toward the granite masses."

The comparison with Bendigo and Ballarat is just, as I can testify. The argument can be made stronger by reasoning that the branch or apophysis of granite that penetrated the quartzite and slate lost its mica and feldspar, gaining in quartz, until it became like an ordinary quartz vein, acquiring an "auriferous character," and becoming a vein of quartz "exactly resembling" the neighbouring anticlinal formations "into which it eventually merged." The differentiation from a dike of granite containing quartz, mica, and feldspar to a simple quartz vein, recalls the modern theory advanced by J. E. Spurr that some veins of silica or "alaskite" represent the last phase of magmatic segregation. Selwyn's question as regards the behaviour of the quartz veins when reaching the granite in their strike has been answered by mining operations that have followed such veins from the slate and quartzite into the granite. The quartz penetrates the granite and has been found gold-bearing, although not rich. The veins maintain their identity, but not for long, after entering the granite; and there is evidence to suggest that the quartz is an extreme phase of the silicification to which, in places, the granite itself has been subject.

A paper to be discussed at a meeting of the Institution of Mining and Metallurgy, held in the Rooms of the Geological Society, Burlington House, Picadilly, W. on Thursday, April 18th, 1912, at 8 O'Clock p.m. and presented at a meeting of the Canadian Mining Institute, at Toronto, on March 6th, 1912.

Coming to the barrel structure, Selwyn says:

"The facts which I have observed lead to the conclusion that the corrugation of the quartz is intimately connected with, and dependent on, the operations of the forces which have produced the slaty cleavage; the same forces have likewise, in all probability, caused the opening between the beds in which the quartz has been deposited; and also the great parallel east and west synclinal and anticlinal foldings of the strata. In every corrugated vein which I have examined, the axes of the corrugations or barrels always coincide with the strike of the cleavage. If the walls are of sandstone (whin), they are rarely corrugated, and seldom show any cleavage planes; though their surfaces, especially if in immediate contact with the quartz, frequently show ridges or parallel undulations, which strike with the cleavage and seem to have impressed




corresponding swells or undulations on the quartz. Where cleavage and bedding coincide in strike and dip, no corrugations occur, nor are they observed in layers which are enclosed between walls of hard whin. All those veins, which are sharply corrugated and contorted, lie within the limits of beds of highly cleaved soft slates of from three to five feet wide, between beds either of whin and a hard compact slaty rock, which constitute the walls of the veins, but in no instance exhibit corrugations corresponding with those of the vein, and are commonly perfectly smooth and even throughout."

Here Selwyn is on the edge of a discovery that would have gone far to explain the origin of the 'barrel' the leads; the effects of contemporary dislocations; and the influence of stringers and off-shoots on the richness of the leads, characters that simply or collectively it would be difficult to account for, associated with a stratified deposit."

Mr. Poole is, I believe, still happily living. I hope he may long be spared, for he injected a notable amount of good sense and keen observation into his writings on this subject. Obviously his distinction between 'beds' and 'veins' is well put and conclusive.

In the following year (on March 12, 1879) the same observer read a paper before the Geological Society

structure. Whether he expresed himself badly or whether he really appreciated that the 'corrugations' follow the line of *intersection* between the planes of cleavage and the planes of the vein-walls is not clear. He certainly afforded a hint to succeeding observers, but no sign is given that they appreciated it.

### Henry S. Poole.

In 1878 H. S. Poole reported that: "The distinctive features of the gold leads of Nova Scotia are their general conformability with the slate and quartzite beds and their regularity, suggesting that they are beds rather than veins. But there are characters that point to their being true veins in spite of these features, and they are the following: the roughness of the planes of contact between quartz, slate, and quartzite; the irregularity of their mineral contents; the termination of

of London, and again combated the old ideas of Hunt and Hind; for he said: "The theory that the 'leads,' as the lodes are locally called, are contemporary beds with the slates and quartzites has not since been generally accepted; nor has it gained ground with the further knowledge derived from working, nor been adopted by any of the miners, among whom are men experienced in other gold-producing countries."

* * * * *

In referring to the Waverley deposit, Poole says.

"In the overlying stratum the position of the plication in the quartz is marked merely by a moderate undulation. The quartz having yielded in the greatest degree to the lateral pressure would indicate that, at the time of the upheaval, it was then in a more plastic condition than the containing rocks, and the more when it is observed that the rolls contain angular fragments of slate, and send off shoots and tongues of quartz up into the superjacent stratum."

The notion that the extraordinary serpentine folds characterizing the 'barrel' structure must have been rendered posible by a plastic condition, assumed by the quartz by reason of excessive pressure, is not undeserving of respect; it affords one of the explanations most favoured by other geologists who came to Nova Scotia long after Poole; but it is rendered untenable by the evidence submitted by me in the first half of this paper.

**John William Dawson.**

Next we come to an authority of the first rank, John William Dawson, the chief of the Geological Survey of Canada. As early as 1878 he stated that "gold deposits seem richer in the vicinity of the granite," and at the same time he re-affirmed his view that "the granite intrusions and gold veins are roughly contemporaneous." In 1891, by which time he had been knighted, and was known as Sir William Dawson, he published 'The Geology of Nova Scotia, New Brunswick, and Prince Edward Island.' In that book he refers to the deposit of gold-bearing conglomerate at Gay's river, an occurrence important as affording evidence concerning the age of the gold deposits. He says:

"It was described in The Canadian Naturalist for 1864, by Mr. C. F. Hart, and Dr. Honeyman has favoured me with manuscript notes of a visit to the place in 1866. From these sources I extract the following information: The locality is at the junction of the Lower Carboniferous conglomerate with the slate and quartzite, forming the extremity of the ridge separating the valleys of the Stewiacke and Musquodoboit rivers. The slates belong to the Silurian gold-bearing formation, and contain small but rich auriferous quartz veins. The conglomerate is formed of the debris of these older rocks, and gold occurs in it exactly as in modern auriferous gravels, being found in the lower part of the conglomerate, and also in the hollows and crevices of the underlying slate. The fact is interesting, as showing that the gold veins existed in their present state at the beginning of the Carboniferous period, and that the causes which produced the modern gold alluvia were then in operation. By a later repetition of this process, the drift of boulder clay which overlies the conglomerate is at this place also slightly auriferous."

This is suggestive evidence. As Dawson says, a placer deposit was formed in the Carboniferous by the concentration of the debris eroded from the gold veins formed in the Silurian period, and in a long subsequent era the Carboniferous gravel, hardened to conglomerate, became degraded and distributed in the drift of the Glacial period, and this in turn is washed into the river-beds of to-day. Dawson calls the prevailing formation 'Silurian.' A generation ago it was the fashion to impute Silurian age to gold-bearing slates of unknown geological antiquity; this tendency is to be debited to the example of Sir Roderick Murchison, who ventured the rash prophecy that gold was confined to rocks of Silurian age. We may also demur to Dawson's assumption that because gold derived from the quartz veins is found in a Carboniferous conglomerate, that therefore "the gold veins existed in their present state at the beginning of the Carboniferous period." This is an assumption echoed by later observers, but it may well be questioned. All that the facts prove is that the gold in the superficial parts of the veins was in a condition similar to that in which it is found to-day in the outcrops, but the outcrop of a geological to-day is not the outcrop of a geological yesterday; the processes of nature do not rest in idleness; solution and precipitation, re-solution and re-precipitation are continually at work. It is not safe to assume that because gold is found now at two or three hundred feet below the surface that it existed there in its present state before several thousand feet of overlying rock was removed by erosion and denudation. That false assumption vitiates many of the theories of a much lower date.

Dawson quotes from notes made by him on a visit to Waverley in 1866. He says:

"The appearances showed that the barrel arrangement had constituted the crumpled crown of the anticlinal bend or arch—an explanation already given by Professor Silliman, and on one side the vein could be seen following the beds downwards on the side of this arch. The arrangement indicates great lateral pressure; and, which is of more importance, proves conclusively that the quartz veins are contemporaneous with the folding of the rock, since they have perfectly followed its folds without fracture. That the auriferous quartz beds are not veins is evident from the manner in which they send off branches into the neighbouring rock, as well as from their own crystalline structure and the character of the imbedded minerals. They are undoubtedly true veins, but not veins formed by fracture of the containing rocks when in a hard and a metamorphosed state. They have been formed and filled in the very act of the contortion and altering of the strata, and are thus of the nature of segregation veins, gradually formed as the spaces containing beds were bent without fracture and with but little crushing. The barrel quartz is most instructive as an illustration of this peculiar mode of formation, which must have occurred in the disturbance and metamorphism of sediments."

Here we have another reasonable theory. A sedimentary origin for the quartz is not entertained, but the folding of the quartz must have been contemporaneous with the regional plication that made the saddles and domes. The addition of segregation as a factor in the formation of these curious lodes aids the theory undoubtedly, but it is not convincing in the light of later evidence. Dawson says that "the quartz veins have perfectly followed the folds (in the rock) without fracture." This is not a fact. They do not follow the bedding-planes perfectly, but transgress

those lines of structure most palpably. Returning to the question of origin, he adds:

"No geologist who examines these veins can, I think, doubt their aqueous origin; but different opinions may be entertained as to the precise mode of introduction of the metallic minerals. The facts already stated . . . . appear to me to prove conclusively that the veins were formed at the time of the disturbance and alteration of the containing beds, and in consequence of the mechanical and chemical changes then in progress. In this case the gold and other metallic minerals were probably contained in a state of solution in alkaline sulphurets in the silica-bearing heated waters which penetrated the whole of the beds, and from which, as from a sponge, these silicious and metallic matters have been pressed out in the folding and contortion of the beds."

"Sulphurets" is used for sulphides. This old term still lingers in California. At one time it was employed to designate the sooty products of decomposition resulting in the early sulphatization of base-metal sulphides. However, this is by the way. The foregoing paragrpah of Dawson is but supplementary to the one preceding, and elaborates the theory on which I have already animadverted.

---

A newspaper report is to the effect that mining activity is general again throughout the coal fields of Eastern British Columbia and Southern Alberta. Production of coal in these districts is stated to now be nearly normal. Among the mines in the latter district, the International, at Coleman, is reported as shipping about 2,000 tons of coal daily and making some 500 tons into coke, while the McGillivray Creek Company's mine, a neighbouring property, is shipping about 400 tons daily.

---

Statistics for 1909, given in a Bluebook, prepared by the British chief inspector of mines, and issued last September, show that at the mines and quarries of the world, 6,004,928 persons were employed, and of these more than one-half were engaged in coal mining. Great Britain employed more than 997,000; the United States, 660,000; Germany, 688,000; France, 190,000; Russia (1908), 174,000; Belgium, 143,000; Austria, 134,000, and India more than 119,000. The coal produced was 1,113,308,386 metric tons, possessing a value estimated at nearly £400,000,000 sterling, or say two thousand million dollars. Production of the United States was more than 418,000,000 tons, while Great Britain was second, with more than 268,000,000 tons. Canada was

A new record for haulage ropes has been made on the French slope, Reserve Colliery, where the rope now in use has hauled over 500,000 tons. It is about 23,000 feet long.

---

## THE CANADIAN H. W. JOHNS-MANVILLE COMPANY, LIMITED.

Increased business in the sale of J-M Asbestos, Magnesia and Electrical Supplies, throughout the territory covered by the Canadian H. W. Johns-Manville Company, Limited, at Winnipeg, has necessitated a move from its old quarters at 320 Main Street, to 89 Princess Street.

The new building will enable a much larger stock of goods to be carried on hand than heretofore. Mr. M. C. Burgess, who has been a resident of Winnipeg for many years and is well and favourably known in that section, has charge of this office, and under his supervision is a force of nineteen men.

---

## THE CONSULTING ENGINEER.

The enlarged sale of operations which has taken place during the past decade and the amalgamations of large areas have undoubtedly reduced the field of the consulting engineer and metallurgist in general practice. Most of the great mining houses have their own staff of experts, who take the place of the formerly employed consultant. In the case of small companies and individuals there is too great a tendency to do without the services of the consulting engineer, which is due to ignorance and inexperience. No doubt much useless expenditure would be saved by employing consulting engineers, as no class of work lends itself to such big losses through faulty equipment and development as mining, and it pays to employ the best man to get the best work. We have seen many instances of this penny wise and pound foolish policy. A little knowledge of mining is a dangerous thing, and many really valuable properties have come to grief for the want of expert guidance in the initial stages. In America engineers insert their professional cards in the mining papers, a practice which should become much more prevalent, as it is a perfectly proper means of bringing their names before possible clients.

---

# SPECIAL CORRESPONDENCE

### NOVA SCOTIA.

.. **Dominion Coal Ouputs.**—Taking all things into consideration, the Dominion Coal Company had in April the best month in its history. The output was 379,612 tons. Divided by twenty-five working days this gives an average daily production of 15,180 tons. During the month the output for the first time crossed the 17,000 mark. The output for April of last year was 286,533 tons, and the best previous April produlction was obtained in 1907, when 316,384 tons were raised, so that the current year's figure exceeds the existing record by 63,000 tons.

The outputs of the individual collieries were as under:

| | Tons. |
|---|---|
| No. 1 | 50,162 |
| 2 | 72,372 |
| 3 | 11,935 |
| 4 | 37,847 |
| 5 | 24,950 |
| 6 | 27,045 |
| 7 | 16,730 |
| 8 | 15,330 |
| 9 | 37,379 |
| 10 | 17,909 |

| | Tons. |
|---|---|
| 12 | 25,740 |
| 14 | 26,624 |
| 15 | 8,278 |
| 16 | 4,310 |
| 21 | 1,568 |
| 22 | 1,434 |
| | 379,612 |

Collieries Nos. 6, 2 and 14 established new records. No. 2 Colliery in particular did exceedinly well. This mine worked only 24 days, and produced a daily average of slightly more than 3,000 tons from the Phaen Seam and 1,500 tons from the Harbour Seam, or a combined total of 4,500 tons per day over the one bankhead. There are very few shaft mines in America which can do better than this, if any.

The output for the first four months of the year compares with previous years as under:

| | Tons. |
|---|---|
| 4 months ending April 30, 1908 | 1,249,535 |
| 4 months ending April 30, 1909 | 957,471 |
| 4 months ending April 30, 1910 | 899,250 |
| 4 months ending April 30, 1911 | 1,172,420 |
| 4 months ending April 30, 1912 | 1,344,000 |

It will be noticed that the 1908 figures, which up to the present year were the highest, were exceeded to the end of April by almost 100,000 tons.

The ice conditions along the coast were unusually favourable for shipping operations. Although there was as much if not more than the usual amount of ice in the Gulf and along the coast of Nova Scotia, it kept well out to sea, owing to the prevalence of northwesterly winds, and shipping was not hindered. The St. Lawrence opened for navigation about the 27th of April, and the first cargo from the mines left on that date. It is probable that the amount of coal which will be sent up the St. Lawrence from the Cape Breton and Nova Scotian mines during the ensuing season will far exceed anything in previous seasons. There will be some very fine steamers on the route. Both the Dominion Coal Company and the Nova Scotia Steel & Coal Company will have vessels of large carrying capacity—up to 10,000 tons and even greater—all self-trimmers and capable of being loaded and discharged with great rapidity.

The Dominion Coal Company is now beginning to feel the benefit of the large capital expenditure which has been in progress over a very long period—ten or twelve years in fact. Since the year 1900, the company has developed and equipped collieries Nos. 2, 3, 6, 9, 10, 12, 14 and 15, and have in course of development Nos. 16, 21 and 22. In addition, No. 1 Colliery was practically re-modelled after the fire in 1903, and No. 7 Colliery was entirely renewed after the fire in 1906. At all the other collieries arge additions have been made to the od equipment. In addition to this a very comprehensive scheme of electrification is approaching completion, and the appliances for preparation of the coal for the market have been improved and added to all around the collieries. Large sums have been spent on discharging plants at the St. Lawrence ports and at St. John and Halifax, on loading piers at Sydney and Loiusburg, and on railway branches and rolling stock in connection with the Sydney & Louisburg Railway. The expenditure on new collieries was required not only to meet the increased demands for coal, but to replace the diminishing output of some of the old collieries, and last year the company made the first decided advance in its annual output since the increase obtained in 1906. In 1912 an output of at least 4,250,000 tons may be expected, and with ordinary good fortune the annual production should advance to 4,500,000 in 1913. The potentialities of the Dominion Coal Company have often been enlarged upon, but it is difficult teoxaggergate them. When it is considered that this company controls absolutely for over seventy years to come the finest coal property in the Dominion, and the major portion of the only coalfield of any importance on the Atlantic seabord of the American continent, it is evident that the industry is even yet but in its infancy, and that the Dominion Coal Company will at some future date attain an importance as yet unthought of.

## ONTARIO.

**Porcupine, Swastika.**

Owing to the fact that the heads on three out of four of the tube mills at the Dome mine have broken and that it must be some time before new castings can be made the output from the mill for the first month did not in any sense represent the practice of the mill under normal conditions. To date two gold bars have been shipped, one containing something over two thousand ounces from the plates and another about 1,800 ounces from the presses. During the first month of operation the mill only ran 414 hours and on an average only twenty of the forty stamps were dropped. Owing to the accidents to the tube mills, it is not likely that the mill will attain anything approaching capacity until June.

The McIntyre mill is producing steadiy. To the end of the week of May 11, seven gold bars will have been shipped, worth between $20,000 and $25,000, no official figures having been furnished. The management states that a contract has been let for the construction of a twenty-stamp mill which calls for the completion of the plant in 135 days, so that it should be in operation by September. The present 10-stamp mill has given such satisfactory results to date that the enlarged mill will be based upon the practice there obtaining, but the exact details have not yet been worked out. To date there is between 4,000 and 5,000 feet of work accomplished at the McIntyre mine. No. 1 and No. 4 shafts are down 220 feet and 240 feet respectively, and both show ore for the full width. A churn drill operating at the west end of Pearl Lake to discover the depth of bedrock struck a body of quartz at 130 feet. As it appears to be right on the strike of the Hollinger series of veins the discovery may develop something of importance. Now that the McIntyre has ample power fifteen drills are working and the vein at the No. 5 shaft is being drifted upon again. While recent developments have shown that McIntyre ore is not likely to be as high-grade as Hollinger there does appear to be a probability that a large body of medium grade ore will be developed and put in sight by the end of the year.

Developments at the McEaneny have been extremely propitious in the last month. At both levels remarkable ore is being drifted on. The vein which, though very rich, had been rather narrow till within the past week has widened considerably without showing much falling away in values. On the hundred-foot level 100 feet of ore has been developed, and on the 200-foot, 60 feet. The new electric hoist is now running and the plant is now one of the most complete and efficient in camp. The shaft is being rushed down to the 300-foot level with a view of opening up another level as soon as possible.

The Moneta Mining Company has run into a body of quartz at the 200-foot level containing sulphides, but the management of the mine has not as yet stated if the ore contains pay values. The Moneta is in the sand belt to the west of the Hollinger and hopes to get the extension of the Miller-Middleton vein.

There is to be no merger of the Hollinger, the Miller-Middleton and the Dixon properties for some years at any rate. It is felt that it would be prejudicial to the interests of Hollinger shareholders to link a developed mine as the Hollinger is today with two prospects, very promising it is true, but still prospects, and it is therefore very likely that one or other of the Timmins-McMartin-Dunlap holdings will be floated as separ-

ate companies. A report recently made on the Miller-Middleton shows that while that property has a prospect of a large body of milling ore it is by no means in the same category as a mine with the Hollinger.

Working under Pearl Lake at the 200-foot level the Plenaurum is still meeting with considerable success. The big vein at No. 1 shaft has just been cut and shows nine feet of quartz, all pay ore. The cross-cut that opened up this vein will be continued to catch the extension of the Jupiter. Another vein has been cut in No. 2 shaft, and altogether at the 200-foot level the Plenaurum has five veins from which it is probable that ore can be mined and milled at a profit.

Some specimens, remarkable for the coarse gold to be seen in them, have been taken from the drift at the 100-foot level of the Three Nations Lake, the ore being encountered 30 feet from the shaft. The gold is associated with galena in narrow quartz seams.

The management of the Hughes Porcupine property has been taken over by Mr. Ernest H. York, whose last charge was the Calcite Lake mine near Gowganda. Mr. Mowery Bates is the retiring manager. It is understood that the Hughes will at once set up the compressor that has for some time been on the property.

The management of the Dome Lake mine give out the statement that the two and a half tons of ore sent down from a mill run to the Kingston School of Mines returned an average assay of $42. The Dome Lake has decided to build a 10-stamp mill and has ordered a 10-drill compressor and boilers.

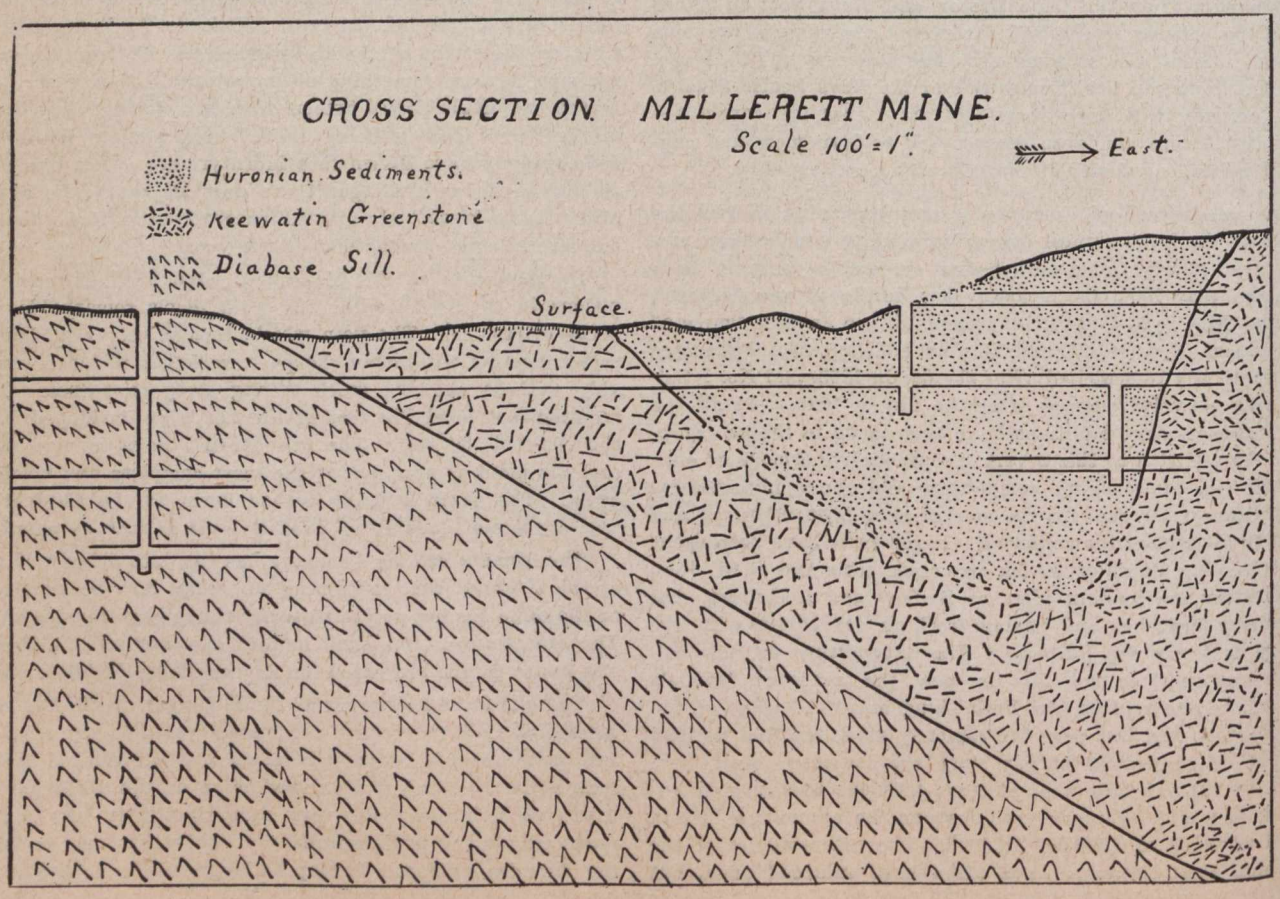
The final payment on the Davidson property has been made by the Crown Chartered Company, and the latter company is now sole owner of the property, where developments are still favourable.

The annual meeting of the Rea ousted the president, C. P. Hill, from the presidency, and appointed an entirely new board of management. The financial statement showed that development money was exhausted, but that the company had no debts. The manager showed a number of plans showing the development work, but declined to make any estimate of the tonnage or grade of ore in sight. The newly-elected directors are A. C. McMaster, Toronto; M. Doheny, Montreal; W. A. Mitchell, Toronto; W. H. Jackson, Toronto; James Wright, Chicago; Henry Lockhart, New York, and T. H. Rea, Toronto.

**Cobalt, Gowganda and South Lorrain.**

Before the Cobalt branch of the Canadian Mining Institute, Prof. G. R. Mickle, provincial mine assessor, read a very valuable paper on the total production of the Cobalt camp. Prof. Mickle has opportunities in his o..cial position to correctly estimate the ore in sight and likely to be put in sight which no other one man possesses. By a process of deduction he showed that 56 per cent. of the silver had been mined and marketed from the known productive veins, which were 111 in number. The amount of silver produced from these veins to July of last year, was 107,800,000 ounces and 8,000,000 ounces on the dumps would bring the total up to 115,800,000 ounces. Proceeding, the speaker showed that according to the percentage of good ground not yet prospected or adequately prospected, 21 more productive veins ought to be found. From these new veins 35 million ounces should be extracted, which with the 46 per cent. of the silver yet to be mined and marketed from the known veins would give a total production from the camp of 242,000,000 ounces. Estimating that 25,000,000 ounces had been produced since July it would be seen that at the end of April there was 101,200,000 yet to be extracted from Cobalt veins. Of the 111 producing veins 86 were in the Huronian, 12 in the diabase, and 13 in the Keewatin. The estimate was made for Cobalt proper and does not include South Lorrain, Elk Lake or Gowganda.

At the annual meeting of the La Rose Mining Company the following new names were added to the directorate: E. W. Nesbitt, of Woodstock; Edwin Hanson, Montreal, and W. M. Dobell, Quebec. These gentlemen take the place of E. P. Earle, Richard T. Greene, and David Fasken. As the company is now a Canadian corporation the headquarters of it have been removed from New York to Montreal.



Under the management of Mr. M. B. R. Gordon, acting for Sir Henry Pellatt and associates, work has been resumed at the Ophir mine. In the same section the John Black has also opened up again. Other non-producers that have resumed or expect to resume are the Twentieth Century, the Silver Queen, the Jajola and several others.

The shipments from the outside silver districts of South Lorrain and Gowganda were Mann, 20.00, Millerett 20.00, from Gowganda and 73.22 from the Wettlaufer in South Lorrain.

The Nipissing statement for the end of March was cash on hand, $1,091,826, ore in transit and at smelters $254,836, ore sacked ready for shipment $203,650, total $1,550,412.

---

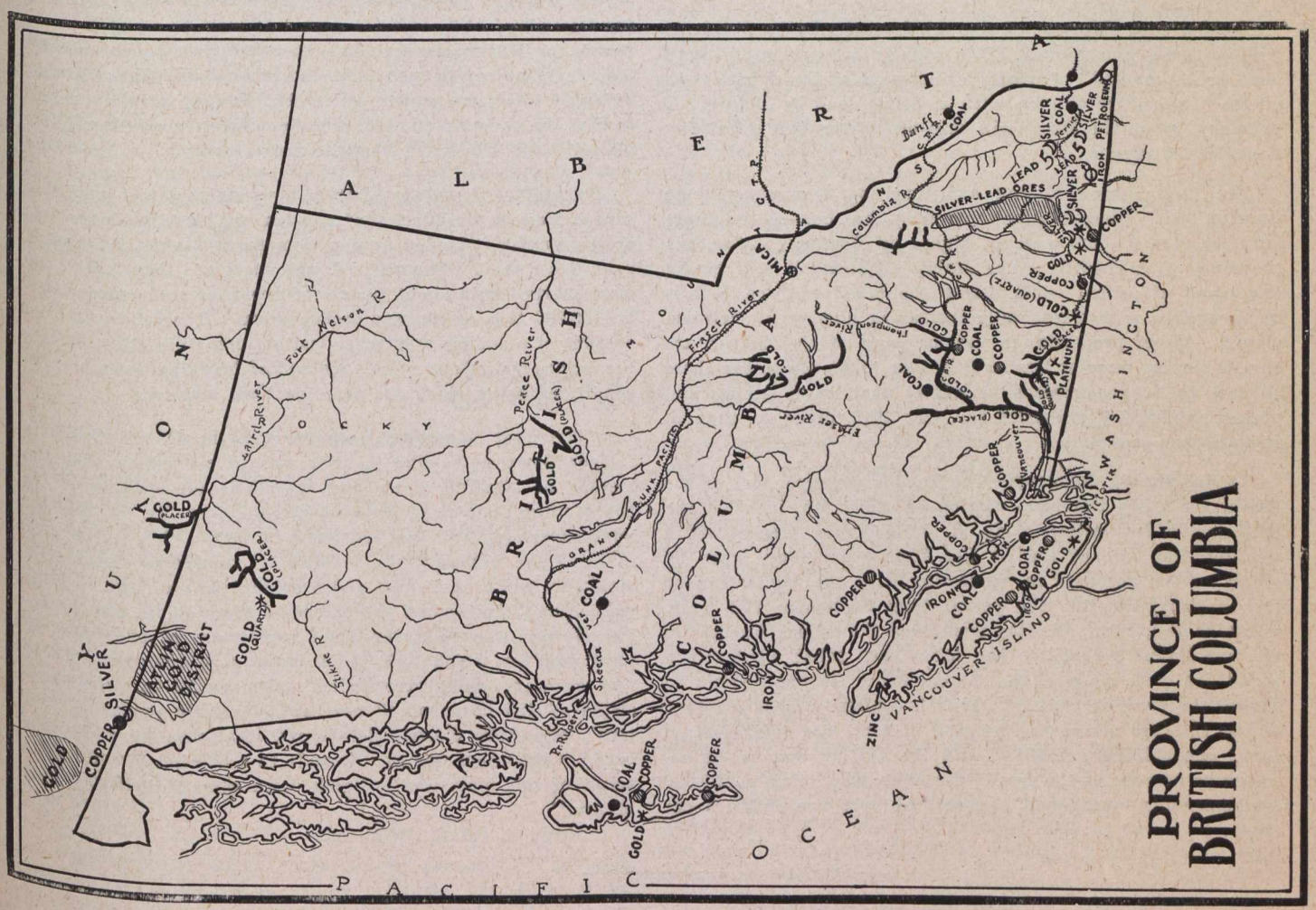
## BRITISH COLUMBIA.

As the spring advances there is increased activity in connection with mining in the province. In the larger placer mining districts—Cariboo and Atlin—preparations are being made for what is hoped will prove a long season's run. In smaller degree there will also be activity on some of the gold-bearing streams in East Kootenay, Big Bend of the Columbia (in Revelstoke mining division), Similkameen, and Omineca.

The outlook for lode mining is distinctly encouraging on the whole. Lead in East Kootenay, silver and lead in Ainsworth and Slocan, gold and lead in in Nelson, gold and copper in Rossland, copper with gold and silver in association in Boundary. Gold and copper in Similkameen, and gold and copper in the Coast district, are the chief metals that will be produced.

Coal mining may be expected to be on a large scale than in any previous year. This expectation covers all three coal-producing districts of the province, namely Vancouver Island, Nicola Valley and Similkameen, and the Crow's Nest.

**Cariboo.**—In Quesnel mining division the gravel-washing season has been opened by the Quesnelle Hydraulic Gold Mining Company, which commenced piping on April 15th—at least a month earlier than is customary in Cariboo district. High carbon steel plates and manganese steel rails have been placed in the sluiceways. During the winter 85 tons of plates and 25 tons of rails were hauled from the Canadian Pacific Railway at Ashcroft to the mine, and these were placed in position in the sluices by the early part of April. These 40-lb. steel rails will, it is expected, last at least ten times as long as the ordinary Bessemer steel rails. The steel pates are 58 inches square, and their carbon content varies from 0.80 to 1.20 per cent. In the sluice bed they are spaced two inches apart and each plate is placed half-an-inch lower than the preceding one, it having been found that this arrangement reduces the wear at the end of the plates. The rails have been put in for 200 feet of the sluiceway; eventually a total length of 300 feet will be reached, the railed part of the sluiceway being lengthened as required. The company's water system covers a distance of approximatey 25 miles from dam on Swift River to dump on Quesnel River. An important feature is that it includes three inverted siphons of 5 feet inside diameter and aggregating 9,000 feet in length, having a capacity of 60,000,000 gallons of water every 24 hours.



Included in the mining news published in district newspapers are many notes indicating progress, and promise of extended operations and enlarged production. Shipment of ore and concentrates from mines in Four-mile camp, near Silverton, is being well maintained. About Sandon much mining work is being done. The low-level tunnel on the Slocan Star group is in about 900 feet, and in the old workings above developments are encouraging for finding more ore. Above Cody several properties are being worked, and of these the Twilight, Reco, and Noble Five should soon ship ore. The deep development work on the Payne, situated about two miles from Sandon, is being proceeded with, fair progress being made in driving the long cross-cut tunnel. The erection of a new concentrator building for the Rambler-Cariboo and removal of mill equipment from the old mill to the new, will be undertaken as soon as it can be done with advantage; also construction of an aerial tramway from the portal of the low-level tunnel of the mine down to the mill site alongside the new railway. Development of the Rambler-Cariboo Extended, and the Rio, is being continued. The finding of a shoot of good ore in the latter has been reported.

Farther east, shipment of zinc ore from the Lucky Jim mine will be made immediately after railway transportation shall have been provided. Further development of the upper levels of the Whitewater outcrop mine is being done by Retallck & Company, while the Utica will ship ore to the extent railway facilities will admit.

The Consolidated Mining and Smelting Company, beside working No. 1 mine, in Ainsworth camp, has bonded the Highland, situated a short distance higher up Kootenay Lake than the town of Ainsworth. The Mabry syndicate is still giving this camp attention, while across the lake the Blue Bell is being worked with a gradually increasing number of men employed. Other properties in various parts of the district are also employing more or less men, so that taken altogether there appears to be good reason to expect that more mining and greater production will mark the year 1912, probably, than in any previous year.

**Le Roi Mining Company.**—The London correspondent of the Vancouver Daily Province, writing on April 5th, included the following in his letter: "Mr. A. J. McMillan presided at a meeting held here of the Le Roi Mining Company, when he presented the accounts in connection with the liquidation of the company, covering the period from September 2nd, 1910, to March 2nd, 1912. Having mentioned the salient features in the liquidation, he said he had often been asked what return would finally be made to the shareholders. It was difficult to answer the question exactly. They had already made a return of two shillings per share, the cash in hand was equivalent to about one shilling per share, and the further sum to be received on account of the sale of the mine, amounting to £25,000 or thereabouts, was equal to something over two shillings per share. At the present time he was endeavouring to effect the sale of the smeltery. If this sal should go through it might mean another shilling, or one shilling and six pence for the shareholders. The accounts were agreed to without comment from the shareholders."

**Hedley, Similkameen.**—A few weeks ago the Hedley Gazette published the following information: "The mining outlook for Camp Hedley in 1912 looks better than it has done for years. In addition to the Kingston, the Apex, and in all probability the Oregon, there are negotiations now afoot which indicate the bonding of some more likely ground in the immediate vicinity." On April 25th, the same useful local newspaper stated that "some prospecting outfits have been seen in Hedley during the past week. There is no part of the province that offers better encouragement to those pioneers of industry who have added so much to the country's wealth than the hills overlooking the Similkameen River."

From the Gazette it is also learned that the Hedley Gold Mining Company crushed 6,263 tons of ore at its 40-stamp mill during March. The highest previous monthly record was that for December, 1911, of 5,514 tons. It may be noted that the figures for March, given above, show that the estimate of 6,247 tons for that month, printed in the Canadian Mining Journal of April 15th, was rather under the quantity actually milled, so that the estimate of profit for the quarter ended March 31st, placed at $76,676, is not likely to prove too high.

**Boundary.**—Boundary district newspapers lately published information to the effect that another big blast had been fired at the British Columbia Copper Company's Mother Lode mine, near Greenwood. Summarized, the facts are that 2,200 holes were charged with about 10 tons of explosive and, approximately, 100,000 tons of ore was broken down. The following brief account of a similar occurrence last autumn will better indicate the nature and effects of this method of breaking down ore, the conditions being much the same on both occasions:

"The most important work done in the British Columbia Copper Company's mine in 1911 was in connection with the method of breaking down and extracting ore inaugurated in the Mother Lode mine the previous year by Mr. E. Hibbert, mine superintendent, and continued in 1911. This consisted of dividing the orebody into a series of transverse stopes of a maximum width of 25 feet and breaking the ore down in large quantities. An idea of the extent of these stopes may be obtained from the following brief particulars of one blast, in preparing for which 2,433 holes, averaging approximately 14 feet each in depth, were drilled. The explosive charge consisted of 425 boxes of 40 per cent. dynamite (equal to 10⅝ tons), and 2,525 electric detonators, low tension No. 7, were used. Connection was finally made to a 550-volt circuit. The result of this blast was to break down more than 100,000 tons of ore."

# GENERAL MINING NEWS

## NOVA SCOTIA.

**Halifax.**—Unable to procure a supply of coal in Great Britain, the Shaw Saville and Albion Liner Tokomaru was forced to cross the Atlantic for a cargo for Cape Town and last week loaded at the Scotia piers in North Sydney. In addition, she also took sufficient bunkers to last her on a fifteen thousand mile voyage to New Zealand and sailed Saturday for Tenerific on the first stage of her long trip to the Antipodes. Since the beginning of the strike at the British collieries, Cape Breton coal has gone to many quarters of the globe, but the present shipment, or part of it, is probably traversing a longer distance than any previous cargoes. Not since the British strike of 1873, when Nova Scotia collieries shipped coal to the Philippines and the East Indies, has there been anything like the amount of export trade carried on by the larger Nova Scotian companies that has marked the past three or four months. In addition to other business, the Scotia Company captured a con-

tract said to be for over thirty thousand tons in Uruguay, while the Dominion Coal Company has also sent a large tonnage to many foreign ports. Montevideo, Cape Verde, Rio de Janiero, the West Indies, and many European ports have drawn on the two big Cape Breton Companies, and a cargo has gone to London.

### QUEBEC.

**Montreal.**—Plant for the future of the Amalgamated Asbestos Corporation under the reorganization scheme are being rapidly worked out under the direction of the general bondholders' committee. It is understood that Mr. W. G. Ross, formerly managing director of the Montreal Street Railway, will take the presidency of the new company, but it is not likely the appointment will be formally made for a few weeks. As was generally expected the name of the company will be changed, taking the title of the Asbestos Corporation of Canada. Mr. Ross is widely known in financial circles as a successful organizer and administrator, and it is believed that the future of the Asbestos Corporation could not be placed in better hands. He went abroad after his resignation from the street railway management about a year and a half ago and took a long rest. Since his return a few months ago he has been engaged in looking after his private affairs, but it was regarded as a certainty that sooner or later his business ability would be turned to account in connection with some of the large industries of the country. It is learned that the $7,000,000 capitalization will be divided as follows: $3,000,000 1st mortgage 40-year 5 p.c. bonds; $4,000,000 6 p. c. preferred participating with the common after latter has received 5 p. c. dividends; $3,000,000 common stock. For each $1,000 Amalgamated Asbestos bonds the holder will be given $250 in new bonds, $500 preferred and $250 common stock. Bondholders may subscribe to new bonds to extent of 6¼ per cent. of par value of present holdings. Preferred shareholders of Amalgamated Asbestos may subscribe to new bonds to extent of 20 per cent. of par value of present holdings, terms of subscriptions in each case being 85 per cent. for the bonds together with 100 per cent. bonus or common stock. There will be seven directors of the new corporation—five will be W. G. Ross, H. J. Fuller and Wm. Macmaster, of Montreal; Uzal H. McCarter, of Newark, N.J., and H. E. Mitchell, of Philadelphia. The remaining two are to be named by the English committee.

### ONTARIO.

**Toronto, May 2.**—At the annual meeting of the Dobie Mines, held here yesterday, the financial statement showed the company to have on hand in cash $48,699, and in stores, etc., something like $2,000 more. Ther are in the treasury also 59,995 shares. The report did not make reference to the claims put into the Dobie treasury by Messrs. Armstrong and McGibbon. These properties will probably be fully prospected this summer. The old directors were re-elected.

**Elk Lake, May 9.**—The Syracuse Mining Company is letting a contract for 100 feet of sinking on its property in Tudhope Township. There is a shaft already sunk on this property to the depths of 100 feet and the present contract will reach the 208-foot level. This will make the 10th property resuming active work in the Elk Lake district.

# COMPANY NOTES

### BEAVER CONSOLIDATED.

The annual report submitted by the directors of the Beaver Consolidated Mines Company, covering a period ending February 29, 1912, shows gross earnings of $223,098, out of which dividends amounting to $169,912 were paid, while $20,293 was written off for depreciation.

The net value of the ore shipped amounted to $385,513. The report shows that the mill with its present equipment will handle from 50 to 60 tons of ore per day, and the machinery in hand is of such a character that with an additional expenditure of $5,000 the capacity of the plant can be brought up to 100 tons per day. The mill to date, together with the tramway and pipe line to the lake, has cost $48,000, and is all paid for. Development work during the year amounted to 3,514 feet.

President F. L. Culvert, in his report, states in part:

"There are now eight levels on the property. The main shaft is down to a depth of 548 feet. On the 400-foot level the ore chute has been reached with splendid results. On the 460-foot level we have crosscut to the vein and are driving on it toward the ore chute, and believe the same good results will be obtained as on the levels above. The station has been cut at 530 feet and a crosscut is being driven to the vein. Sinking on the main shaft will soon be resumed and continued to a depth of 600 feet, where the next station will be cut.

"Owing to the erratic nature of the veins in the Cobalt camp, it is hardly advisable to undertake to give an estimate of ore in sight. At the best it would be only guess-work, but the persistency with which new ore chutes of very rich values are being encountered would make it appear that the property has a long, prosperous life before it. Up to the present time only about five acres have been prospected.

"The company did not go on a regular dividend-paying basis last year, but distributed 8½ per cent. on the capitalization, or nearly $170,000, to the shareholders. We believe the year 1912 has much greater prospects than the year just closed. Having to-day one of the most efficient working plants in the Cobalt camp, and excellent ore showings, it would seem that larger distribution in the way of dividends may be made to the shareholders, but the directors are of the opinion that a substantial cash surplus should be accumulated and the mill be operated for a reasonable time before definitely placing the company on a regular quarterly dividend basis.

"The company has now cash in hand and in bank amounting to $84,484, and there is ore in transit or at the smelters amounting to $76,504. This, together with accounts receivable and supplies on hand, gives the company a net cash working balance of $170,170."

### TEMISKAMING QUARTERLY DIVIDEND.

A quarterly statement issued by the Temiskaming directors says:

The total production of silver for the quarter was 562,910 ounces, of which amount 305,557 were obtained by hand-sorting, and 257,353 were saved at the mill.

The cost of production covering every charge was 16¼ cents per ounce.

Though no new discoveries of moment have been made, some of the known deposits at the various levels are opening up splendidly, promising well for continued good production.

The company's statement is as follows:

| | |
|---|---|
| Cash in banks | $289,577 |
| Owing from smelters | 182,369 |
| Ore on hand | 11,995 |
| Accounts receivable and stocks on hand | 512,445 |
| Less March pay roll and accounts payable | 28,225 |
| | $484,219 |
| Less balance of deferred payments for North Dome Mining Co., Limited, stock | 175,000 |
| Balance | $309,219 |

### BRITISH COLUMBIA COPPER COMPANY.

The situation at the British Columbia Copper Company has changed within the past few months. The company is now operating again under normal conditions after a period in which operations were greatly handicapped, due to a coke strike at Crow's Nest Pass, during which period the company was required to purchase Eastern coke at an exorbitant price laid down at Greenwood. At the present time the plant is operating to capacity, all furnaces being in commission. Over 2,000 tons of ore per day are being handled, of which approximately 500 tons are coming from the New Dominion property. Preliminary earnings for March on the 1,050,000 lbs. produced have been placed at $57,000. It is now believed, owing to the higher metal price indicated for April over that used as a basis of calculation, that these profits will be increased by approximately $10,000, making the final figure around $67,000. It may be said that these figures represent the largest monthly earnings ever made by the British Columbia Company. The new Voight property, located near Princeton, which the British Columbia Company now has under option, is developing particularly well, and the management are very much encouraged with the results so far obtained. The property contains a large territory, but up to the present time development has been confined to but two claims, numbers fourteen and eighteen. The surface showing at the property consists of a highly silicious zone. Since taking the Voight property under option, state Thompson, Towle & Company, a shaft has been sunk 90 feet and drifting begun. At about 75 feet from shaft this drift cut a distinct vein of high grade ore 8 feet wide. At this point the ore asayed $11 in gold and 8 per cent. copper. Further opening up of the lode has indicated an average for all of the samples of more than 3½ per cent. copper and $3.50 gold. The ore is basic in character, containing a heavy excess of iron and lime and high in sulphur. It is the intention to ship these ores to the British Columbia's Greenwood smelter.

### GRANBY CONSOLIDATED.

The advance in Granby has been due to no particular new development beyond the fact that a sustained 16c. copper market will permit Granby showing earnings of $9 per share on its present basis of operations. The Granby facts have been clearly shown in recent bulletins that have been issued from time to time. In fact, last February, when copper was selling around 14c., it was stated: "If a 14c. price for copper can be maintained until summer, Granby may not have to do any new financing for its Hidden Creek property. The Granby from its Phoenix properties can earn $75,000 per month, possibly more, with the present price of copper, and the company should earn $500,000 before the Hidden Creek property is in commission. In other words, the profits from its Boundary operations can finance Hidden Creek developments and smelter construction, and thereafter with two smelters in operation it is figured that Granby will be able to produce between 4,000,000 and 5,000,000 lbs. copper per month, which would permit of very handsome earnings on its 150,000 shares stock."

It is officially stated that construction of the new 2,000-ton smelter will start on May 1st, which will involve an expenditure of $1,000,000, and it may require $1,000,000 more to place the property in shape for production, and while some of the Granby interests have been very desirous of placing the Hidden Creek property on a productive basis without the issue of any new securities, it may be decided to do some new financing, although this has not yet been definitely determined.

### WETTLAUFER COMPANY.

At the annual meeting of the Wettlaufer mine of Cobalt, Ont., it was shown that the company shipped 925,017 ounces of silver during the year, giving a total receipt of $481,368. During the twelve months, 2,179 feet of development work was accomplished and some excellent values were encountered in various parts of the workings.

The production, development, administration and expenses for the year were $167,977, leaving a profit for the year of $313,390. Out of this amount dividends amounting to $212,488 were paid, leaving a surplus of $100,902. The previous surplus on the books of the company was $121,908, making a total on December 31st of $222,810.

The general balance sheet of December 31st, 1911, shows assets as follows: Mine property, $1,382,602; plant and machinery, $36,964; buildings, $17,061; ore in hand and in transit, $92,430; inventory, $12,105; accounts receivable, etc., $1,075; cash on hand, $128,279, or a total of $1,671,518. The liabilities were: Capital stock, $1,416,590; accounts payable, $22,087; reserve for taxes, etc., $10,030; profit and loss surplus, $222,810.

President Harry Lockhart, in his report to the shareholders says in part: "The underground development during the year has been satisfactory and the policy inaugurated during the past year of keeping reserves well ahead of extraction will be continued. The discovery of a new ore body on the fourth level has added materially to the value of the property." General Manager Halstead Lindsley places the ore reserves at 1,003,000 ounces, and in his report says: "There were shipped 925,017 ounces during the year and 2,179 feet of development work was accomplished. The positive ore reserves are estimated to contain 1,003,000 ounces. No estimate of probable ore has been attempted, but it is likely that development in the new ore body will materially increase the reserves within the near future."

The directors made the announcement at the meeting that quarterly reports would be issued to the shareholders in future.

# STATISTICS AND RETURNS

### B. C. ORE SHIPMENTS.

The shipments to the Trail smelter are over 1,000 tons heavier this week (ending May 4th) than last. The Trail smelter passed the 100,000 ton mark, the B. C. Copper Company the 200,000 ton and the Granby the 400,000 ton.

The Granby blister copper shipments were 440,000 pounds, making 7,458,500 pounds for the year to date.

In some districts the roads are clearing up, as evidenced by the resumption of shipments by the Rambler-Cariboo and the Silver Cup. Leasers made shipments from the S. & F. at Rossland and the Molly Hughes at New Denver. The Standard and

Molly Gibson both shipped a heavier tonnage than for some time past.

Ore production and shipments to Consolidated:

| | Shipments For week. | Shipments To Date. |
|---|---|---|
| **Rossland—** | | |
| Centre Star | 3,673 | 54,877 |
| Le Roi | 1,088 | 16,542 |
| Le Roi No. 2 | 735 | 10,635 |
| Bluebird | .... | 57 |
| I. X. L. | 12 | 12 |
| **East Kootenay—** | | |
| Sullivan | 365 | 9,303 |
| St. Eugene | .... | 401 |
| Society Girl | .... | 21 |
| **Ainsworth—** | | |
| Utica | .... | 132 |
| No. 1 | .... | 330 |
| Silver Cup (Lardo) | 31 | 117 |
| Monarch (Field) | 32 | 208 |
| **Foreign—** | | |
| Knob Hill | 151 | 1,401 |
| Hope | .... | 20 |
| Northport | .... | 34 |
| Bonanza | .... | 80 |
| Halley | .... | 30 |
| Total | 6,633 | 102,697 |
| Granby | 23,469 | 414,099 |
| **Slocan—** | | |
| Standard | 309 | 3,261 |
| Van Roi | 31 | 1,261 |
| Hewitt | .... | 90 |
| Ottawa | .... | 28 |
| Eastmount | .... | 51 |
| Fidelity | .... | 61 |
| Apex | .... | 36 |
| Richmond-Eureka | .... | 7,473 |
| Rambler-Cariboo | 34 | 445 |
| Reco | .... | 24 |
| Lone Batchelor | .... | 31 |
| Ruth | .... | 259 |
| Middleton | .... | 24 |
| Molly Hughes | 7 | 7 |
| Other mines | .... | 228 |
| **Nelson—** | | |
| Canadian King | .... | 54 |
| Arlington | .... | 670 |
| Nugget | .... | 44 |
| Granite-Poorman | .... | 100 |
| Queen | .... | 100 |
| Emerald | .... | 853 |
| Vancouver | .... | 17 |
| Devlin | .... | 11 |
| Molly Gibson | 165 | 753 |

| | Shipments For Week. | Shipments To Date. |
|---|---|---|
| **B. C. Copper Company—** | | |
| Motherlode | 5,750 | 134,396 |
| Rawhide | 5,709 | 58,714 |
| Emma | .... | 4,650 |
| Athelstan | .... | 357 |
| Jackpot | 408 | 6,274 |
| Unnamed | 416 | 2,943 |
| Total | 12,283 | 207,734 |

## COBALT ORE SHIPMENTS.

Fourteen mines shipped ore from Cobalt for the week ending May 4th, establishing a record for the year. The total shipments were 22 cars, 17 of which were high grade.

The total shipments for the week were 1,427,549 pounds, or 713 tons.

The shipments for the week and year (in pounds of ore) were:

| | Week. | Year. |
|---|---|---|
| Beaver | 66,700 | 250,658 |
| Buffalo | 62,782 | 886,354 |
| Can. Gowganda | ..... | 15,967 |
| Casey Cobalt | ..... | 549,000 |
| Chambers-Ferland | 63,300 | 323,500 |
| City of Cobalt | ..... | 291,712 |
| Cobalt Lake | 80,509 | 351,189 |
| Cobalt Townsite | 104,900 | 863,994 |
| Colonial | ..... | 40,000 |
| Coniagas | 242,600 | 1,471,376 |
| Crown Reserve | ..... | 382,204 |
| Drummond | ..... | 604,000 |
| Hudson Bay | ..... | 500,979 |
| Kerr Lake | 123,733 | 617,015 |
| La Rose | 152,705 | 2,424,660 |
| Mann (Gowganda) | ..... | 40,000 |
| McKinley | 71,136 | 1,932,878 |
| Millerett | ..... | 156,000 |
| Miller Lake-O'Brien | ..... | 146,500 |
| Nipissing | 147,509 | 1,496,495 |
| O'Brien | 63,865 | 462,835 |
| Provincial | ..... | 44,440 |
| Temiskaming | 120,528 | 685,097 |
| Right of Way | 76,600 | 296,896 |
| Trethewey | 54,364 | 326,999 |
| Wettlaufer | ..... | 216,470 |

## DOMINION STEEL.

The April output of the Dominion Steel Company was: Coke, 42,495 tons; pig iron, 25,610; steel ingots, 29,710; blooms, 24,915; rails, 15,980; rods, 3,963; total shipments 17,585. The output at the Sulphate of Ammonia plant was 485 tons, a record, the best previous being 468 tons.

# SHARE MARKET

(Courtesy of J. P. Bickell and Company, Standard Bank Building.)

May 8th.

**New York Curb.**

| | Bid | Ask |
|---|---|---|
| Braden | 5⅜ | 5½ |
| B. C. Copper | 5 | 5⅜ |
| Bute Coal | No Market. | |
| Giroux | 5½ | 5⅝ |
| Greene-Cananea | 8⅝ | 8¾ |
| Inspiration | 8½ | 8¾ |
| Yukon Gold | 3⅜ | 3½ |

| | Bid | Ask |
|---|---|---|
| Goldfield Cons. | 4 | 4⅛ |
| Nevada Cons. | 21⅛ | 21⅜ |
| Miami | 24⅝ | 25 |
| Ray Cons. | 18½ | 18⅞ |
| Chino | 28⅝ | 28⅞ |
| United Copper. | 1 | 1 3/16 |

### Cobalt Stocks.

| | Sales. Low | High |
|---|---|---|
| Bailey | .01¾ | .02⅛ |
| Beaver Consolidated | .45 | .46½ |
| Buffalo. | 1.20 | 1.25 |
| Chambers-Ferland. | .15½ | .18 |
| City of Cobalt | .15 | .18 |
| Cobalt Lake | .25¾ | .27 |
| Coniagas. | 7.00 | ..... |
| Crown Reserve | 3.10 | 3.25 |
| Greath Northern | .11½ | .13 |
| Gould. | .02½ | .03 |
| Gifford. | .03 | .04½ |
| Green-Meehan. | .01⅜ | .01¾ |
| Hargraves. | .05 | .07 |
| Kerr Lake | 2.75 | 2.85 |
| La Rose | 3.55 | 3.90 |
| McKinley-Daragh | 1.69 | 1.70 |
| Nipissing. | 7.70 | 7.90 |
| Nova Scotia. | .01½ | .04 |
| Ophir. | .11 | .12 |
| Otisse. | .01⅜ | .01¾ |
| Peterson | ..... | ..... |
| Right of Way | .10 | .12 |
| Silver Leaf. | .03½ | .05 |
| Silver Queen. | .02 | .04 |
| Temiskaming. | .38½ | .39½ |
| Tretheway. | .54 | .57 |
| Wettlaufer. | .65 | .67 |

### Porcupine Stocks.

| | Sales. Low | High |
|---|---|---|
| Apex. | .03½ | .05 |
| Dobie | .50 | .75 |
| Crown Chartered | .25½ | .26 |
| Dome Extension | .52 | .52½ |
| Eldorado. | .04 | .06 |
| Foley-O'Brien. | .18 | .22 |
| Hollinger. | .12 | .12½ |
| Jupiter. | .35½ | .37 |
| Moneta. | .14 | .15 |
| Nor. Ontario Exp. | .02½ | .04 |
| North Dome | .50 | 1.00 |
| Pearl Lake | .17 | .20 |
| Porcupine Imperial | .04 | .05 |
| Porcupine Central | .70 | 1.00 |
| Porcupine Northern | .15 | .35 |
| Porcupine Tisdale | .03¼ | .03½ |
| Porcupine Southern | .10 | .25 |
| Preston East Dome | .06 | .07 |
| Rea Mines. | .55 | .70 |
| Standard | .03 | .04 |
| Swastika | .20 | .21 |
| Vipond | .39 | .41 |
| United. | .01¾ | .02½ |
| West Dome | .15 | .25 |
| American Goldfields | No Market. | |

### Sundry.

| | Low | High |
|---|---|---|
| Island Smelters. | .10 | .10¾ |
| Canadian Marconi. | 7.40 | 7.80 |

## TORONTO MARKETS.

May 9 (Quotations from Canada Metal Co., Toronto)—
Spelter, 6.50 cents per lb.
Lead, 4.50 cents per lb.
Antimony, 8 to 9 cents per lb.
Tin, 47 cents per lb.
Copper, casting, 16.25 cents per lb.
Electrolytic, 16.25 cents per lb.
Ingot Brass, 7 to 12 cents per lb.

May 9—Pig Iron (Quotations from Drummond, McCall & Co., Toronto)—
Summerlee No. 1, $23.00 (f.o.b. Toronto).
Summerlee No. 2, 22.50 (f.o.b. Toronto).
Midland No. 1, $19.75 to $20.50 (f.o.b. Toronto).
Midland No. 2, $19.75 to $20.50 (f.o.b. Toronto).

## GENERAL MARKETS.

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

### Coke.

May 7—Connellsville coke (f.o.b. ovens).
Furnace coke, prompt, $2.40 to $2.50 per ton.
Foundry coke, prompt, $2.75 per ton.
May 7—Tin, Straits, 45.70 cents.
Copper, Prime Lake, 15.85 cents.
Electrolytic Copper, 15.75 cents.
Copper wire, 17.00 cents.
Lead, 4.20 cents.
Spelter, 6.85 cents.
Sheet zinc (f.o.b. spelter), 8.65 cents.
Antimony, Cookson's, 8.00 cents.
Aluminum, 19.50 to 20.00 cents.
Nickel, 39.00 to 40.00 cents.
Platinum, ordinary, $46.00 per ounce.
Platinum, hard, $48.50 per ounce.
Bismuth, $1.80 to $2.00 per lb.
Quicksilver, $41.00 per 75-lb. flask.

## SILVER PRICES.

| | New York cents. | London pence. |
|---|---|---|
| April 23 | 59⅝ | 27 7/16 |
| April 24 | 60½ | 27⅞ |
| April 25 | 60⅜ | 27 13/16 |
| April 26 | 60¾ | 28 |
| April 27 | 60⅜ | 27 13/16 |
| April 29 | 60⅝ | 27 15/16 |
| April 30 | 61¼ | 28 3/16 |
| May 1 | 61¼ | 28 3/16 |
| May 2 | 61 | 28⅛ |
| May 3 | 60⅞ | 28 1/16 |
| May 4 | 60⅝ | 27 15/16 |
| May 6 | 60⅛ | 27 11/16 |
| May 7 | 60¼ | 27¾ |