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CIRCULATION.

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FREE TRADE IN COAL.

The principal desideratum in discussing questions of public interest is that there be first of all a correct conception of the issue or issues under consideration. Superficial views, arguments based upon incomplete and inaccurate knowledge, are equally mischievous. And it must always be remembered that we have to deal with things as they are. Neither the weakness of opportunism nor the counsel of perfection is needed. If any situation be fully and fairly presented, it is robbed at once of half its danger.

It is not our intention here to attempt an adequate outline of the question of free trade in coal between the United States and Canada. We hope in later issues to take the subject up in as exhaustive a manner as possible. Just now, however, it is intended merely to indicate a few facts that are apt to be overlooked.

The coal industries of Nova Scotia, as has been mentioned specifically in a former editorial, provide a livelihood, directly and indirectly, for many thousands of people. They furnish almost fifty per cent. of the revenue of the province. They have been built up, under competitive conditions, to supply a Canadian demand with a Canadian article. In developing the St. Lawrence trade large discharging and storage plants have been erected at Quebec and Montreal, and the market has been held with difficulty, in spite of the tax against United States coal.

The trade with the Atlantic States is less than five hundred thousand tons. The St. Lawrence trade is considerably more than two millions of tons per annum. Both markets are competitive.

It is admitted that free trade in coal would force Nova Scotia to abandon the St. Lawrence market and confine her attention to the New England and other Atlantic coast States. Is this exchange fair? What would it mean immediately? What would it mean in the more distant future? And, most vital of questions, to whom would the benefit of the exchange actually accrue?

We shall not attempt to answer these questions finally. It will suffice to point out once more that the United States domestic market is now in a very poor condition, and that United States producers are prepared to swamp their Canadian competitors in both markets. This would mean temporarily cheaper coal to Canada. It would also mean huge permanent loss to investors in Nova Scotian collieries, distress and want to thousands of Canadian citizens, and, probably, the destruction of Nova Scotia's most important industry. Incidentally, the development of New Brunswick's coal fields would be indefinitely postponed. Millions of Canadian money would go to the United States.

Cheaper coal would be an incalculable boon to Ontario manufacturers. The removal of the present import tax is, however, no guarantee of cheaper coal. Ontario is not a competitive market.

The surrender of our Eastern markets to the United States can, therefore, be compared to certain diplomatic bargains that are matters of Canadian history.

On the other hand, the opening of the Western States to the free importation of coal and coke from Alberta and British Columbia appears to be inevitable. Our Western Provinces have the coal; the Western States have the market, and only negligible coal deposits of their own.

Canada is fast attaining nationhood. Canada will never reach a position of importance in any way commensurate with the richness of her natural resources until Canadians have learned that these resources are not exhaustless—that they must be conserved wisely and well. We have wasted our forests, we have depleted our fisheries, we have sold part of our coal lands in the West for a mess of politics.

When our powerful neighbour to the south yearns for admission to our market, we can, without discourtesy, demand time for full investigation.

Commercial independence is not without its value. A group of gentlemen at Washington need not be reminded of this.

ELIMINATION OF POLITICS.

In governmental departments, especially in those that employ technical workers, whatever makes for appointment of new officers on their merits makes also for the good of the service. Political influence is the fly that causeth the ointment to be unsavory.

We are gratified to note that political influence is not a factor in appointments made to the staff of the Geological Survey of Canada. Whatever may have been the case in the past, at all times it must have been most repugnant to directors to have unqualified assistants foisted upon them.

The Director of the Geological Survey has issued a short, pointed, and unequivocal form of regulations governing the appointment of assistants to field parties, positions much coveted by youths ambitious and otherwise.

All assistants must have passed at least their second year examinations in the special departments of geology, mining engineering, or surveying, in a Canadian mining school or university, or some other approved higher educational institution, before taking the field. They must be men of good physique. Preference will be given to those with some knowledge of bush work.

Amongst other restrictive clauses, the most important is this: "Each applicant must sign a statement with his application that it is his intention to become

a professional geologist, mining engineer or topographer."

"These regulations," announces the circular, "must be adhered to."

This action should meet with strong approval. Canadian universities are turning out scores of mining and geological graduates. Second and third year men are every summer looking for suitable employment. Heretofore it has not been unusual to find Geological Survey parties recruited with medical students, budding theologians, embryonic lawyers, and unlabelled nondescripts. Vigour, tone, and permanence will be lent to the service by keeping its ranks free from rank outsiders.

NOVA SCOTIA'S MINING REPORT.

A gratifying improvement over its predecessors is noticeable in the annual report of the Department of Mines of the Province of Nova Scotia for 1908. Typographically and in all other respects the 1908 report is distinctly superior to those of other years. This is no small matter. It means, first of all, that the Department is bestirring itself. Also this report will arouse far more interest than would have been possible had the old form been adhered to.

Nova Scotia has large and varied sources of mineral wealth. Providence has ordained that the winning of this wealth should not be easy, and that each of the Province's mineral industries should have its own difficulties and hindrances. The people of Nova Scotia are able to work out their own destiny. If they are to succeed in building up a mining industry that shall be commensurate with Nova Scotia's natural resources, they must grapple earnestly with fundamental problems. The men at the head of their Department of Mines are thoroughly familiar with the needs of the industry. The Department itself needs the vigorous support of an awakened public.

MINING ACCIDENTS.

Mr. Ralph Stokes, whose letter appears on another page, has visited nearly all the more important districts of the British Empire. As a representative of a group of South African, English, and United States papers. Mr. Stokes undertook, a few years ago, to visit and describe the mines of the British Empire. His large and entertaining volume, "Mines and Minerals of the British Empire," has already assumed a place in the world of technical literature. Equally is it a useful record of travel in unfrequented ways.

Mr. Stokes refers to "the influence of more capable and scientific supervision," as indicated by "the large decrease of accidents due to explosives, which class of mishap is above all attributable to carelessness or inefficiency."

THE McCHARLES PRIZE.

The late Aeneas McCharles, a native of Cape Breton and for many years a citizen of Sudbury, Ont., was deeply impressed with the importance of improving our modern means of extracting metals from their ores, or of treating minerals generally. To stimulate Canadians to attack the problems of metallurgy and ore-dressing, Mr. McCharles set apart in his will a fund of sufficient bulk to provide a prize of \$1,000 to the Canadian who does most in any one year to advance the sciences mentioned above.

The drafting of regulations was left in the hands of the Board of Governors of the University of Toronto. These are printed on another page, and should be read carefully.

The McCharles prize should set every young eligible Canadian thinking.

A RESOLUTION.

The following resolution has been forwarded to Ottawa by Secretary Hayward:—

“The Mining Society of Nova Scotia beg to congratulate the Government of Canada on the resumption of the important portfolio of Minister of Mines by the Honourable William Templeman, and have confidence in assuming that the vigorous and wise policy which has brought such signal and beneficial service to the Western Provinces will be extended to Nova Scotia.”

In connection with the above we are informed that the Minister of Mines intends to visit Nova Scotia officially during the current year.

Mr. R. B. Watson, manager of the La Rose and Nipissing, paid a visit to Gowganda recently to look over some of the prospects.

PROBABLE EFFECT OF THE ACREAGE TAX ON MINING LANDS IN ONTARIO.

Paper read by G. R. Mickle before the Canadian Mining Institute, Montreal Meeting, March, 1909.

In order to estimate the effect the acreage tax levied by the Supplementary Revenue Act, 1907, will have, it is necessary to understand not only this Act, but also the conditions under which mining lands have been patented or leased from time to time in Ontario. This Act imposes a tax of two cents per acre on all lands patented or leased for mining purposes, situated in territory having no municipal organization. The tax is a statutory one, no notice or tax bill is, therefore, required. A penalty of 10 per cent. attaches if the tax is not paid by the date specified (October 1st, each year), and after a certain time the lands in default with regard to taxes are forfeited after notice is published in the Ontario Gazette. The Act requires that a tax roll should be prepared showing all the lands taxable. This will be referred to frequently in the course of this paper.

A synopsis of the various Acts and regulations is given in Volume II, Report of Bureau of Mines. Previous to 1867, when Ontario was formed into a separate province, mining lands were disposed of under Orders-in-Council. It was intended originally to grant five square miles, or 3,200 acres, but this was never carried out, and the first grant of land as mining land was in a location of ten square miles, or 6,400 acres, the block being 5 x 2 miles, five miles being laid out along the supposed course of the vein. In those days they must have had great veins. The first “location” granted in this way was the Cutherbertson (Bruce Mines), containing 6,458½ acres, and the patent is dated at Quebec on the 5th October, 1852. In the case of islands or areas broken by any natural obstacle, the location might exceed or be less than 6,400 acres, and accordingly there appear on the tax roll to-day 22 locations containing in all 132,685 acres, the largest being 9,793 acres and the smallest 1,130. The land was sold at 80 cents per acre, and payments spread over a number of years. Priority of discovery was a first requirement.

In 1853 the regulations were changed so that by securing a license to explore good for two years and

costing \$100.00 the licensee might secure an area not exceeding 400 acres, which must afterwards be purchased at \$1.50 per acre. Subsequently the license fee was abolished and the land went to the first applicant under working conditions. These conditions were afterwards eliminated. In 1864 the Gold Mining Act was passed (27 Vict., Chap. IX.) by the Legislature of the United Provinces. This Act was occasioned by the gold excitement on the Chaudiere and other rivers in Quebec, and provided for the setting aside of mining divisions wherein licensees might stake out claims of small area (less than one acre). Under the regulations existing from 1853 to 1869 about 35,000 acres of land were granted in parcels of 400 acres or thereabouts, which now appear on the tax roll. The area of these locations in organized territory has not been ascertained.

In 1869 the first really important Mining Act was passed in Ontario (32 Vict., Chap. 34). The area of mining locations was fixed at 320,160 or 80 acres. Regulations were also contained in this Act for the declaration of Mining Divisions as in the Act of 1864, the area being 200 feet square or about one acre. Neither discovery or work was required to hold mining lands acquired by purchase, the Act simply stating “Crown Lands supposed to contain mines or minerals may be sold as mining lands,” or they might be worked as mining claims if in a declared mining division.

In 1891 the Public Lands Act (54 Vict., Chap 7) was amended, so that the mineral rights were declared reserved in grants of land for agricultural purposes, even if the reservation was not expressly mentioned.

The Mines' Act, 1892 (55 Vict., Chap. 9) is the next important one, no substantial change was made in the size of the locations except that they might be 320, 160, 80 or 40 acres. The system of leasing whereby a part of the rental money might be applied on purchase was made a feature of this Act. Working conditions were included (\$4.00 per acre during 7 years). The provisions regarding mining claims staked by licensees in

mining divisions were retained, the area being from 5 to 20 acres, according as one or more persons were involved.

By the Act of 1897 (60 Vict., Chap. VIII.), discovery was introduced and the amount of land one person might apply for in one year was restricted. Working conditions were maintained.

By the Mines' Act of 1906 (6 Edward VII., Chap. XI.), the whole province where any Crown lands were left was divided into mining divisions. (See Section 79.) The mining location, therefore, automatically disappeared and the mining claim is limited to a maximum of 40 acres. The time in which the purchase price may be paid is three years after application. By the Act of 1897 in the case of mining locations it was three months. (Sec. 37.)

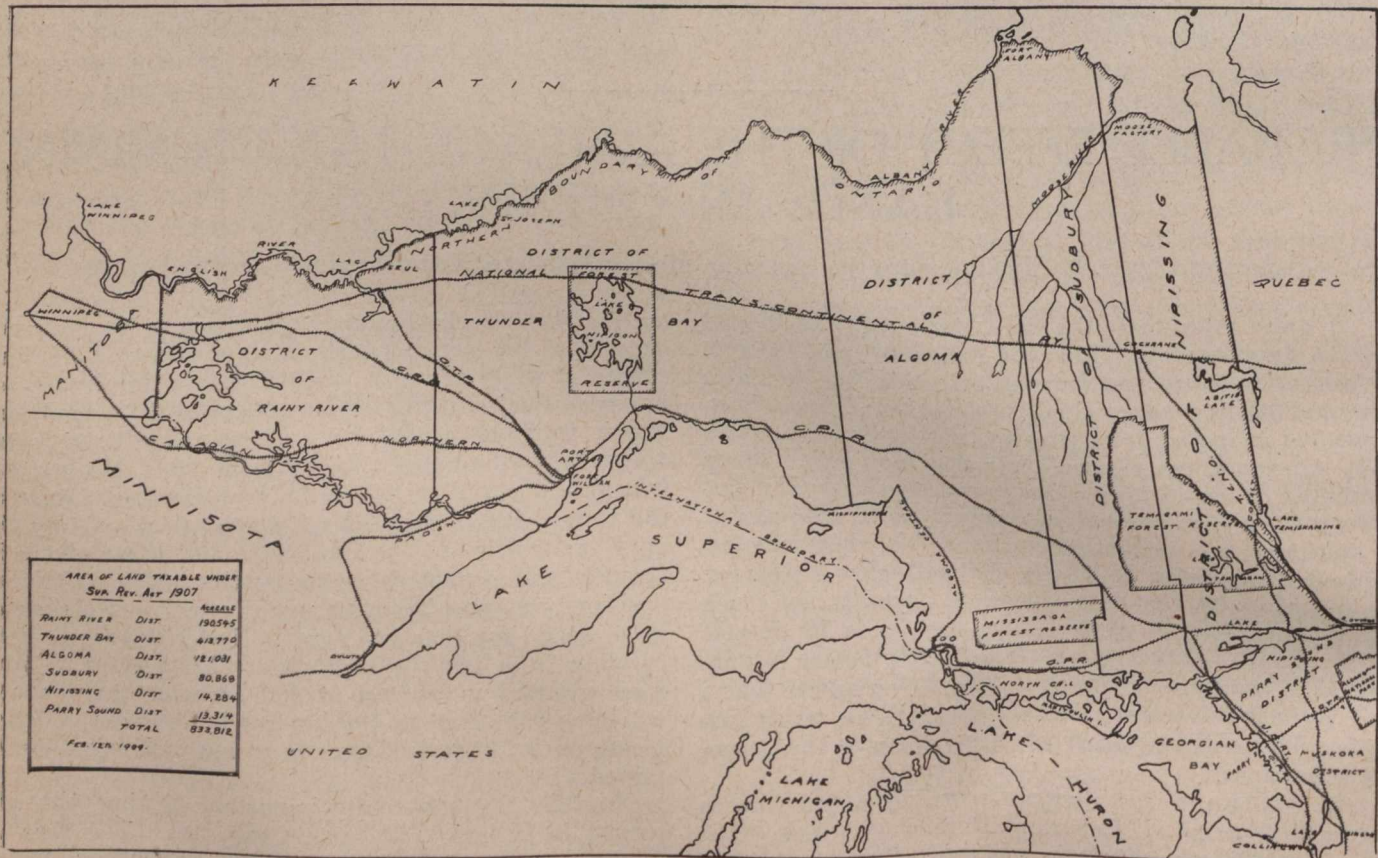
It was stated above that only lands in territory with

land is not suited for agriculture and mining is not actively pursued, no stable population can exist and no municipalities can be formed, and the land, therefore, remains on the tax roll. In general, therefore, a large taxable acreage indicates a backward state of mining.

Coming now to the map, in which the Judicial districts have been adopted in dividing up the province, as these are more likely to remain unchanged for a time than the mining divisions, the acreage of taxable land is given in each.

In Rainy River District the maximum size of any location is 320 acres except in case of broken fronts. Nearly all this land was taken up during the gold excitement of 1896 to 1900. There are also a great many acres bought for iron lands.

Thunder Bay contains about half the total taxable area of the Province, and includes most of the large



Map of Northern Ontario, showing area of lands taxable under Supplementary Revenue Act, 1907.

no municipal organization was taxable. In order to form a municipality it is necessary to have a certain minimum of population; thus the "Act respecting the Establishment of Municipal Institutions in Territorial Districts" (Chap. 225, R.S.O. 1897, Vol. 2) provides that a surveyed township or unsurveyed territory not exceeding 20,000 acres in area and with a population of not less than 100 persons may be formed into a municipality on petition of not less than 30 persons to a district Judge, who is required to call a meeting. At this meeting not less than 30 freeholders or householders must be in favor of forming the municipality. It requires therefore a population of a stable character such as can only exist where there is steady occupation. Lumbering operations, for instance, except those in connection with manufacturing lumber, are not likely to produce the necessary conditions and there remain then practically only agriculture and mining. If the

locations of 6,400 acres mentioned before. The balance of these are in Algoma. As stated before, there are 22 of these immense locations on the tax roll, containing in all 132,685 acres. Seven more than this were patented with 42,418 acres which are now within organized municipalities, making 175,103 acres granted in this lavish way. These seven large locations (6,400 acres) happened to be situated where there was agricultural land and it is due to this that there was sufficient population to form municipalities.

The same conditions hold true in Algoma to a lesser extent. In this district there is also a large area of Indian lands which have been patented by the Dominion Government. As the form of patent does not convey the mineral rights expressly, and gold and silver are reserved in the Dominion Lands Act, it has been held that Indian lands are not taxable under the Supplementary Revenue Act.

In the Sudbury district more municipalities have been formed, many of the townships having sufficient stable population to organize municipalities, solely or mainly on account of the mining industry.

Nipissing, which includes the Temiskaming and Montreal River mining divisions, where there has been such a great mining activity for the last three or four years, shows a very small taxable area comparatively. This is due to several reasons. In the first place most of the mining land has been staked under the Act of 1906, according to which, after staking, a mining claim may be held for three years without patenting provided the working conditions are fulfilled, consequently these claims do not appear on the tax roll. Then a great deal of the land that was applied for previous to 1906 was under the regulations governing mining divisions in the Act of 1907. A claim, therefore, could not exceed 40 acres. Moreover, the successful mining operations have attracted a population sufficient to form municipalities and consequently many of the claims patented would not be found on the provincial tax roll. More municipalities will doubtless be organized, and even when a proportion of the great number of claims now existing are patented, there will probably be no very great area subject to provincial taxation for any length of time.

The Larder Lake section, although something like 4,000 claims were staked there, shows very few patented ones, although it is over two years since the heavy claim-staking took place there.

In Parry Sound, to which Muskoka is added, a great many acres have been bought as mining lands by lumbermen previous to 1897. This was only done to secure sufficient land to pasture their stock. If applied for as agricultural land settlement duties would have been required and only a limited area of 200 acres would be granted.

The effect of this acreage tax cannot be fully determined till the time for forfeiture arrives. According to the Act the earliest date at which that can take place is the 30th June, 1910. At the present time a little over half the total area is in good standing with regard to taxes. Judging from the correspondence received and the way payments come in most of the owners intend to retain their mining lands. As a maximum I would consider 200,000 acres might be forfeited and a minimum of 100,000. In some cases the land belongs to insolvent estates, it is, therefore, not in the interest of anyone in particular to keep up the taxes. In many instances also, the owners acquired the land in time of an excitement and have lost all interest in it now.

Translation of Article by O. Stutzer, of Freiburg, in the "Zeitschrift Fur Praktische Geologie," December, 1908.

In the beginning of May of this year I visited the great cobalt-silver deposits of Temiskaming in Canada. These deposits are fully described by Dr. Miller in his well-known report, "The Cobalt-Nickel Arsenides and Silver Deposits of Temiskaming," 1908.

In Cobalt they regard the diabase which occurs there as the source of the ore, and this belief is founded on the close relations which exist between the diabases and the ore veins in that district. Moreover, the occurrence in Sudbury strengthens this belief, as the nickel ore there occurs in norite, which is a rock closely allied to the diabases. The only other eruptive rock known in Cobalt is the granite. This granite was even in pre-Huronian time partly solidified, but remained active for considerable length of time in greater depths, as can be seen from the younger granite dyke in the southwest corner of the University mine at Giroux Lake. Here the diabase is cut through by the granite. In this granite area I suspect the source of the cobalt-silver ores. The analogy with other occurrences of this type of ore, where the granite is the source of the cobalt-silver ores, leads one to this, and especially may be mentioned the similar occurrence in the Harz Mountains, Joachimsthal, and Annaberg and Schneeberg. The source of the ore there is the granite of Eibenstock, which is rich in alkalis. Also Chalanches, in France, and Wittichen, in Schwarzval. The granite is probably connected genetically with the cobalt-silver ores.

Of further interest is the question of the influence of the country rock on the ore bodies. It is known in Cobalt that the veins in diabase and in the deeper lying Huronian conglomerate carry silver, but in the still deeper lying Keewatin there is generally only cobalt and nickel. Miller explains this, page 33 of his report, third edition, somewhat in the following manner:—

After the deposition of the cobalt-nickel arsenides the cracks were split open again, and so prepared a

way for the percolation of the silver-bearing solutions and deposition of silver.

The rocks of the Keewatin are tougher than those of the Huronian, and therefore this second cracking was confined to the latter rock, that is, Huronian. In consequence of this we find the silver ores only in the higher-lying series of rock. The source of the silver-bearing solutions is not regarded in this supposition as a leaching product of rocks which lie higher, but as a primary deposit of post-volcanic springs in connection with the eruption of the diabase.

According to my view, the origin of the cobalt-nickel-silver ores is not divided in point of time, although most silver and calcite belong to the youngest minerals in the vein. One can collect hand-samples in which the silver is intimately inter-grown with smaltite, which only permits a simultaneous formation of both minerals. As an example of this may be mentioned some pieces of ore in the Trethewey vein. In these pieces it is seen especially well in thin sections, the aborescent silver forms being embedded in the massive smaltite. The shape of the solid silver resembles dendritic forms. It cannot be regarded, however, as a thin deposition of silver in a crack.

If we suppose that there is a relatively simultaneous origin of the different ores, then where we have cobalt-nickel ores we should have silver, too, but that is not the case. In the diabase and in Huronian we find silver, but generally not in the Keewatin, and I was even told that on passing from the Huronian conglomerate to the Huronian slates the silver values are lost, but appear again on coming back into the Huronian conglomerate. The country rock must, therefore, in Cobalt, have had an influence on the precipitation of the ore out of the solutions. This brings to mind the fahlbands of Kongsberg, in Norway. Those fahlbands are zones of rock impregnated with pyrites, which are cut through by

ore veins. The veins are rich in silver only at the junctions with the fahlbands. This phenomenon is best explained as the consequence of electrolytic process. The electrical currents in the earth circulated most intensely through the zones of rock which are impregnated with pyrites and precipitated electrolytically the ores out of the solutions.

In Cobalt the diabases and the different conglomerates perhaps acted as precipitants. The diabase carries a good deal of magnetite, and the Huronian conglomerate has in places a considerable amount of pyrites. This supposition is, however, not entirely satisfactory, as there is a good deal of diabase material in the Keewatin. The Keewatin is certainly decomposed and greatly folded or sheared. At any rate, it would be an interesting task to test the electrical conductivity of the different rocks of Cobalt on the spot.

Comments on Mr. Stutzer's Article.

It is easily seen that Mr. Stutzer understands the points to which attention should be paid in a camp like Cobalt. His visit was, however, brief, and the regional geology new to him, hence it is not surprising that some of his conclusions should not be correct. For instance, he says that "This granite (Laurentian) was, even in pre-Huronian time, partly solidified," etc. The granite was not only solidified, but it and the Keewatin series were subjected to profound erosion. The granite dike of the University property, to which Mr. Stutzer refers, belongs to a much later period of eruption. It is considered to represent the acidic residue of the post-Middle Huronian diabase. Similar dikes are quite numerous in the Montreal River area. A vast period

of time elapsed between the intrusion of the Laurentian granite and that of the granite dike of the University.

Mr. Stutzer infers that "granite is the source of the cobalt-silver ores." Of course this has been the accepted theory in Europe, but anyone who has carefully studied the association of diabase with these ores in Ontario is forced to conclude that the metals were contained in the original diabase magma. When the Cobalt district was first studied it was only to be expected that these somewhat unique ore deposits would be compared with those to which Mr. Stutzer refers in Europe. It was well known what explanation had been given as to the source of the metals, but experience of deposits over a wide area in Ontario shows that the European theories of origin are not applicable, at least, to the Ontario deposits.

Mr. Stutzer refers to the possible influence which country rock may have had on the ore bodies. This point was carefully studied at Cobalt, but it was decided that the country rock had no special significance. Much of the Huronian slate and conglomerate is similar in composition to the Keewatin, from which a large percentage of the material in the Huronian has been derived by erosive agencies. Hence if the Huronian is proved to be a good precipitant for such solutions the Keewatin should have a similar effect. There is no doubt that there have been two periods of disturbance, but the cobalt and nickel were not all deposited in the veins during the first period. The solutions gradually changed; some of the silver components, such as the silver sulph-antimonide and arsenic which occur in small quantities, may belong to the earlier period of decomposition. Much the greater part of the silver was deposited after the second period of disturbance.

EARL GREY'S ADDRESS AT THE C.M.I. ANNUAL DINNER.

His Excellency said he was glad to be able to attend the annual dinner of the Canadian Mining Institute. It was a comparatively young organization, but growing rapidly. In 1898 it had only 63 members; now it had nearly 900.

The mining industry of Canada had only just begun. Until recently, agriculture was the sole industry. The first prospectors and miners were necessarily agriculturists, with no knowledge of mining; consequently mining propositions which under good management and transportation facilities would have been successful, turned out failures, owing to the want of transportation, skilled workers, and intelligent direction. These deficiencies, which interfered with successful mining a few years ago, were now to a great extent removed.

That great Canadian, Professor Grant, whose influence has left so deep an impression on the life of Canada, recognized the want of a school of mining. He opened a school at Kingston in 1893, which has exerted a marked influence on technical education in this country. The mining departments of McGill and Toronto have also done much to supply trained men to intelligently develop the country's mineral resources.

The mineral production of \$10,000,000 twenty years ago had nearly trebled to \$28,000,000 in the next ten years, and that amount had again more than trebled in the last decade to \$86,000,000 for 1907.

The mining industry, like all others, has been checked in its rate of growth in the year 1908 owing to financial stringency and lower prices of silver, lead and copper, but the output of 1908 had exceeded that of 1907, and nothing could be more certain than that the increase in the total value of minerals produced in Canada during the next twenty years would be as great as that which had taken place in the last twenty years.

He understood the object of the Institute was to place the mining industry of Canada upon an efficient and honest basis; to meet both professional and educational requirements; to educate the prospector as well as the mining engineer; to turn out technical men; to provide them with opportunities for exchanging their views and studying each other's methods; and to make the full membership of the Institute a guarantee of both knowledge and, what was far more important, character.

He was informed that the members of the British and foreign mining associations who visited Canada in 1908 had been greatly impressed with the extent of unprospected area in the Dominion, with the magnitude of operations, and with mechanical appliances in operation at Grand Forks and other places. The visit had been mutually advantageous. The visiting experts made some practical suggestions, and also acquired some good ideas.

One result of the visit of the British Mining Associ-

ation, of great benefit to Canada, would be that trustworthy information about Canadian mining propositions would now be obtainable in London, with the result that the mineral industry of Canada would be better safeguarded than hitherto against artificial booms, followed by unjustifiable slumps.

His Excellency, while confessing that his personal sympathies were more with agriculture than with mining, willingly admitted that there was no industry which contributed more to the general prosperity of a country than mining. Successful mining involved increased demand for the employment of capital and labor, increased industrial developments, increased commercial activity, increased land settlement, increased railway traffic and increased national prosperity.

Although the mineral output of Canada was at present only \$12.71 per head of the population, and the agricultural output \$63.90 per head, it was quite possible that these proportions might some day be reversed.

They had, close behind them, the largest bit of unprospected country left in the world. Of the "pre-Cambrian" formation, measuring 2,000,000 square miles and covering half of Canada, they only as yet knew a little about the southern fringe. Although the existence of silver was known at Temiskaming 150 years ago, the discovery of Cobalt was only made in 1903. This discovery was an accidental result of railroad construction, as were also the nickel mines of Sudbury and the asbestos mines of Quebec, notwithstanding that the existence of asbestos had been known for some time.

Although they had only combed a little bit of the southern fringe of this great ore field, they had combed out of this southern fringe the Cobalt silver mines, the nickel mines at Sudbury, the Lake Superior iron mines—the greatest iron mines in the world, and the Michigan copper mines, which occur in the same formation which has flowed over from the Laurentians into the United States.

The rich results that had followed the partial prospecting of the southern fringe of the pre-Cambrian formation justified the expectation that in the unopened cupboard of their treasure house was greater wealth than that which had been already revealed to them, and it was quite possible that the mineral wealth of the Appalachian and Cordilleran ranges was greater still. No one could form an estimate of the riches in the unopened treasure houses of Canada. It was, however, certain that the development of the untouched mines meant great material prosperity for Canada.

The development of a silver camp meant more consumption of timber, coal, coke and limestone; more freights, more machinery, more chemicals, more miners' supplies—all involving an increase of business and of railway traffic, and a consequent advance in land values. The systematic and organized development of the mining industry of Canada was therefore a matter of national importance.

It was well known that the per capita production of men engaged in mining was greater than that of men engaged in agriculture. In Canada the per capita production of men engaged in mining was estimated as twice and a half that of men engaged in agriculture. The Government of New South Wales had published reports from their Government Statistician, Mr. Coghlan (now their Agent-General in London) that the men engaged in silver-lead mining produced more wealth and gave more employment to affiliated industries than

ten to twelve times the same number of men employed in agriculture.

His Excellency had already pointed out the importance of the mining industry to the railways. He added that it had been a surprise to him to discover that in Canada, which had been regarded as a country mainly agricultural, the business of the mines afforded 33 per cent. of the total railway traffics during the year 1907, while the products of agriculture afforded only 17 per cent., and in the United States the difference in favor of mines was still greater, the mines affording 54 per cent. of the total business done by the railways, and agriculture only 9 per cent.

The importance of developing the mining industry would thus be obvious to everyone. At present the cars which took the wheat from the Northwest to the seaports were hauled back empty across half a continent. The development of the mining industry would enable the railway companies to haul back full cars instead of empties.

Ships to Africa went full of the merchandise and machinery required for the mining industry and returned comparatively empty, because gold and diamonds made no freight to speak of. With the development of the mining industry of Canada the great railway companies of Canada might look forward to full trains both ways, and would consequently be in a position to offer lower rates to the farmers; and in addition to the new markets and cheaper transportation rates that mineral developments would bring to the Canadian farmer, the effect of the development of the mining industry would be to strengthen the population of the East, and would provide a balancing compensation to the increasing weight of the growing West, and thus help to ensure the stability of the national equilibrium.

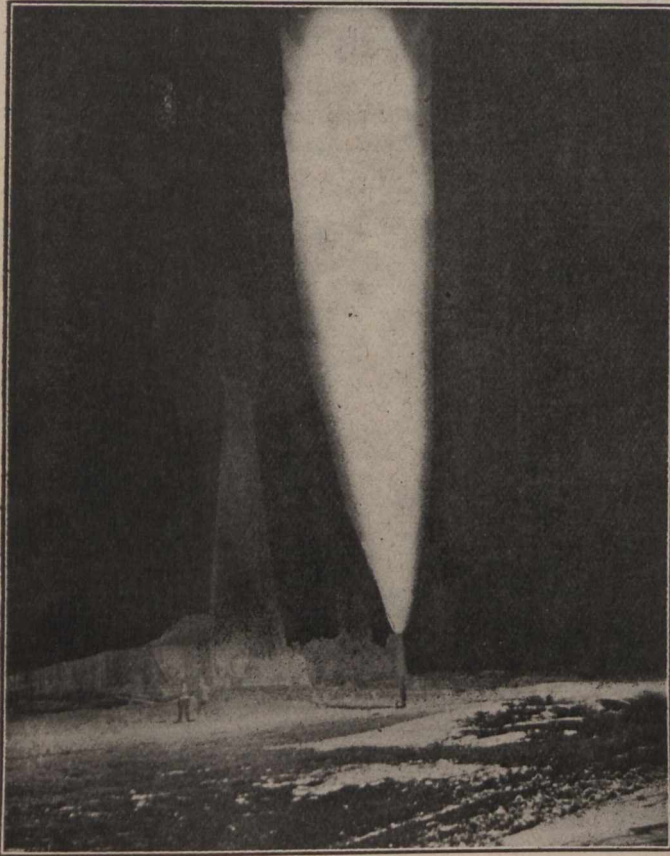
MONEY FOR GEOLOGICAL SURVEY WORK.

The work of the United States Geological Survey is carried on by means of appropriations made each year by Congress, chiefly in the act providing for "sundry civil expenses of the Government," popularly known as the sundry civil act. The sundry civil act passed by the Congress which has just adjourned appropriated for the Survey for the fiscal year 1909-10 the sum of \$1,407,390, specifying that it be applied to the following purposes:—

Geological surveys	\$225,000
Chemical and physical researches	20,000
Mineral Resources report	75,000
Topographic survey	350,000
Forest-reserve topographic surveys	75,000
Water-resources investigations	100,000
Structural-materials investigations	100,000
Fuel-testing investigations	100,000
Mine-accidents investigations	150,000
Geologic maps (printing and engraving)....	100,000
Preparing illustrations for reports	18,280
Books for library	2,000
Statutory and temporary salaries	88,760
Mine inspectors' expenses	3,350
	<hr/>
	\$1,407,390

An appropriation of \$90,000 for the investigation of Alaskan mineral resources by the Geological Survey was carried in the urgent deficiency act. Other appropriations for rent of offices in Washington and for publications make the total amount provided for the work of the Survey about \$1,700,000.

NATURAL GAS IN ALBERTA.



GAS WELL AT BOW ISLAND, ALBERTA.

7,000,000 cubic feet of gas when shot—4,000,000 when photo taken.

Railway corporations are becoming increasingly active in the development of Canada's natural resources. The Canadian Pacific Railway, which was, of course, the pioneer line through our North-West, is also engaging in large enterprises that have a most important bearing upon the future of the country. Its interests in metallurgical and coal-mining ventures are well-known. It has inaugurated comprehensive irrigation schemes. But the most striking of its recent activities have been in connection with the exploitation of the gas fields of Alberta. Of this work, directed successfully by a past president of the Canadian Mining Institute, we hope to have more to say in the near future. The present intention is to give merely an announcement of results already attained.

Under the supervision of Mr. Eugene Coste, a very important well has just been completed to the depth of over 1,900 feet. This well has proved to be a gusher of 7,000,000 cu. feet of natural gas per diem. It is situated near the banks of the South Saskatchewan River, Twp. 11—R. 11—west of the 4' meridian. The accompanying photos show the well burning at night before it was tubed and closed in. Although at the time the photo was taken the well was under full control by means of valves controlling the flow on a pipe line, it could not be closed in until high pressure test tubing valves and fittings had arrived.

Photo No. 2, taken by Mr. S. Mavor, of Glasgow, during the C. M. I. excursion last September, shows one of the wells drilled by Mr. Coste for the C. P. R. This well is at Dunmore Junction, and gets its gas from a depth of nearly 1,100 feet. We are informed that the

flow is one and one-half million cubic feet per day. The distance between the first (Bow Island) well mentioned and the Dunmore Junction well, is nearly 40 miles in an air line. This fact, especially when it is understood that the gas wells of Medicine Hat, Stairs, and Suffield are located between them, shows that already a wide gas belt has been demonstrated by the C. P. R. What effect this supply of cheap fuel and power will have upon the growth of the surrounding districts is not hard to guess. In nearly all discovered fields gas and oil succeed one another. The eventual discovery or appearance of oil would add enormously to the wealth of the country.

It is satisfactory to note that a Canadian corporation, employing a Canadian engineer, has successfully exploited this promising field. Mr. Coste is to be congratulated on the practical value of his geological diagnosis of the district.

Aplite is defined by Geikie as being a fine-grained mixture of quartz and feldspar, both of which minerals have not infrequently intergrown (micropegmatite). Aplite is found especially in veins of granite.

Out of about 150 discoveries of gold and silver in the United States and Canada, tabulated by W. R. Crane, only ten are designated "accidental." The rest, with one or two exceptions, are attributed to the intelligent efforts of the prospector. It may be significant that most of the accidental discoveries date back more than fifty years ago. The most recent is twenty-two years old.



GAS WELL AT DUNMORE JUNCTION, ALBERTA.

1,500,000 cubic feet of gas per 24 hours—September, 1908.



BOW ISLAND GAS WELL—FLAME 160 FEET IN HEIGHT.

THE McCHARLES PRIZE.

In view of the great interest now being taken by Canadians in all developments in the natural resources of the Dominion, the bequest of the late Æneas McCharles providing a fund for the purpose of recognizing the inventions or discoveries of special merit made by Canadians will be welcomed by all.

The following extract from the will of Mr. McCharles and the accompanying regulations drawn up by the Board of Governors of the University of Toronto governing the award as set forth below, give full details concerning the prize, which will be offered for the first time this year:—

“In connection with the bequest of the late Æneas McCharles of Provincial Government bonds of the value of \$10,000, on the following terms and conditions, namely, that the interest therefrom shall be given from time to time, but not necessarily every year, like the Nobel prizes in a small way: (1) To any Canadian from one end of the country to the other, and whether student or not, who invents or discovers any new and improved process for the treatment of Canadian ores ore minerals of any kind, after such process has been proved to be of special merit on a practical scale; (2) Or for any important discovery, invention or device by any Canadian that will lessen the dangers and loss of life in connection with the use of electricity in supplying power and light; (3) Or for any marked public distinction achieved by any Canadian in scientific research in any useful practical line. The following

conditions, as passed by the Board of Governors, determine the method of award:—

- (1) The title shall be the McCharles Prize.
- (2) The value of the prize shall be One Thousand Dollars (\$1,000.00) in money.
- (3) The term “Canadian” for the purposes of this award shall mean any person Canadian born who has not renounced British allegiance; and for the purposes of the award in the first of the three cases provided for by the bequest, domicile in Canada shall be an essential condition.
- (4) Every candidate for the prize shall be proposed as such in writing by some duly qualified person. A direct application for a prize shall not be considered.
- (5) No prize shall be awarded to any discovery or invention unless the same shall have been proved to the satisfaction of the awarding body, to possess the special practical merit indicated by the terms of the bequest.
- (6) The order of priority in which the three cases stand in the wording of the bequests shall be observed in making the award; that is, the award shall go *caeteris paribus* to the inventor of methods of smelting Canadian ores; and, failing such inventions, to the inventor of methods for lessening the dangers attendant upon the use of electricity; and only in the third event, if no inventors of sufficient merit in the fields of metallurgy and electricity present themselves, to the inventor distinguished in the general field of useful scientific research.
- (7) The first award shall not be made before June, 1909.”

A committee to make the award of the prize has been appointed by the Board of Governors of the University of Toronto.

It will be seen from these conditions that the Committee of Award is given a wide scope in making its selection, as the prize is open to candidates in every part of the Dominion, and is not necessarily confined to those who have made discoveries or inventions in recent years.

All communications in connection with this award should be addressed to the Secretary of the McCharles Prize Committee of Award, University of Toronto, Toronto.

TRAFFIC TO GOWGANDA.

The following statement may be of interest as showing the amount of money that is being spent at the present time in preparation for development of the silver prospects in the Gowganda and Montreal River districts.

As everyone who is interested in that country knows, freight is taken by rail either to Charlton on the T. & N. O. Ry. or to Selwood on the C. N. O. Ry., and is then transferred to teams to be hauled to its destination.

As far as I could learn five hundred tons or more is being handled daily from Charlton to Elk City at an average rate of at least 75 cents a hundred pounds, giving a daily expenditure for freight, over and above the railway charges, of \$7,500 a day.

About one hundred tons of this freight stops at Elk City, while the remaining four hundred tons goes on to Gowganda. The average freight rate from Elk Lake to Gowganda is at least \$2.50 a hundred pounds, or \$20,000 a day for the four hundred tons. This gives a total daily freight charge from Charlton to Elk City and Gowganda of \$27,500 a day, or \$825,000 a month.

It is not improbable that the value of the material laid down at Charlton is worth more than the freight charges amount to to its destination, or, in other words, that the supplies and machinery being sent into the Gowganda and Montreal River districts at present represents an expenditure in first cost and freight of something like two millions of dollars a month.

This enormous expenditure shows a very real intention on the part of those interested in mining in Ontario to prospect and develop that northern country.

J. B. TYRRELL.

9 Toronto St., Toronto.

REPORT OF THE DEPARTMENT OF MINES, PROVINCE OF NOVA SCOTIA, 1908.

As was noted editorially in the Canadian Mining Journal, the Report for 1908 is a great improvement on its predecessors. It is clearly printed, well arranged, and amply illustrated.

The following summary shows the mineral production:—

	Year ended Sept. 30, 1907.	Year ended Sept. 30, 1908.
Coal raised (gross tons).....	5,730,660	6,299,282
Pig iron (gross tons).....	293,436	326,303
Iron ore (net tons).....	*630,275	*902,475
Limestone (net tons).....	458,601	484,685
Coke made (net tons).....	493,102	505,003
Gypsum (gross tons).....	332,345	242,535
Gold (ounces).....	15,006	11,990
Bricks.....	25,000,000	23,000,099
Building stone (net tons).....	63,861	45,500
Cement (barrels).....	58,762	44,529
Antimony ore (net tons).....	1,403	132½
Manganese ore (gross tons).....	**495
Copper ore (net tons).....	2,471	1,200
Drain pipe (feet).....	300,000	300,000
Grindstones (net tons).....	350	360
Copper (pounds).....	12,320	28,800
Moulding sand (net tons).....	190	185

*Including imported ore. N. S. ore 30,575 tons.

**All imported.

It will be noticed that coal, iron ore, coke, and however, was all imported, with the exception of 30,375 raised in the province. The decrease in gypsum, gold, and antimony will be referred to later.

The total revenue of the Mines Department was \$683,016.95. To this amount the royalty from coal

mines contributed \$616,933.66. Gold rentals brought in \$10,805.

During the fiscal year ending Sept. 30, 1908, the Government paid as a bonus on each ton of coal consumed in the manufacture of iron and steel in the Province the sum of \$65,294.48. The Dominion Iron & Steel Co., the Nova Scotia Steel & Coal Co., the Londonderry Iron & Mining Co. were the recipients of this bonus.

The returns of coal sold show that the principal increase was in the Quebec (St. Lawrence) trade, and in the New Brunswick and Newfoundland sales. A considerable falling off is apparent in the United States sales.

The returns of coal sold during the year 1908 show, compared with the returns of 1907, as follows:—

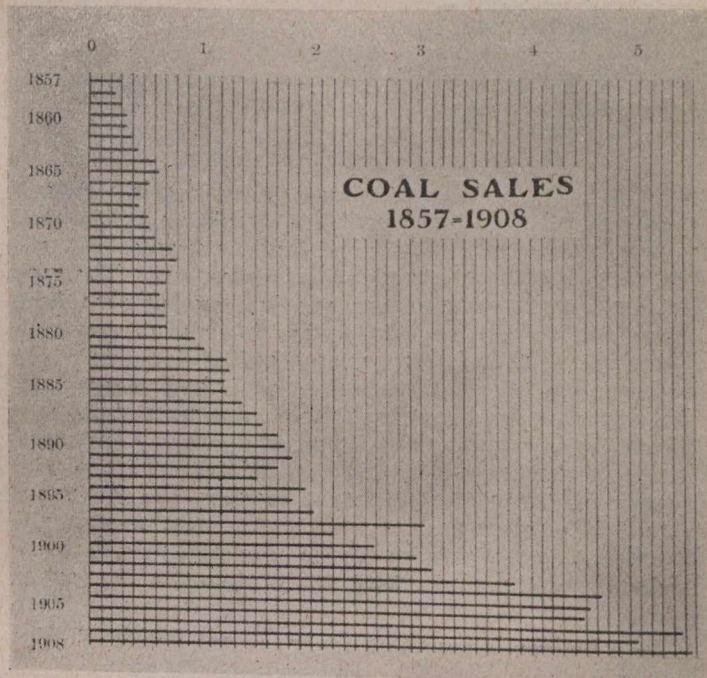
	1907.	1908.
New Brunswick.....	427,128	510,331
Nova Scotia.....	1,882,419	1,950,632
Newfoundland.....	146,502	207,062
Prince Edward Island.....	77,493	63,331
Quebec.....	1,709,592	2,047,638
West Indies.....	2,598
United States.....	616,312	499,634
Mexico.....	7,591	8,907
Other countries.....	12,483	4,697
Bunker.....	204,572	193,352
	5,046,690	5,485,583

By counties the production was:—

	Tons.
Cumberland County.....	559,013
Pictou County.....	777,217
Cape Breton County.....	4,556,446
Inverness County.....	402,655

Collieries—Cape Breton.

North Atlantic Collieries, Port Morien.—The main haulage deep, which had 700 feet of water in it, was pumped out and extended 800 feet. Travelling road and levels were extended. Fifteen hundred feet of



double track were laid in the haulage deep. A half battery of Babcock & Wilcox boilers was installed at the main lodgment. The quantity of air in circulation is 30,000 cubic feet per minute. The workings of this mine are all submarine.

Dominion Coal Company Collieries.—It is out of the question to note all the changes and improvements in this company's collieries and plants. A few general notes must suffice.

Electric turbine pumps have been installed at Dominion No. 5. Extensive surface improvements have been made at many of the mines. It is pleasing to note the large amount of Canadian machinery that has been and is being installed. During 1908, Dominion No. 12 colliery was connected to Grand Lake by seven miles of railway. At all the collieries safety lamps, Ackroyd & Best and Marsaut are in use. Bulldog and excellite appear to be the principal explosives used.

At the **Nova Scotia Steel and Coal Company's Collieries**, Sydney, No. 1, No. 2, No. 3, No. 4 and No. 5, many improvements were made and outputs were increased. At No. 1 the output was 253,900 tons, in mining which amount 19,021 lbs. of powder was used. At No. 3 the quantity of 46,902 lbs. of powder was used in mining 299,374 tons of coal.

The Mackay Mining Company is a small concern which promises larger development. The mine has been wired for electric power, and an electric chain coal cutter is in use. The output is about 50 tons per day.

The Colonial Coal Company has a property once worked by the Toronto Coal Company. The mouth of the slope is less than 200 feet distant from the waters of Little Bras D'or. An extension of the I. C. R. will come within three-quarters of a mile of the mine. The old slope has been cleaned out and retimbered, and a

haulage road laid. It is expected that 200 tons per day will be shipped during the 1909 season.

Sydney Coal Company.—This mine output 5,000 tons in 1908, as compared with 3,000 tons in 1907. The mine is principally worked for local sales.

Inverness Mine has added to its equipment boilers, new machine shop, 40 miners' houses, 200 mine cars, and 50 new 30-ton railway cars.

The mine of the **Mabou & Gulf Coal Company, Limited**, was put out of commission on August 8th. The Government of Nova Scotia is now keeping the mine in safe condition.

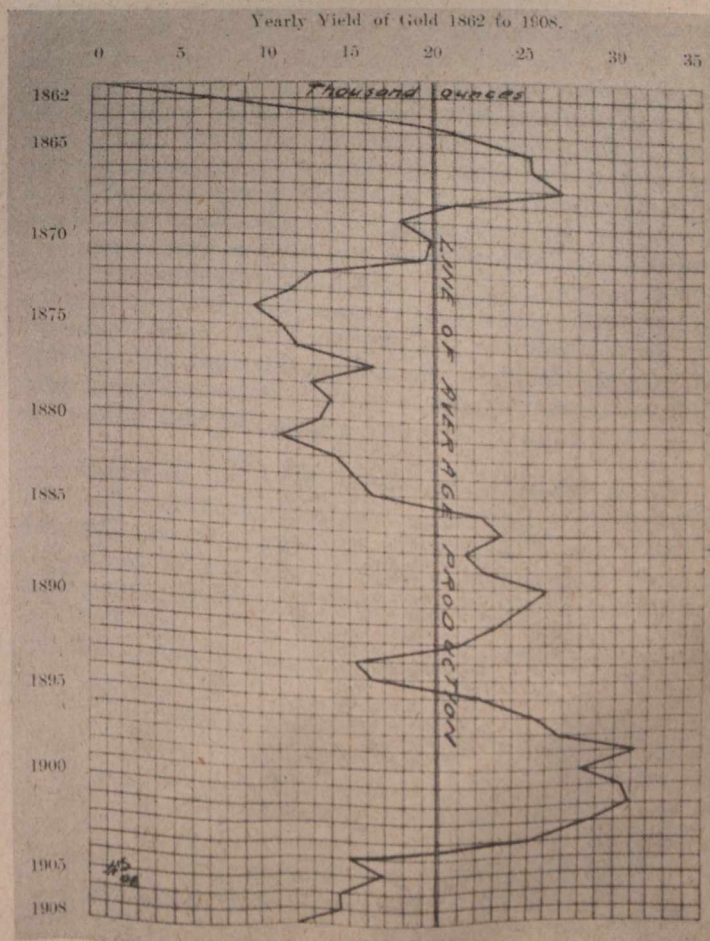
Improvements made at the collieries of the **Port Hood-Richmond Railway & Coal Company** have been noted before in these columns. Here the output has been brought up to 99,700 tons, an increase of 23,617 tons over last year. Safety lamps are in use, 300 Ackroyd & Best lamps being in stock.

Cumberland County.

Cumberland Coal & Railway Company's Springhill collieries have had a good season. On No. 2 seam 1,800 feet of railroad and other pillars have been extracted at the 2,400-foot level to the rise. On other levels extensive work has been completed. On October 2nd the bench coal of No. 1 was struck. It was found to be more than four feet thick, of good quality, and free from stone and splint. Amongst other improvements, a new pumphouse has been erected level with the dams, and a Blake pump installed.

Minudie Mine, River Hebert, has worked continuously.

Scotia Mine, Maccan, was taken over by the Great Northern Coal Company of New York, on March 16,



In the "Deposits" column are entered the deposits made in the bank, and on the credit side is entered in the cash column the amount of cash deposited. In the "Discount" column on the Dr. side are entered discounts allowed to customers on the payment of their accounts. In the "Discount" column on the credit side are entered discounts received from creditors when paying to them the amount of their bill. In the "Cheques" column are entered all cheques issued against our bank account. At the end of each month the cash balance is posted to the debit of the cash account in the Ledger, and the bank balance to the debit of the bank account in the Ledger. The total of the discounts allowed is posted to the debit of discounts account, and the total of discounts received to the credit of discounts account. Opposite each entry in the Cash Book is the name of the other account affected by the transaction. If on the Dr. side the amount is posted to the credit of the account named. If on the Cr. side, the amount is posted to the debit of the account named.

To relieve the Cash Book from a mass of small items a Petty Cash Book is kept, a summary being made at the end of the month, and entered in the Cash Book in one entry. Many systems of keeping the Petty Cash are in use, but the following is perhaps the neatest and best: A cheque of say \$100.00 is given to the Petty Cashier, and then a cheque is given for the total amount of vouchers turned over to the Head Cashier, restoring the Petty Cash balance to the original figure. At all times the Petty Cashier must have on hand \$100.00 in cash or receipted vouchers. This system is called the Imprest System.

We will take up in the next paper the best forms for the Purchase Journal and Sales Journal as applied to mining. The foregoing discussion enunciates a few general principles of bookkeeping applicable to every form of undertaking, and it does not lose in value, because it does not bear solely on the mining industry. In the Purchase Journal, etc., important differences arise when they are applied to different lines of business. Therefore, while of no more value to the reader, the following article will be of more direct interest than the above.

THE ELECTRO-METALLURGY OF IRON AND STEEL.

Abstract of a Lecture Delivered by Dr. Stansfield at McGill University Before the Members of the Canadian Mining Institute, 3rd March, 1909.

Dr. Stansfield's lecture, which was graphically illustrated by lantern views and experiments, was a terse and lucid sketch, tracing the main features in the development of the electric furnace with special reference to the electro-metallurgy of iron and steel. The following inventions were referred to as some of the principal steps in the first stage of this development.

1. **Acheson's Graphite Furnace** (1896), in which heat is generated by passing an electric current through a continuous carbon core for the purpose of converting anthracite into graphite. Though this furnace is a later invention for a special purpose, it illustrates the first principle of generating heat by the interposition of a solid resisting medium. This was practically demonstrated by passing a heavy current through a

stick of carbon, which was thereby heated to a white heat.

2. **Sieman's Electric Furnace** (about 1880). In this the charge is placed in a crucible between the opposing ends of two vertical electrodes the upper carbon and the lower metal fitted into the back of the crucible. This was the first application of any importance of the electric arc for heat production. Some copper was actually fused by this means before the audience.

3. **Moissan's Furnace**. A modification of the above principle, in which the arc, between two horizontal opposing carbon electrodes, is deflected down onto the charge immediately below it by means of an electromagnet placed beneath the furnace. By means of a most ingenious contrivance, invented by the lecturer some years ago for Roberts-Austen, the actual details of melting first copper and then iron by this process were reflected onto a screen much enlarged for inspection, forming a very neat, interesting and beautiful experiment.

To this point the furnaces had no special reference to iron or steel. Before proceeding to this stage in the development it was pointed out that while the cost of electric heat was very high (1 ton of good coal produces as much heat as 1.1-3 h.p. of electric energy per year), on the other hand the heat could be applied to the work in hand with far greater efficiency. In the electric furnace for every unit of heat used effectively about .5 unit is lost, in shaft furnaces the corresponding loss is about 1.6, in open hearth 3.1, reverberatory 7.5, and in crucible steel furnaces the enormous proportion of about 40 units is wasted.

The Canadian Government in 1903, recognizing the great importance to the Dominion of developing the smelting of iron ores electrically, appointed a commission, under Dr. Haanel, to investigate and report. Dr. Haanel, after visiting Europe, conducted some experiments at Sault Ste. Marie. These, together with investigations made by the lecturer and others, have demonstrated that, as compared with the usual methods of smelting and refining, electric furnaces (1) removed more of the sulphur and phosphorus, thus either giving a better quality of metal or enabling ores containing larger proportions of these impurities to be utilized, (2) could successfully heat ores containing a far higher percentage of titanium, (3) gave a denser and more homogeneous steel than even the crucible steel furnace.

The lecturer then proceeded to trace the steps in the next stage of the development, which has special reference to the production of iron and steel.

A.—The Smelting of Iron Ores.

1. **The Heroult Furnace**. This, as used by Dr. Haanel for experiments at Sault Ste. Marie, consists essentially of a shaft, in which a vertical carbon electrode is suspended. The base of the furnace is lined with carbon, which forms the lower electrode. The length of the upper electrode limits the height of the shaft.

2. **The Turnbull-Heroult Furnace**. In this the shaft is higher, and the ore is conveyed at its base by inclined shoots to a smelting trough or canal, into which descend six electrodes, permitting the use of a three-phase current.

3. A Swedish modification, in which the gases from the top of the furnaces are conducted down to tuyeres placed on a level with the carbon electrodes, thus cool-

ing the latter and helping in the more rapid reduction of the ore.

B.—STEEL FURNACES.

The chief processes used in the production and refining of steel are: (1) The open hearth, (2) the Bessemer, (3) the crucible process. It is only with the last of these that the electric furnace seriously competes, as its function at present is chiefly, as pointed out above, to produce the highest grades of steel, and not, as in the case of the first two processes, to produce large quantities of the lower grades cheaply.

1. **The Heroult Steel Furnace.** This has a shallow-hearth lined with dolomite. Two carbon electrodes descend through the roof nearly to the surface of the slag. An alternating current passes down one electrode through the molten metal and up the other electrode, thus forming two electric arcs.

2. **The Colby** is a simple induction furnace, consisting of a soft iron core, surrounded by an insulated primary winding, sometimes made of copper tubing, through which water is circulated for cooling purposes. In place of the secondary winding is an annular trough, which contains the metal, kept molten by the induced current.

These two furnaces were shown after the lecture in actual operation in the College Laboratory.

3. The next modification was practically a combination of two Colby furnaces, each with its iron core and primary winding belt so arranged that the annular troughs met in a central large chamber, thereby much increasing the capacity of the furnace. Additional iron pole-pieces, placed opposite this central chamber, served to give the additional heat needed at this point. The current being supplied to the pole-pieces from special secondary windings on the iron cores.

4. The latest improvement has been to substitute a three-phase current for the two-phase, there being three iron cores, each with its primary winding and annular trough, connecting with the large central chamber. Pole-pieces are inserted between each pair of units. This furnace has been made to hold up to 8 tons of steel, and has the additional advantage of inducing a circulation in the molten metal, insuring a more complete homogeneity.

Dr. Stansfield has recently written a book on "The Electric Furnace: Its Evolution, Theory and Practice," which those requiring more detailed information should consult.

D. B. LANGFORD.

ELECTRICITY IN MINES.

By T. J. McKavanagh, Electrician, Cable SS. "Minia," Halifax, N.S.

Paper read before the Mining Society of Nova Scotia.

It is impossible in a paper of moderate length to go fully into comparative costs and economies; and I must be content with a review of what is generally accepted as the most modern and economical in the application of electricity to mining.

Generating.—Water power appeals most to those engaged in mining other than coal mining, and when within reasonable distance, and construction costs are moderate, is the most economical prime-mover. Occasionally a low priced steam plant is less costly than storage works to take care of the load peak in dry seasons; and there is ample evidence of considerable economy being affected by the use of steam in water-power schemes. Steam turbines of both the velocity and impulse types are superior to the reciprocating engine; the advantages being briefly low capital and running costs, small space occupied, light foundations, and in the matter of steam consumption, the low pressures admissible make easy the use of high superheat. Gas engines, favorably located, are slightly more economical than turbines at high load factor, but the turbine excels at the low load factor usually obtained in mining.

Distribution.—The mechanical simplicity of the induction motor, and convenience and economy in transmission, have brought the three-phase system into almost universal use. Underground safety, convenience and economy, in order given, must be satisfied and when reasonable care is exercised electricity is eminently satisfactory. Economy must not be lost sight of in our striving for safety; and an inexpensive cable, well installed, will serve better than an expensive cable in which the maker is supposed to have said the last word regarding safety.

Bitumen-insulated cables, lead covered and wire armoured, laid solid with bitumen, in wood or metal troughing, is common practice. The copper cores of such cables are liable to become decentralized when

carrying full load for long periods; and the wooden bridges and inferior bitumen filling often used are decidedly injurious to the lead cover and wire armour. Asphalt bridges and clarified bitumen are proper. Cheap and reliable is paper insulated bitumen sheathed cable laid solid in a mixture of good pitch and pitch-oil in wood or metal troughing.

Armoured cables carried in slings are much benefited by occasional applications of bitumastic paint, and when the protective materials are well compounded, may be laid direct in ground or, better still, in a trench of puddled clay.

The desirability or otherwise of "grounding" the armour of cables has often been dealt with, and we are certain that "grounding" in practice does not afford protection against shocks. This is not because of "grounding," but owing to the great difficulty in the way of providing reliable "grounding," and in the sense of security felt in some "grounds" which are liable to become seriously affected by changes in the strata. "Grounding" of the armour is the immediate cause of many types of bad faults, and owing to the great uncertainty of "grounds" in dry mines, danger from shocks is perhaps best guarded against by using no "ground."

Fully ninety per cent. of the faults in direct current systems can be obviated by using concentric cables in which the inner wire is negative. Cables bunched together should be suitably protected to prevent flame spreading in the event of a cable breaking down. Asbestos strips about three inches wide, and three-sixteenth inch thick, soaked in a solution of silicate of soda and wrapped on the cable while soft, afford excellent protection.

Three-phase cables (6,600 volts), paper insulated, lead covered and double wire armoured, are in a recent installation carried down shaft by means of wooden cleats bolted to channel irons let into wall. The same

type of cable is in another instance carried down shaft in pitch-pine casing. The casing has a groove slightly less than the diameter of the cable, and the cable is hammered home and a pitch-pine cover screwed on. Mechanically this method to take weight of cable is good, and the necessity for armoring is evident; but the fire risk is greater than in the former method; and an overloaded cable would more readily break down owing to the heat insulating properties of the wood.

Switches and Motors.—Switches must be gas-tight, and when not of the oil-brake type, should be flame-tight if placed where not in the path of downcast air current. Excepting oil-break switches, no switch is proof against the lighter gases, and when not favorably placed they must be able to withstand the shock of internal explosion, and by means of wide joint faces, cool the escaping gases to make external ignition impossible. A switch much used in surface work, having two blades hinged at one end and held together at the other end by a bar of insulating material carrying a handle and metal stubs and screws, has recently been condemned. An operator opening a motor switch received fatal shock through his little finger touching one of the screws. The current was alternating 250 volts. At least four healthy persons received fatal shocks from 200 volts alternating current system during 1907. Six thousand volt cables are safe.

Direct-current motors with interpoles and fixed brushes, at all loads are sparkless, and indeed excellent; but cannot equal the performance of induction motors which have worked without harm when submerged. Tests on flame-proof motors have proved them worthy of the name; but at coal-faces where gas-blowers are frequent and ventilation difficult, compressed air presents fewer risks and should be used.

Applications.—The electric motors have considerably influenced the design of mining pumps, and the centrifugal pump direct driven by an induction motor has no peer in mechanical and low first cost. Owing to the perfect balancing in turbine pumps, and the constant turning effort of the electric motor, heavy foundations are not required for this type, and the small space required is often a considerable advantage. It cannot now be objected that the centrifugal pump is confined to low heads: a head of 1,650 feet has been overcome by two inter-connected electrically driven pumps handling 1,540 gallons per minute.

At Lindall Moor mines, three stage vertical sinking pumps direct-coupled to 315 b. h.p., 3,000 volt motors, and running at 1,480 r.p.m., handle 1,000 gallons per minute against total head of 780 ft. Combined efficiency of motor and pump seventy-three per cent. Some makers claim eighty-five per cent. as combined efficiency of direct-driven pumps.

Vertical type motors, direct-coupled to centrifugal pumps, and the pumped water taken round the motor case for cooling purposes, are being successfully used.

Drills.—Electric percussion drills operated by solenoids, taking current from a low frequency two-phase generator, or operated by motor placed on top of drill chamber, are well taken up despite much adverse criticism by air-drill makers and users.

A novel combination of motor, compressor and drill, lately introduced, has many good points, and a large number of complete outfits are in successful operation. The compressor is a valveless, duplex, single-acting machine, and two short lengths of hose convey alternate impulses of air pressed to about 40 lbs., to a special type of air-drill. There is no exhaust, and the air car-

ries atomized oil which lubricates the drill compressor pistons. A 5 h.p. motor-compressor equipment is equivalent to a 3¼ inch air-drill working at 100 lbs. pressure.

The motor and compressor are mounted on a small trolley suitable for mining gauges, and the alternate current motor equipment weighs 730 lbs. with 60-cycle motor, and 820 lbs., with 30-cycle motor, and the direct current motor equipment weighs 883 lbs. Drill weight, 288 lbs.

Coal-cutters.—Electrically driven coal-cutters make satisfactory progress, and when compressed air is used with coal cutters, considerable economy can be effected by the use of electrically driven portable air compressors, owing to the short pipe lines and smaller compressors, impossible when steam is used. A motor compressor having 4 cylinders disposed radially in a circular cast-iron casing, and capable of dealing with 120 cubic feet of free air per minute, and delivering at 80 lbs. per square inch, has a base 3 ft. by 2 ft. 6 in. extreme width at end of motor bearing 4 ft. 9 in. and height of 4 ft. 6 in.

Ventilation.—Fan driving is now entrusted to the electric motor, and at Durham Colliery a 55 inch double-inlet service fan, with a capacity of 145,000 cu. ft. per minute against 2½ inch water gauge, is driven by a 2 speed induction motor of 62.5 and 125 b. h. p. running at 183 or 365 r. p. m. as required.

Haulage.—Main and portable haulages are most economically and conveniently operated by electricity; and where conditions permit of its use, the electric locomotive is rapidly displacing the mule and compressed air locomotive. In coal gathering from the face, the electric locomotive is particularly useful and economical; and perhaps there is room for the storage battery locomotive in this class of work. Storage battery locomotives with flameproof motors and oil type switches are not burdened with overhead wires, rail return and sparking trolley, and should find favour where sparking is objectionable. Electrically driven conveyors carrying coal from the face to the gate, are extensively used, and great saving is claimed for them when working thin seams.

Winding.—While it is admitted that the modern steam winding engines are excellent, and that in winding, electricity has a formidable rival; nevertheless, electric winding is the more economical, and decidedly so, when working deep mines or where it is possible to supply a number of mines from a generating centre. Several systems have been tested in every-day working on the continent, and we now have sufficient information as to their merits and demerits, and their economy as compared with steam.

We will now deal with a system which has proved satisfactory, and the best of its class, and figures from a representative installation will give an idea as to the sizes of the machines for a given duty. A Koepe pulley having a diameter of nearly 10 ft. is used, and the haulage speed is 33 ft. when motor makes 64 r. p. m. Hoists 492 tons in eight hours from depth of 2,625 ft. Current at 1,000 volts, 44 cycles per second, is supplied to a 250 h.p. 3-phase motor. Directly coupled to this motor is a direct-current generator of 650 k.w. capacity at 500 volts, when running at 285 r. p. m. On the same shaft, between the motor and generator, is a fly-wheel of cast steel, 13 ft. in diameter, and weighing about 40 tons.

The winding motor is a separately excited, direct-current machine, rated at 320 h.p., 64 r. p. m., and taking current at 500 volts from the direct-current generator of the flywheel set. It is able to take an overload of 45% for 30 minutes, and 100% for five minutes.

The working of the system is briefly thus: The flywheel-set being running, exciting current is applied in progressive steps to the fields of the generator and haulage-motor, thereby causing the voltage of the generator, and the speed of the motor, to increase progressively.

At this, the accelerating period, the haulage-motor demands about 615 h.p., but no abnormal demand is felt at the generating station; the kinetic energy of the flywheel supplementing the induction-motor and enabling the generator to give up the required energy. The power required at full speed is very small, and the power supplied by the induction-motor is absorbed by the flywheel in regaining its normal speed, reduced when the heavy load came on. The power-demand on the generating station is practically uniform, and is only the normal rating of the induction-motor.

While stopping, the exciting current of the generator field is interrupted, and that of the motor increased. The counter emf. of the motor, now driven by the inertia of the moving masses, greatly exceeds the emf. of the generator, and the motor gives back current to the system and at the same time acts as a brake, giving smooth and quick retardation. While winding, should the 3-phase supply be interrupted, the inertia of the flywheel is sufficient to ensure winding for some considerable time.

The speed variations of the flywheel-set lie between 490 and 432 r. p. m. In a series of tests of this system, a winding-drum of 12 ft. diameter and weight of 16 tons, direct-coupled to a motor running at 150 r. p. m., was used (the ropes being removed), and it was found possible to change from full-speed in one direction to full-speed in the opposite direction in $3\frac{1}{2}$ to 5 seconds.

A system but recently brought to notice bids fair to supplant the former system, and without doubt its operation is very simple and economical. It is known as the Thury direct current series system, and while it may or may not have been applied to winding, its suitability is evident, and the successful operation of the generators and motors involved is beyond doubt. Here we have a direct series generator in the generator station, and further, the generator-shaft carries the flywheel.

A direct-current series motor is coupled to the winding-drum, and starting, stopping, reversing and breaking are all easily controlled by one lever that directly, or through gearing, shifts the brushes on the motor. No switches or rheostats are required in the motor-room, and the generator-switchboard surprises one used to 3-phase switchboards. In fact, switchboards are not required; a pedestal carrying a double-pole switch, ammeter, and voltmeter, being sufficient.

Excepting for stops of considerable duration, the brake need never be applied; the single control-lever puts brushes in neutral position, and the motor is held at rest for any length of time, provided generator is running. The speed of winding can be fixed at certain predetermined limits by aid of a centrifugal governor, acting directly on the brushes, and suitable devices ensure smooth retardation and prevent overwinding.

As in the former system, the flywheel is called upon to assist at acceleration periods; but here the generator must be capable of standing overloads, and the prime-

mover need only be large enough to cope with the mean load. The factor of this system is large. There are no fuses, no circuit-breakers, no small wires, and no multiplicity of small exciting and switch motors, and accident to the prime-mover will not result in immediate shutting down of the system. With sufficient flywheel effect and prime-movers aggregating 1,000-1,200 h.p., winders absorbing 9,000 to 12,000 h.p. can be satisfactorily operated.

Long-distance, high-tension transmission systems, delivering current at 60,000 volts to series motors coupled to 3-phase alternators, are being operated successfully, and this is the system of transmission to be used in the Victoria Falls scheme.

UTILIZATION OF SCRAP TIN.

Outside of the direct production of tin from the ore there is in Europe, and especially in Germany, a great quantity of tin regained from scrap tinned sheet. The amount of scrap tin thus treated in Germany is about 30,000 tons a year. This is mostly done by electrolytic processes, the coated tinned iron or steel being placed in an iron basket, which is used as the anode of a powerful electric current, and plunged in an 8 to 10 % solution of soda lye. The tin is deposited in a spongy form on the cathode; the resulting mass is washed, compressed and melted. As the scraps as a rule have on them only about 2 to 3% of their weight in tin, we can put the amount of pure metal thus gained at about 600 to 900 tons per year. The most important works of this kind are in Essen, on the Ruhr—principally famous as being the seat of the Krupp parent establishment.

R. G.

DESCRIPTION OF SAFETY CATCH IN USE AT N. S. S. & C. CO., SYDNEY NO. 1. COLLIERY.

(From the Report of the Nova Scotia Department of Mines.)

Fig. 1 shows the general arrangement of auxiliary safety catches used in connection with the coal cage. They are known as Walker's detaching hooks. The hook failing to hold the cage in case of an overwind, it is the intention that the cage will drop back and be caught at four points by the catches marked A. Two of these engage, at each end of the cage, the top band of the cage. The handspring T keeps an inward tension on these catches within limits that may be adjusted by the stop marked S, arranged so that the cage is always free to be drawn in an upward direction through the catches; but once having passed through, the close together and prevent the cage from coming back.

Fig. 2 shows safety doors used in connection with the Walker hooks on man shaft No. 1 colliery. The doors are placed about four feet below the bottom of the cage, when the Walker hook has engaged the hawse pipe.

The doors are built of 3-inch hardwood, completely covered on the bottom and around the edges with steel plate, forming a smooth surface with the tackling chain of the cage to work against. In the event of an overwind, these doors are forced open by the chain and cage passing through, and are closed by means of a spring. This design can be used only where centre spears and buntons are used.

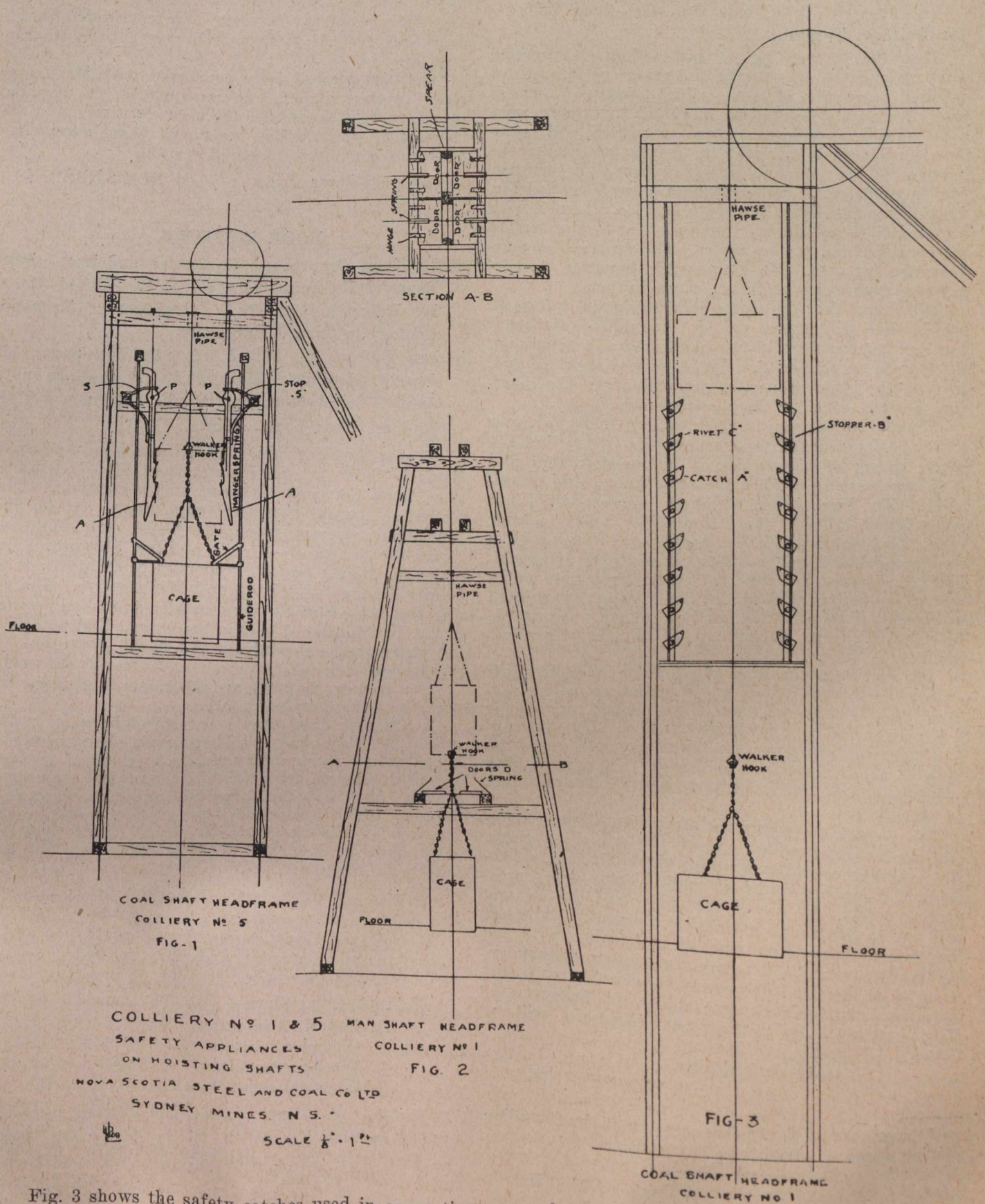


Fig. 3 shows the safety catches used in connection with the Walker hooks on coal shaft at No. 1 colliery. Eight forged steel-patches are placed in a vertical position in the centre of each end of the cage and spaced about three feet apart, vertically. They are supported between two 4 by 6 by 3/4 inch angle irons fastened in

a number of places to the head frame. The catches are steel forgings hung by the pin, and are prevented from turning over the centre by means of a rivet marked C, and take the weight off the cage by means of stopper B.

JOHN PRESTON.

THE SLICKENSIDES LETTERS.

Cobalt, Ont., Oct. 20th, 1908.

Mr. Geizhals, Toronto:

Dear Sir,—According to instructions, I examined your claim on the Boomflats, and report as follows: I reached your claim after a perilous passage in a canoe and effected a debarkation. I found that there were some unusual geological features presented, and therefore considered it advisable to return and secure the services of the eminent foreign expert and scientist, Mr. Lugenpeter. I was fortunate enough to find Mr. Lugenpeter free for a few days, and he returned with me at once to the claim. I am indebted to him for the scientific portion of the report. The practical suggestions are my own. Mr. Lugenpeter, however, authorizes me to state that he fully concurs in them.

We found that the claim consisted mainly of rock, which the local expert called "awful fine diabase," but Mr. Lugenpeter did not have such a high opinion of it, as he explained the acid edge was lacking, and, in fact, the basic properties predominated. He therefore did not consider the chances so good.

I would advise you to refer to Mr. Obalski's paper entitled "La Probabilite de trouver des Mines."* The whole theory of prospecting is embraced in this, and it is expensive to acquire the same knowledge practically. Mr. Lugenpeter, although urged, would not state definitely what the "Probabilite" was in your case. The rocks, which Mr. Lugenpeter pronounced a "metamorphosed gabbro with phenocrysts of amphibole," contained a number of cracks or seams, which were filled mainly with mud. The local expert pointed out some calcite of a fine quality, but we were unable to see any silver. It was an off day for silver evidently.

The workings consisted of a hole or incipient shaft about 10 feet deep. This would be dangerous for rabbits, but otherwise will not do any harm, provided it is not extended any farther vertically. I would suggest that you have some poultry netting put round the shaft to keep things from falling in. There is nothing in the shaft now, and it would be a pity to see anything go into the hole.

Mr. Lugenpeter would not accept any direct remuneration for his services, except the actual expenses. He is, however, profoundly interested in the establishment of a fund to found an institution to teach prospecting solely. He leaves the amount of the fee you will pay to this fund entirely to yourself. No doubt the sum you decide on will be in keeping with the highly illuminative and valuable opinions quoted above. As soon as the fund has accumulated sufficiently, the institution to teach La Probabilite de Trouver des Mines au nord de la Province d'Ontario will be founded. I remain,

Yours faithfully,

J. M. SLICKENSIDES.

*Paper read at the Quebec meeting of the Canadian Mining Institute, 1906.

Toronto, November 15th, 1909.

Mr. Geizhals, Toronto.

Dear Sir,—Subsequent to the date of my report of October 20th, Mr. Lugenpeter communicated with the well-known authority, Dr. Bartyrlowell, whose abstruse writings on the aplitic phase of the diabase have excited so much interest among prospectors. Mr. Lugen-

peter, with the true modesty of science, was quite willing to concede Dr. Bartyrlowell a place among scientists fully equal to his own. He considered that in every respect Dr. Bartyrlowell was entitled to rank with him.

Dr. Bartyrlowell fully concurred with Mr. Lugenpeter in the opinions expressed above. I consider, therefore, that this settles the matter entirely, and that there is no doubt about the report being correct and final and conclusive in every respect.

Yours truly, J. M. SLICKENSIDES.

BOOK REVIEWS.

Clays, Their Occurrence, Properties, and Uses. With Especial Reference to those of the United States. By Heinrich Ries, Ph.D., Professor of Economic Geology in Cornell University.

Second Edition Revised—8 vo, xix+554 pages, 112 figures, 44 plates. Cloth, \$5.00 (21 shillings, net). John Wiley & Sons, New York. Chapman & Hall, Limited, New York. 1908.

Whilst Dr. Ries' object is to treat his subject particularly from an American (United States) point of view, more than half of his volume is composed of information that is of general application. In the first four chapters, comprising 311 pages, the following topics are discussed:—Origin of Clay, Chemical Properties of Clay, Physical Properties of Clay, Kinds of Clays, Methods of Mining and Manufacture. The remainder of the book is taken up with a detailed account of the distribution of clay in the United States, including many chemical analyses and useful geological observations.

The former chapters are, therefore, the more important to the Canadian reader.

In Chapter I. is given a careful elaboration of the origin of clay, the weathering processes involved, kaolinization, residual clay, kaolin, mechanical changes, chemical changes, consolidation, concretions, and other kindred phases in the formation and history of clay deposits. It is impossible here to note many of the features of this chapter. Dr. Ries' classification of clays, however, is worthy of special attention. The following are the main heads of his scheme:—

- A. Residual Clays. (By decomposition of rocks in situ.)
- B. Colluvial Clays, representing deposits formed by wash from the foregoing and of either refractory or non-refractory character.
- C. Transported Clays—
 1. Deposited in water.
 2. Glacial clays.
 3. Wind-formed deposits.
 4. Chemical deposits.

Dr. Ries' gives this classification in much more detailed form than the above. His scheme is, we believe, the most satisfactory and least arbitrary one that has yet been offered.

Chapter II., entitled "The Chemical Properties of Clay," is an excellent resume of functions and influence of the essential and incidental constituents of clay. The interpretation of ultimate chemical analyses is thoroughly discussed. Rational analyses, which have for their object the determination of the percentage of

the different mineral compounds present, are explained; and the two methods are correlated. For both methods the laboratory routine is given. The effect of each mineral constituent upon the process of manufacture and upon the finished article is carefully explained.

"Physical Properties of Clay" is the title of Chapter III. Here such qualities as plasticity, texture, tensile strength, fusibility are defined and discussed. In both Chapters II. and III. the bearing of chemical and physical investigation upon the commercial value of clay is constantly kept before the reader.

Chapter IV. defines the different varieties of commercially valuable clays, and describes methods of mining and manufacture.

The remaining chapters deal with the geology and distribution of the clay deposits of the United States. Many of these deposits are, of course, closely related to neighbouring Canadian occurrences.

Dr. Ries has carried into his work a large and compelling enthusiasm. Whilst his capacity for minute and painstaking observation is obvious, it is also clear that he has grasped the economic philosophy of his subject. Hence his book is unquestionably profitable to all those who seek a wider knowledge of the possibilities of the clay industry, an industry that should presently attain large proportions in Canada.

PERSONAL AND GENERAL.

Mr. O. B. Smith, superintendent of the Granby mine, has gone on an extended trip to California.

Mr. R. B. Watson, general manager of the Nipissing Mines Co., was in New York recently on company business.

Dr. J. E. Woodman, of Dalhousie University, Halifax, has been appointed professor of geology in the University of New York.

Mr. E. E. Musgrave, general agent for the Tye Copper Co., of Ladysmith, B.C., is in Mexico arranging for purchases of ore for shipment to the Tye smelter.

Mr. A. J. McMillan, managing director of the Le Roi, has returned from London, England, where he attended the recent annual meeting of the Le Roi Mining Co.

Mr. W. A. Carlyle, consulting engineer of the Le Roi, is leaving for England to confer with the directors regarding the proposed exploration and development of the mine.

Mr. A. B. W. Hodges, general superintendent of the Granby Company, has been on an extended trip to Arizona and Mexico, where he inspected several of the large smelting plants.

Mr. Walpole Roland, consulting mining engineer, Port Arthur, Ont., who met with a serious accident about two months ago while engaged in professional work, is nearly recovered from his injuries.

Mr. A. B. W. Hodges, general superintendent of the Granby Company, and Mr. R. H. Stewart, manager of the mines of the Consolidated Mining and Smelting Co., have been interviewing the B. C. Government regarding some changes to be made in the code of mine signals now in use.

The following gentlemen were elected to membership at the regular March meeting of Council, held on the 2nd instant:—

Members—J. Austen Bancroft, McGill University, Montreal, Que.; J. L. Coulson, M.E., 186 Beverley

Street, Toronto, Ont.; James M. Macoun, Geological Survey, Ottawa, Ont.; James McGregor, Inspector of Mines, Box 668, Nelson, B.C.; Armand Mosco Vici, Box 544, Montreal, Que.; Horace G. Nichols, M.E., Ymir, B.C. Prof. Wm. Nichol, Queen's University, Kingston, Ont.; Sydney Smith, General Manager Duchess Silver Mining Co., Cobalt, Ont. formerly associate member); R. B. Watson, M.E., care Nipissing Mining Co., Cobalt, Ont.; R. P. D. Graham, Montreal, Que.

Associates—A. W. English, Giroux Lake, Ont.; M. Gallagher, Standard Explosives, Ltd., 132 Board of Trade Building, Montreal, Que.; Alfred McMillan, Rossland, B.C.; Chas. A. Smart, 33 Sussex Avenue, Montreal, Que.

CORRESPONDENCE.

To the Editor Canadian Mining Journal:

Dear Sir,—I read with interest your editorial comment on Mr. Corkill's report for the Ontario Bureau of Mines, in which special reference was made to the undue prevalence of accidents in the Cobalt district. The question of the accident rate in mines is one of such wide importance, from the humane as well as the economic point of view, that on exchange of data and experiences between various mining fields may prove of service, even when the conditions obtaining may appear fundamentally dissimilar. Upon the Rand gold fields, which employ 185,000 men, 700 to 800 annually lose their lives through mining accidents. This high rate of 4 per 1,000 is largely due to the great number of native labourers employed. The advantage of placing men of good technical qualifications even in the lesser positions of control has been evinced during the last year or two by a remarkable advance in underground efficiency and decrease in costs. But the change, the application of engineering principles and other organization where all was previously under the careless direction of the rule-of-thumb man, has also had its marked effect on the accident rate. The figures for 1907 and 1908 (the latter year essentially one of high pressure work) compare as follows:—

Men Killed Owing to—	1907.	1908.
Fall of ground.....	197	204
Explosives.....	280	209
Other accidents.....	333	299
	810	712

There was thus a decrease of 100 in the fatalities in 1908, although there were 10,000 more men employed. The influence of the more capable and scientific supervision is further indicated by the large decrease of accidents due to explosives, which class of mishap is above all others attributable to carelessness or inefficiency.

The current half year is unfortunately destined to show an unfavourable record owing to the flooding disaster at the Witwatersrand mine, by which 125 men lost their lives. But it is most probable that the rate will show a steady decrease in future under the better systems of supervision being gradually established.

Yours faithfully,

RALPH STOKES.

Eckstein's Central Administration, Johannesburg S.A., Feb. 20th, 1909.

Bridgewater, N.S., March 8, 1909.

Editor of The Canadian Mining Journal, Toronto.

Dear Sir,—In answer to the questions of Mr. J. D. Ramsay in your issue of March 1st, I beg to reply as follows:—

I stated that I objected to the conclusion of Prof. Haultain that free-milling gold ores in general could be valued more accurately by assaying than by mill-test.

I also stated that in my remarks I referred particularly to the free-milling gold ores of Nova Scotia.

I am not familiar with the Rand ores; but I can hardly believe that even with them an assay is more accurate than a mill-test, provided, of course, that the samples for both are taken with the same degree of accuracy. I may say that my sampling has been done carefully and systematically in all cases.

Of course, the gold is unevenly distributed through the veins. There are very few free-milling gold ores in the world where the gold is not so distributed.

Yours truly, E. PERCY BROWN.

IMPRESSIONS OF COBALT.

To the Editor of the Canadian Mining Journal:

In the "London Mining Journal" of February 6th "an occasional correspondent" has an article under the above heading, his second impressions after a two weeks' stay in the camp. Naturally, after so short a visit, especially in the winter when the snow lies heavily on the ground, a man is more than likely to get certain false impressions.

He says in speaking of the Keewatin: "This formation, then, is far from hopeless, as was at one time imagined; certain veins in passing into the Keewatin from conglomerate or diabase have at first suffered impoverishment, but on further exploration have regained their valuable contents." This correspondent has been misinformed. The Keewatin was never

thought to be hopeless. From the early days of the camp certain productive veins have been known to occur in the Keewatin. The correspondent is quoting others, rather than recording his own observations, when he says that certain veins which have suffered impoverishment on passing into the Keewatin, from conglomerate or diabase, have again regained their valuable contents. To quote again from the article: "In the central portion—notably in the O'Brien and Nipissing—there does not seem to be any favor evidenced for either conglomerate, diabase, or Keewatin; farther east it is reported the Drummond mine in passing from diabase to Keewatin changed for the worse, whilst the Nova Scotia had a direct reversal, being greatly benefited." While the O'Brien has good veins in both the conglomerate and diabase, it may be asked what percentage of the output has come from the Keewatin? The Nipissing has had one good vein in the Keewatin, but the great majority of their numerous veins have been in the conglomerate. The Drummond vein was in conglomerate, and not in diabase. The Nova Scotia vein is in Keewatin at the surface, and passes downwards into a diabase sill.

The article has the following sentence: "Personally, from what I have recently seen, I should consider the Montreal River section quite equal to duplicating the present output of the Cobalt section." Mining men are frequently accused of being optimists; this correspondent is certainly one. Whatever may be the future of the Montreal River section, there is nothing to lead one at present to say that it will duplicate Cobalt in silver production.

Doubtless the correspondent has intended in his article to give readers of the "London Mining Journal" a fair and unbiased account of the Cobalt camp from impressions which he has gathered. The article is simply an illustration of the kind of stuff with which the public is fed during a mining boom.

Yours, etc.,

READER.

INDUSTRIAL PAGE.

AN INDUSTRY WITH TRADITIONS BEHIND IT.

The B. Greening Wire Company, Limited, Hamilton, Ont., has issued a large illustrated catalogue. In a prefatory historical note much matter of interest is given. Very rarely in this country can the family history of the heads of an enterprise be traced back for several centuries. The Greening family, however, since the year 1600, has been connected with the wire and allied industries.

It is on record that about 1600 A.D., at Tintern Abbey on the Wye, pins and needles were manufactured by a member of the Greening family. In the year 1799 Nathaniel Greening, at the age of 20, went to Warrington from the Tintern Abbey wire mills, and there established a business in wire drawing on Bridge Street, near the site of the present Lion Hotel. A few years later the firm of Greening & Rylands was formed. This concern lasted until 1840, when the partnership was dissolved. Mr. Greening then took his sons into business under the firm name of N. Greening & Sons.

The late Benjamin Greening, second son of Nathaniel Greening, had served a seven years' apprenticeship with Greening & Rylands as a wire drawer. On the

completion of his apprenticeship he commenced business for himself, and continued until 1858. He then removed to Canada, and became one of the pioneers of the industry here. Under the firm name of B. Greening & Co. he carried on the enterprise successfully until his death in 1877. His son, S. O. Greening, succeeded him, and added largely to the works. In 1889 the B. Greening Wire Co., Limited, was incorporated as a joint stock company. Since that time important additions have been made annually to the plant and equipment. In 1907 very extensive additions were made, including an entirely new weaving mill and plant of the finest description.

The Greening catalogue contains detailed descriptions of the various grades and kinds of wire cloth for screening, milling, bolting, fanning mill use, etc., etc. Perforated metals, brass and copper wire cloth, window guards, steel wire chains, and numerous other articles are listed, with full specifications, in the catalogue. Mining men will find the pamphlet useful in their offices.

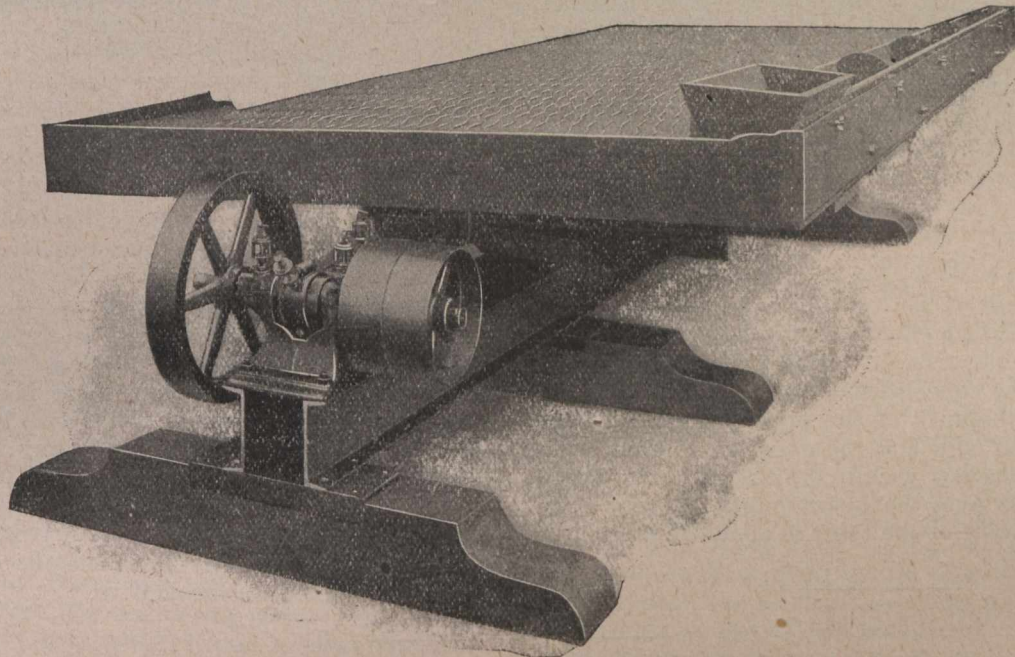
THE HENNIG ORE CONCENTRATOR.

Reference was made in the Canadian Mining Journal of March 15 to the Hennig concentrating table. Through the courtesy of the manufacturers, the Ore Dressing Machinery Co., 114-118 Liberty Street, New York, we are enabled herewith to reproduce several cuts that will illustrate the principles and working of the table.

The driving gear is in one piece, and includes fast

crosspieces made of 8-inch by 8-inch timber, and resting on these crosspieces are two 9-inch channel bars. The table proper rests upon the two crosspieces, the four corners of which are fitted with short steel pins that have ball ends. These pins work freely in sockets fitted to the ends of the crosspieces on the bottom of the table.

Fixed rigidly to the channel bars are the crosspieces, and projections from the crosspieces work freely be-



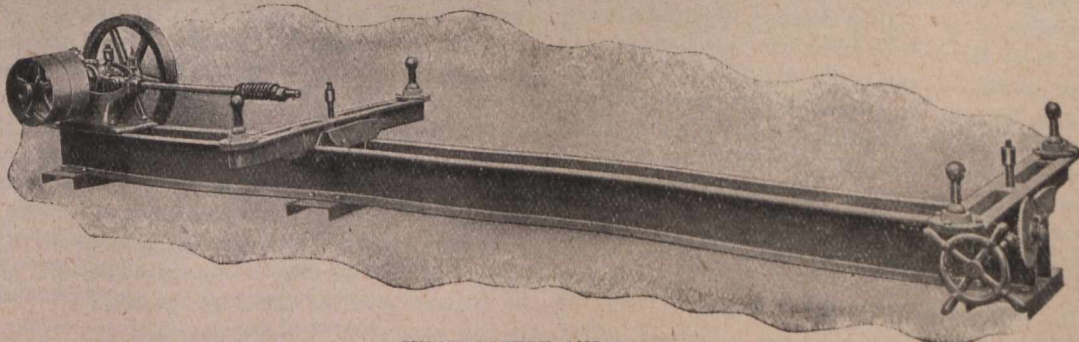
THE HENNIG CONCENTRATOR.

and loose pulleys, balance wheel and double eccentric drive. Three-quarter horsepower is required to drive the table. The longitudinal oscillations may be varied from nothing up to 15-16 inch. The rate of the oscillations range from 150 to 180 per minute.

The Hennig table is provided with a total length of 1,256 feet of riffles. Each riffle is made up of semi-circular metal strips. Each metal strip is 5-6 inch wide and 3-16 inch high, except when flattened. At the feed

tween guides attached to the bottom of the table. The guides may be set at any angle with the line of the driving rod, thus giving the required amount of side motion. From the ball-and-socket arrangement mentioned above a rocking motion may be imparted. Thus these three motions, longitudinal, side, and rocking, reproduce closely that of the orthodox prospector's pan.

The feed trough is 15 feet 7 inches long, 3 inches high, 8 inches wide at the feed end, and 3 inches wide



SUBSTRUCTURE AND DRIVE.

end of the table the distance between the riffles is 3 inches, while at the discharge end it is only $\frac{3}{4}$ inch. These figures vary according to the requirements of the ore under requirement.

The riffles are flattened as the discharge end of the table is approached, and are arranged in sinuous curves.

The foundation of the table consists of three 5-foot

at the discharge end. Adjustable gatelike strips divide the trough into five compartments, leaving spaces anywhere from 1-10 inch to 5-16 inch. The pulp is fed onto the table through holes placed $2\frac{1}{4}$ inches apart in the outer side of the feed trough. At the feed end of the table these holes are $\frac{3}{4}$ inch in diameter. Those at the discharge end are only $\frac{3}{8}$ inch. The feed trough is capable of adjustment to within 0.001 inch.

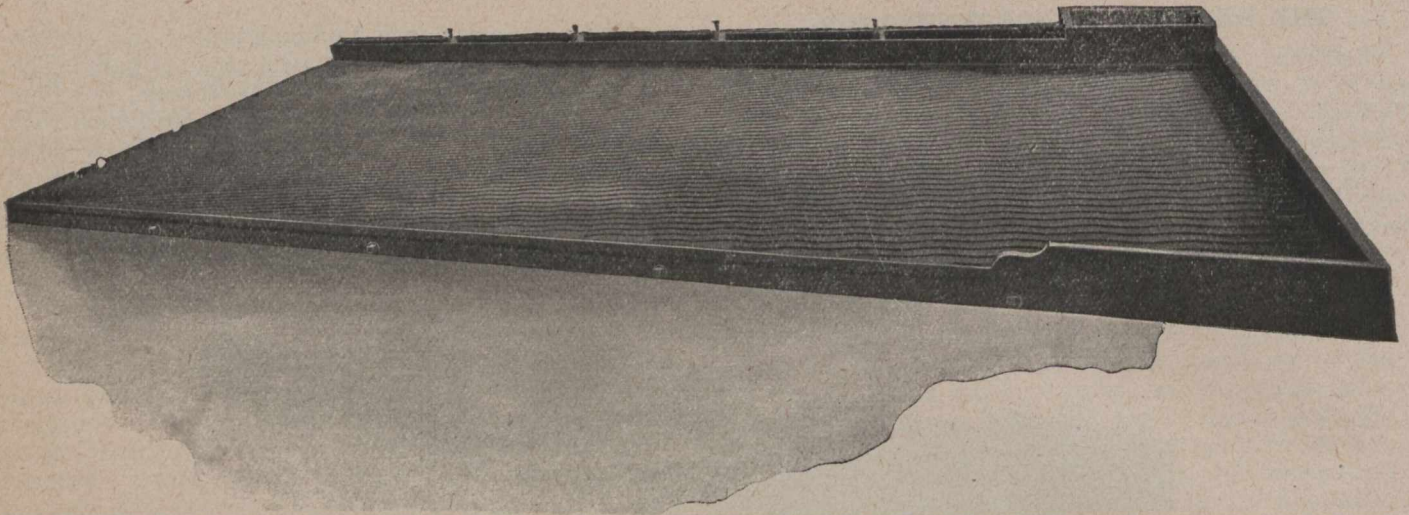


TABLE AND FEED TROUGH.

The ore is allowed to pass into the wide end of the trough at the head of the table. The gates being adjusted, a concentrating effect is obtained by the grooves in the bottom of the trough. With proper adjustment 90 per cent. of the concentrates should be made in the trough, only the balance of the pulp passing over the table. The curved riffle and the gyratory motion cause the pulp to be washed within the arc of every small curve continuously over the entire length of every riffle. The average capacity of the table is about 50 tons in 24 hours.

Messrs. Jones & Glasco, of Montreal, who have been introducing Renold chains into this country, have been meeting with splendid success. The J. R. Booth Paper Company have ordered four main drives from motors 75 horsepower each. This firm has already had a Renold chain running night and day for three years, which shows no sign of wear. The Wire and Cable Company have ordered twelve of the drives, and several orders have been filled for single drives. The Bell Asbestos Mine has recently installed one of these drives to replace gears on a locomotive.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Free Coal.—The new U. S. tariff provides for free entry of coal, with an "if," and as usual an important "if." Uncle Sam is given to making offers in the subjunctive mood. Canada should know that by this time. The following figures will bear study. In the twelve months of 1908 the Dominion of Canada produced 10,511,426 tons of coal. She consumed 20,714,821 tons, or twice as much coal as was mined in the Dominion. The deficiency between her coal output and consumption was made up from the coal fields of the United States. It is usually supposed that the bulk of the coal importations into Canada from the United States consist of anthracite coal, which cannot be produced in Canada, because we do not possess anthracite coal fields. This is a comfortable belief, but what are the facts? The coal imported into Canada from the United States amounted in 1908 to a total of 10,203,395 tons. Of this amount 7,084,130 tons, or approximately 70 per cent., was bituminous coal, while 3,119,265 tons, or 30 per cent. only was anthracite, and anthracite dust.

The coal mining industry of the Dominion has not made the strides it should have done. It has lagged behind the other mineral industries of Canada. In 1900 the total Canadian coal production was 5,777,319 tons. Last year, as previously mentioned, it reached 10,500,000, being an increase in nine years of four and three-quarter million tons. This figures out to an annual increase of half a million tons annually.

Compare this with the coal production of the United States. This has now reached the appalling total of five hundred million (500,000,000) tons per annum, and the output is increasing at the rate of fifty million (50,000,000) tons yearly. Compared with the coal mining industry of the United States, our Cana-

dian industry is very small beer indeed. But, small as it is, the coal mining industry yields one-fourth of the entire revenue that is obtained from the mineral output of the Dominion.

Will free coal tend to enlarge the growth of the coal mining industry? If under the fostering care of protective coal duties the industry has advanced by such insignificant increases in output, what will happen when the protection is removed and the barriers are let down?

It has become the fashion to believe that Canada is very poorly supplied with coal seams, and indeed it is rare to find anyone, outside of the limited circle of the men engaged in the coal industry, who has any true conception of what Canada possesses in the way of coal. It is quite true that from New Brunswick to Manitoba coal is not to be found, and that, as the recent Government Report puts it, "the coal fields of Canada are not found in proximity to the centres of population." Such a statement might be fairly modified if it read "not found in proximity to the present centres of population." Coal has a way of attracting population, and some day in Canada it will be far more correct to say that the coal fields "are in proximity to the large centres of population."

The report just referred to states that 60 per cent. of the Canadian output is produced in the Maritime Provinces, and 40 per cent. in the West. How long will it be before these figures are reversed? The report is accompanied by a map of the prairie provinces, Manitoba, Saskatchewan and Alberta, on which the coal-bearing country is indicated by green colouring, and there is green enough to satisfy an Irishman on St. Patrick's morn. From the Peace River to Saskatoon, a distance of 600 miles, is one continuous stretch of coal-bearing land. To quote from the Government's Report: "It is difficult to realize

the immense area underlaid by coal-bearing rocks in these provinces. Mr. Dowling, of the Geological Survey, has shown in a recently published map that there are four different coal horizons, all more or less productive, reaching from the summit of the Rockies to Manitoba between the international boundary and the Peace River."

New collieries are being opened up all the time in the Western coal field, and new coal companies in large numbers are seeking incorporation. Indeed, Western Canada seems on the eve of becoming one of the great coal-producing districts of the North American continent. In comparison to the vast coal deposits of Alberta and Saskatchewan the coal fields of the Maritime Provinces are small.

Free admission of American coal into Canada would spell ruin, absolute and irremediable ruin to Nova Scotia. How very dependable Nova Scotia is on her coal fields may be gathered from the fact that the idleness of one single colliery through fire was given as a partial excuse for a deficit in the provincial revenue in 1907. There is a coterie of mild lunatics in Nova Scotia who call themselves the "Free Coal League." At least one hears about this league occasionally, and therefore its existence is presumed, although some people say it is a one-man show. Letters from the league refer to the "incredible folly" of Canadians in refusing Uncle Sam's offer of reciprocity in coal. They claim that if the New England markets were open to Nova Scotian operators we should be shipping from this Province "16,000,000 per annum, instead of 600,000 as at present." The general argument of the reciprocity advocate is that New England is the natural market of Nova Scotia. Maybe, only New England is in the United States and Nova Scotia is in Canada. But aside from that, could Nova Scotian operators compete successfully with American operators even in New England? The United States coal trade papers say not, and they should know what they are talking about. "Mines and Minerals," in a very frank editorial, says in effect that free admission of U. S. coal into Canada would give to the American operators a large and profitable market, and at the same time the Nova Scotian coal operators could not successfully meet West Virginia coal in New England. If U. S. coal trade papers write in this strain, and if they see great advantage to themselves in a free coal arrangement, even for that particular territory which is claimed to be natural market of this province, how can that advantage be ours also? In vain is the net spread in the sight of any bird.

U. M. W. A.—On the application of two members of the U. M. W. of America, the Department of Labour has granted a Board of Conciliation to inquire into an alleged dispute between the Dominion Coal Company and its workmen. In their application the U. M. W. A. claim that the Coal Company has discriminated against members of the U. M. W. A., and has given preference to members of the Provincial Workmen's Association. That is about the gist of the complaint of the U. M. W. A., and they make the usual statutory declaration that unless the grievance is adjusted a strike will take place.

The Company have replied to the application in a very brief document. They say that no discrimination has taken place, but assert the right of the management to give preference of employment as the Company see fit. The reply says that recent, owing to dulness of trade, there has not been employment for all, and preference has been given in dispensing employment to members of the P. W. A., with which body the company have a contract for two years, and to which the majority of their workmen belong. The company state the prosperity of the Nova Scotian industry depends on its ability to meet American competition in Canadian market; that it would be most prejudicial to the industry of the workmen employed were under the control of a foreign union such as the U. M. W. A. having its headquarters in the United States. The reply concludes as follows: "It is a well-known fact that the coal

operators of the United States are making strenuous efforts to oust Nova Scotian coal from the St. Lawrence markets, and the Dominion Coal company is determined to protect its business and the vital interests of its employees by preventing this foreign labour union from exercising control over the majority of its workmen."

The Coal Company have refused to appoint a representative on the Board, and the Government have appointed Mr. Geo. S. Campbell, of Halifax, to act in this capacity. In granting the application, the Government appointed as the U. M. W. A. representative on the Board a person who is the local president of the U. M. W. A., and who is furthermore one of the persons against whom discrimination is alleged on the part of the Coal Company. The appointment is one that is open to justifiable criticism, and it can only be surmised that the department was misinformed when it made the appointment. If the appointment was made with a true knowledge of the facts, it makes a farce of the whole proceeding, and the precedent, if followed, will speedily negative the usefulness of the Industrial Disputes Act. It is understood, however, that the department acted under a misapprehension of the circumstances. The chairman, at the time of writing, was not appointed.

This Board of Conciliation will have an unusual task to perform, inasmuch as no dispute exists as the term is generally used. There is no question of wages or hours to be adjudicated upon, and there can be but little doubt that the framers of the Industrial Disputes Act had not foreseen the possibility of the Act being used as a means to force the recognition of a foreign trades union. Indeed, it is a little difficult to see how the terms of the Industrial Disputes Act can be said to cover the application of a foreign trades union, because the actions of such a union are beyond the purview and the jurisdiction of the Canadian law courts. The headquarters of the U. M. W. A. are in the United States, and all the members of the union must be governed by the orders which emanate from headquarters, or they cease to become members. Being outside the jurisdiction of the Canadian courts, the pains and penalties of the Act cannot apply to the officers of a foreign union, and it is difficult to see why the converse should not be true. The rulings of the Supreme Court of Canada would not be regarded in Indianapolis, but, under the constitution of the U. M. W. A. the rulings of Indianapolis must be obeyed in Canada. Herr Bebel, the leader of the Sozial-Demokratik party of Germany, might as fairly ask for the intervention of the Department of Labour as Tom Lewis, of Indianapolis. The cases are perfectly analogous.

ONTARIO.

Cobalt.—In the March 15th correspondence it was stated that the Toledo Mines Co. had purchased a plant from the Sullivan Machinery Company. This was not the case, the plant in question being supplied by the Canadian Rand Co.

By far the most important find of the year in Cobalt was made by the Nipissing Mines Co. in their No. 64 shaft at a depth of 172 feet. The men were cutting out a station at this level when the vein was found, and the dip is such that it will come into the shaft a short distance below the stations. The vein matter is smaltite, niccolite and native silver, with small amounts of bismuth. The vein varies in width from 13 to 30 inches, and will average about 22 inches. The ore is high-grade, and will assay several thousand ounces to the ton. While cutting out the station 13 tons of ore were taken out. No. 64 shaft is situated a few hundred feet east of the Temiskaming & Hudson Bay shaft, and the vein is supposed to be a continuation of one worked by the latter company. Several hundred feet of prospecting drifts on the 80-foot level failed to show any signs of the vein.

Great interest has been aroused by the new find made at the Cobalt Lake. On March 15th, when working in the west cross-cut from No. 6 shaft, at a depth of about 133 feet, a high-grade silver vein from 2 to 12 inches in width was discovered. A round of holes was fired on Saturday night, when coming off shift, but the ore was not discovered till Monday morning, when the men went in to do the mucking. The vein cuts the cross-cut at a slight angle, and is supposed to be a continuation of one of the McKinley-Darragh veins.

No. 8 vein of the Coniagas mine, which gave good results on the 75-foot level, has been struck again on the 150-foot level. The vein carries high values, and the wall rock is highly mineralized. The company's concentrator is treating about 80 tons of ore a day and produces one car of concentrates a month, assaying in the neighborhood of 2,000 oz. per ton. The shipments of the mine are very regular, and average one car of high-grade ore and one car of concentrates a month. The ore is treated by the smelter at Thorold, which is owned by the Coniagas people. A force of over one hundred men is employed at the mine.

Extensive development work is being carried on at the Trethewey mine, and the company also have a contract with the T. & H. B. mine, whereby the latter company is drifting in the 150-foot level on a continuation of one of their veins, in Trethewey ground. A small concentrating plant is in operation, and this month the company has shipped two cars of high-grade and one of low-grade ore to the smelters. A new jig and a concentrator table has been added to the ore-house. A force of 60 men is employed on the property.

Considerable development work is being done in No. 3 shaft of the Right of Way. At the 75-foot level the cross-cut running northeast has been driven over 200 feet, and the management expect to strike a good vein shortly. The vein has been traced on the surface, and was also worked by the Silver Queen, where it showed high values. A winze is being sunk from the present workings, and is now down 35 feet. It will be continued till a depth of 75 feet is reached. In No. 2 shaft, which is the main working of the mine, the new vein on the north side is being followed on the second level. This vein was found about a month ago, and has been drifted on for over 70 feet, and it carries high-grade ore. Very little stoping is being done on the property, most of the ore coming from development. A force of 90 men is employed.

Another strike has been made at the Chambers-Ferland, a 5-inch vein of cobalt having been discovered in the workings from No. 2 shaft.

The new 14-drill tandem compound air compressor for the Crown Reserve is now on the ground, and will be installed shortly.

The annual report of the Temiskaming mine has been issued, and shows a production for the year of 831 tons of ore, which produced 1,026,285 oz. of silver of a net value of \$494,211.46. A new plant with a greatly increased capacity has been installed, which will enable the company to carry on their mining operations on a much larger scale than heretofore. No. 1 shaft has been continued from the 200 to the 250 foot level, and the new No. 2 shaft with three compartments has been sunk to the 200-foot level.

A new strike has been made at the Columbus mine in the 250-foot level of the main shaft. Some time ago the mine was flooded by a subterranean body of water, but this has been pumped out and work resumed.

At the Kerry Mining Company's lease at Cart Lake a strike of importance was made on March 14th in the north cross-cut at the 100-foot level of their No. 1 shaft. The vein is calcite, carrying values in native silver. At the company's lease on

Peterson Lake, a station is being cut at the 125-foot level in preparation for drifting on a vein of calcite and native silver. The company intends to order new boilers and a compressor, as their present plant is inadequate to handle the work. A force of 40 men are at work on the property.

The Davis property, north of the Shamrock, has been leased to Mr. Bilsky, of the Nova Scotia, and his associates. They will obtain air from the Badger mine, the pipe for which is now being laid. Drills have been purchased, and work will be commenced as soon as air is ready for delivery at the mine.

A contract has been let to sink a 100-foot shaft on the property of the Eastbourne Cobalt Mining Co., located near the Badger mine. Several promising veins have been encountered in surface prospecting, and it is on one of these that the shaft will be sunk.

The Alexandria mine has struck good ore at the 170-foot level of the shaft. The vein was encountered at a depth of 160 feet, but at that time was only a very narrow stringer of calcite, but it subsequently widened and showed good silver values. The shaft will be sunk to the 200-foot level, when a cross-cut will be run to tap the No. 2 Bailey vein, lying about 60 feet south of the shaft. This vein shows up well on the surface. The present compressor is too small to do the work required, so a larger one will be installed.

The new compressor and gas producer plant recently installed at the Keeley mines will be ready to start in a short time. Silver has recently been struck in the No. 2 shaft.

The John Black Mining Co. is putting in a small boiler and hoist for development work.

The Bailey mine intends to put in a plant in a short time.

The Silver Cross Mining Co. has purchased a 60 h.p. boiler and a 3-drill compressor. The company intends to carry on the work on a larger scale than formerly.

Twelve men are employed at the Gifford mine sinking the shaft, which is now down to a depth of 75 feet. The shaft will be sunk to the 200-foot level before any drifting is done. Air for one drill is supplied from the Temiskaming mine, and the hoist is run by a small boiler.

Montreal and Buffalo capitalists have incorporated the Goodwin Lake Mines Co., the holdings of which consist of two hundred acres in the western edge of Lorraine Township. The company intends to push the development work as rapidly as possible.

The Quaker City Cobalt Mines, which have been closed down for the past year, have resumed operations. A 30 h.p. boiler, hoist, pump and two drills are now on the ground, and will be ready to commence operations about the last of March. A shaft 40 feet deep has been sunk on a calcite vein, and the company intends to continue sinking until a depth of 150 feet is reached. At that depth drifts will be run in the vein, and cross-cuts to tap parallel veins which show on the surface.

The Cobalt Rosario Mining Co., which owns two 20-acre claims in the vicinity of Iron Lake, Coleman Township, are sinking two shafts, one of which is down 35 feet, and the other 15 feet. They will be continued to the 100-foot level. The company has been doing surface prospecting since last summer, and has shown up some calcite veins.

The Century mine in Bucke Township has bought a three-drill compressor and a 60 h.p. boiler. The machinery is now being installed, and it is expected that it will shortly be in operation.

Considerable work is being done by the Cobalt Mutual Mines operating in Bucke. A contract has been let for one hundred feet of drifting from the lower level of the shaft on the claim located in Lot 1.

A force of ten men is doing development work on the property of the Haileybury Silver Mining Co. in South Lorraine. Drifts are being driven on the vein at the 72-foot level in No. 2 shaft. The vein is from four to five inches in width, but does not carry much silver at the present time.

W. H. Hayden, consulting engineer for the Elk Lake Cobalt Mines of Ontario, in the Elk Lake District, is putting in duplicate plants on two of the company's properties. Each plant will consist of a 60 h.p. locomotive boiler, a three-drill straight-line Rand compressor, a hoist and drills. Mr. Hayden is also putting in a similar plant for the Temagami Cobalt Mines of Ontario.

A force of 16 men is at work in the Devlin mine, Elk Lake, sinking two shafts, which will be continued to a depth of 100 feet. The company expects to be in a position to install machinery by next summer.

The Wettlaufer mine in South Lorraine has purchased two 60 h.p. locomotive boilers, a compressor and hoist.

The Montrose Syndicate Mines, operating in the same district, intend putting in a small plant for development work.

Mr. J. W. Ford, of Haileybury, has put in a small plant at his mine, located out near the Temiskaming.

Considerable activity is being displayed in the Larder Lake District, and machinery and supplies are being sent in over the road. The Reddick mine will install a gas producer, which will run the compressor. Fifteen men are working on the property, but a much larger force will be employed in the near future. The Victoria Creek Mining Co. are opening up properties with a force of fifteen men. A shaft, which will be sunk to a depth of 100 feet, is now down 40 feet.

Silvers, Limited, in Gowganda, have ordered a small plant. Work on the property will be pushed as rapidly as possible, and a carload of machinery and supplies has been shipped. A contract has been let for sinking a 100-foot shaft, and 100 feet of drifting from that level. The shaft is now down a short distance on the vein, which carries exceedingly high silver values.

Mr. C. A. Foster is putting in two 25 h.p. plants on his properties in Gowganda.

Twenty men are employed in mining operations at the Gowganda Queen mines, whose property consists of seven claims in the Gowganda District. Permanent camps have been erected, and excellent progress made with the development work.

The Cragg Mines, of Gowganda, have made an important strike. A vein three inches in width and carrying high silver values has been discovered and stripped for over fifty feet. A tunnel will be run to tap the vein at a depth of 100 feet.

The shaft on the Mann property is down over 25 feet, and will be sunk to the 100-foot level before a station is cut. Another shaft on the north lot will be sunk to the same depth. Two 25 h.p. plants are being installed, and a force of men are at work erecting additional camps.

A 10 x 6 vertical shaft is being sunk on the Boyd-Gordon property. Three veins are showing in the shaft which is now down to a depth of over 45 feet. These veins show very high values and considerable ore is already bagged ready for shipment. The ground, west of the shaft, is being cleared preparatory to starting an open cut, which will be worked while the shaft is being sunk to the 100 foot level. Over thirty men are at present employed on the property.

A shaft has been started on Captain Munn's property, south of the Bartlett Mines.

A good deal of the machinery for the Bartlett Mines is now on the ground, and the boilers are being brought in.

The Nipissing Central Railway Co. has asked for a franchise to build an electric road between Cobalt and Haileybury. The company guarantees that the road will be started by May 15 and finished November 1, 1909. A half hourly service would be maintained between the two towns. The line would be a great boon to the two towns, and particularly to those people who work in Cobalt, and who would live in Haileybury if possible, as the latter town is much preferable as a place of residence.

BRITISH COLUMBIA.

Rosslund.—The Le Roi 2, Ltd., which has just paid a regular quarterly dividend of two shillings per share, earned net profits of \$53,053 for the year 1907-8, exceeding the two previous fiscal years, when the figures were \$41,604 (1905-6) and \$12,555 (1906-7). The dividends paid during the three years mentioned amounted to \$37,800, against \$37,800 and \$12,600 respectively.

A good strike has been made on the ninth level of the War Eagle mine. The vein opened up at this point is forty feet wide and approximately 400 feet in length. Assays made so far show the ore carrying \$20 to \$100 in gold and copper. Large quantities of rich ore are being stoped from the eleventh and twelfth levels of the Centre Star mine, and from the four good ore shoots in the Iron Mask ground. The Trail smelter has entered into a long contract with the Le Roi 2, Ltd., for the treatment of its product, the arrangement during the past contract having proved profitable to both concerns. The Trail smelter is now treating 40,000 tons of ore per month, the gross value of the output per month being \$400,000 or \$4,800,000 per annum, approximately, of which about 40 per cent. is gold, silver 22 per cent., lead 22 per cent., and copper 16 per cent. Nearly all of the ore treated at this reduction works is derived from the mines of the Consolidated Co. itself.

The Le Roi mine was closed down for an indefinite period upon the return of A. J. McMillan, managing director, from London, last week. The working arrangements at the mine were somewhat unsatisfactory, as very little headway could be made in the affairs of the company as long as the shipments were so light. Mr. McMillan will return to England with Mr. W. A. Carlyle, consulting engineer, and if possible arrangements will be made to raise capital with which to explore the Le Roi ground as it should be explored. It is thought that the outcome of this move will be the organization of a company with sufficient capital to buy other mines, as well as do extensive development. In this way the Northport smelter could be run to its full capacity, and, with the installation of several modern appliances, on an economical basis.

Work has been suspended on the Giant-California group for an indefinite period.

Boundary.—Ore production at the Granby mines is up to the full capacity of the seven furnaces now working at the Grand Forks smelter; in fact, there is a surplus of ore in the bins at the smelter, which has necessitated the mines closing down an occasional Sunday. The production at the Mother Lode mine of the B. C. Copper Co. is going along steadily, but there was a cessation of operations at the Oro Denoro a few days last week.

At the Snowshoe mine the working force was reduced during the past seven days, as owing to a surplus of ore on hand at the Trail smelter shipments from this mine had to be curtailed.

In a report on the Dominion Copper Company's property, made in June last, F. A. Provot gives a few facts of interest concerning the costs for mining, smelting, etc. There is a probable ore reserve in the Rawhide and Idaho claims of this company of between two and three million tons of ore, which should average \$1 in gold, 18c silver and 22 lbs. copper, and which will very likely give a net recovery of 17 lbs. copper and \$1.15 in gold and silver to the ton. During the year ending July 31,

1907, the recovery was \$1.04 gold, silver 15c, copper 15.5 lbs. The copper recovery was rather low, owing to the large amount of Sunset ore, useful as a flux, put through the smelter to keep up the supply for the furnaces. Estimating what the Dominion Copper Co. could do, Mr. Provot says that treating a tonnage of 300,000 tons per annum they could mine and produce copper at the following figures: Cost of mining the ore per ton, \$1.25; smelting, \$1.38; converting, refining and marketing as per contract with the B. C. Copper Co., 3c per lb.; 17 lbs. would be 51c, making a total cost of \$3.14. Deducting \$1 for the value of the gold and silver would leave \$2.14 for the 17 lbs. copper per ton, or about 12c per lb. From this it will be seen that with copper at a normal figure, say 15c per lb., a profit of about \$120,000 per annum, could be realized. In all of the other mines of the Dominion Company than the Rawhide and Idaho extensive development work should be undertaken before the company would be warranted in making the necessary additions to the smelter. It would take \$50,000 to \$75,000 to place enough ore in the probable stoping areas of the different mines to warrant the resumption of operations and the installation of much-needed mining and smelting facilities.

A Boston company, F. W. Mason & Co., have sent a letter to the shareholders of the Dominion Copper Co., in which they voice the opinion that the right of the Reorganization Committee to sell the property of the company should be invalid after reorganization has been accomplished. This concern also thinks that the old shareholders should receive a bonus of 40 or 50 shares of the new stock when subscribing for the bonds instead of 10 shares. Their first contention seems sound, and the second is worthy of consideration. Reorganization is too often a game of "freeze-out" for the men who have put their good money into mining and industrial companies. The old shareholders should be able to get into the reorganized company on a good and fair basis, and it is only a matter of time until government supervision of corporations will control this feature of reorganization.

The Provincial Government has granted a charter to the Greenwood Tunnel-Tramway concern.

On the Bounty Fraction, near Beaverdell, high-grade galena ore is being taken from the new vein recently opened up, which is over three feet wide on an average.

Slocan-E. Kootenay.—The decision of the Supreme Court of the United States, removing the duty from zinc imported into that country, will very likely result in a large amount of zinc

ore being shipped to United States points pending the enlargement of the Nelson electric smelter.

The Consolidated Mining & Smelting Co. has taken a two and one-half years' lease on the Queen Victoria mine, near Nelson. Shipments and development work will be started as soon as things can be got in shape.

The greater part of the Silver King mine at Nelson has been unwatered, and the force is being augmented. Steady shipments will be made to Trail smelter as soon as the tramway can be put in good condition and stoping begun.

M. Davys has secured the Tiger group at a price of \$80,000, and will have arrangements completed to begin work on the property by the first of June. The group contains six claims.

It is understood, through advice received from London, that the Ymir Gold Mining Co. is putting out an issue of \$2,000,000 common stock. This will probably be used to raise capital with which to further develop the company's property.

What is known as the Echo group, comprising the Echo, Echo Fr., St. Elmo, Idaho, Portland and Ontario mining claims in the Sheep Creek district, have been bonded by Wm. Maher, of Nelson from the owners, who are Nelson, Rossland and Trail mining men. This property is situated on Summit Creek about four miles from the Mother Lode and Queen groups.

The Iona group of claims has been bonded by H. L. Rodger, of Spokane, for \$10,000. Work is to be commenced right away.

The International Coal & Coke Co. shipped 46,427 tons of coal during February, averaging over 2,000 tons for every working day. The net profit on the operations of the company last year was approximately \$275,000, after paying a dividend that absorbed about half of this amount the company shows a surplus of \$600,000 on the books.

Vancouver.—Operations are about to be resumed at the Ladysmith smelter. The plant will be operated to its full capacity this season.

Four claims have been staked by J. McCuish and Chas. Newman, on which there is a good showing of ore similar in character to that found in the Rossland district, although somewhat richer. Samples recently assayed show \$18 in gold, 25 oz. silver and something under 1 per cent. copper.

Jas. Cronin, erstwhile managing director of the St. Eugene, is deeply interested in a group of silver-lead mines in the Babine Mountain district. Work is to be started on this group as soon as the season opens.

GENERAL MINING NEWS.

NOVA SCOTIA.

North Sydney.—Rev. M. A. McPherson, of Little Bras d'Or, who has had a gang of men prospecting for coal at Leitches Creek, a few miles from here, has found a seam of anthracite coal eight feet thick, with every indication of a large quantity.

NEW BRUNSWICK.

Campbellton.—A company composed of Gloucester and Kent County men was formed last fall to explore lands in the St. Isidore district. Considerable preliminary work was done last fall, and this winter the government drill has been at work. At various depths seams of coal have been bored through, one being over two feet thick. Now at a depth of five hundred feet a seam four feet thick has been bored through. It is probable the deposit may be developed.

ONTARIO.

Cobalt.—A vein 21 inches in width, of smaltite and native silver, was found in No. 64 shaft of the Nipissing at the 175 foot level. This is the first shipping ore located in this shaft, which is situated near the T. & H. B. line.

During February the Nipissing mined ore of an estimated value of \$144,384, and shipped ore of an estimated value of \$190,640. The important developments of the month included the striking of ore in a raise from the 210 foot level of vein No. 26; the cutting of veins Nos. 72 and 101 at depths of 75 feet; and the continued good showing at the Fourth of July shaft.

The structural steel for the new shaft at the Temiskaming is now being hauled in. There will be a large quantity of second grade ore available for the concentrator, which the Temiskaming is to erect before the summer is over.

The Muggley concentrator has finished milling several thousand tons for the Nova Scotia mine.

The main shaft of the Nova Scotia is down 235 feet in the same ore as found in the new vein last summer. No. 5 and No. 6 levels, which are now 75 feet apart, are being connected up. No. 5 is down 160 feet. There are now 130 men at work on the property.

A new vein has been struck on the Cobalt Lake property running parallel with the drift from No. 6 shaft. The vein runs along the McKinley-Darragh boundary, but is not the McKinley-Darragh vein, as the shaft will have to be continued about fifty feet farther to cut the McKinley vein. The new vein is one foot wide and carries high silver values.

The appeal of the Coniagas Mines, Ltd., and of the Coniagas Reduction Co., against the freight rates of the Grand Trunk on ore shipped from the mines to the smelter in Thorold, has been set by the railway commission for hearing in Toronto in May.

The February shipments comprised 17 mines, with 71 cars, containing 2,103.85 tons, or an average of 79 tons per mine. For February, 1908, the shipments were 1,184.53 tons, so that the 1909 shipments are nearly double those of 1908.

A vein four to six inches wide was caught in a circular cross-cut, 65 feet from the west cross-cut at the 80 foot level of No. 2 shaft on the Chambers-Ferland, at a point 275 feet from the shaft. The vein has been drifted on to the north of the cross-cut for twenty-five feet. At this point the drift is between the walls of an eighty foot ore body suitable for concentrating purposes.

A four inch vein of calcite was found at the 100 foot level on the Cart Lake lease of the Kerry Mining Co., about 120 feet distant from the shaft.

At the Coniagas, No. 8 vein, which was rich on the 75 foot level, was located on the 150 foot level, and, although narrow, shows very rich ore.

Elk Lake.—Elk Lake is at present in the midst of its first mayoralty campaign. There are in the field two well-known and highly respected citizens in the persons of Mr. Ludger Joudouin, general merchant, and Mr. John Munroe, pioneer locator and ex-pugilist. Either candidate should make a good mayor and will undoubtedly change the complexion of affairs around Elk Lake.

At the 60 foot level No. 1 vein on Elk Lake Discovery has widened to three inches of ore.

The mining recorder here has recorded over 300 claims in the Shining-tree district to date. According to reliable informants there have not been many bona-fide discoveries.

Gowganda.—It has been officially announced by the C. P. R. that a canoe freight route will be established to Gowganda from Bisco, on the C. P. R. main line, 35 miles west of Sudbury.

The Government has made public the tenders received for Gowganda townsite lots. Over 500 tenders were received. One hundred and twenty lots were undisposed of. 130 lots are to be sold for \$17,664.50, or an average price of \$136. The highest bid was \$412, and the lowest accepted was \$25. The successful tenderers include parties in Toronto, Ottawa, Montreal, and New York.

In anticipation of a building boom enormous supplies will be rushed to the town as soon as the Government makes public its transportation policy.

BRITISH COLUMBIA.

Rossland.—A strike of considerable importance has been made in the War Eagle, in the ninth level. Drifting has shown the new vein to be 40 feet wide and 400 feet long, containing

heavy sulphides, with high gold values. This same vein has been productive on the tenth level, and while no work has been done on it in the upper levels it is thought the ore will extend several hundred feet above the ninth level and possibly to the surface.

Rich ore has been found on the eleventh and twelfth levels of the Centre Star in some of the larger stopes. During February the Centre Star made profits of \$30,000.

Recent developments on the Idaho have been most profitable. On the fourth level a stope 150 feet long by from 20 to 30 feet wide is producing a good tonnage of heavy sulphide ore, containing about ten dollars in gold, besides good values in copper and silver. On the main vein stoping is being continued westward, recent values in the west drift having been high.

Three furnaces are running at the consolidated company's smelter at Trail, treating about 1,000 tons of copper ore per day, from which are being produced six hundred tons of copper matte per month, containing \$240,000 worth of gold. The lead furnace averages 200 tons of ore per day. The lead refinery at Trail is producing 2,000 tons of pig lead per month, and is shipping close to 250,000 ounces of refined silver to China each month.

Pending arrangements for the exploration of the property down to 2,500 or 3,000 feet from the surface, the Le Roi mine has laid off a number of men. The exploration work carried on for some months past has proved disappointing, and it has been decided to suspend operations until arrangements are made for carrying out a large and comprehensive plan of exploration and development.

Phoenix.—Seven furnaces are at present in operation at the Granby, the enlargement of the second battery not being completed as yet. The mines have been more than supplying the requirements of the smelter in ore, all the bunkers being filled at present and some 75 loaded cars on a siding.

Greenwood.—One of the biggest mining deals in British Columbia for some months past was closed recently, when the Granby Smelter Company purchased large copper claims on Moresby Island, near Queen Charlotte Island, for \$100,000. It is likely another smelter will be erected similar to their present works here.

Ymir.—The Ymir Mining Company has decided to spend \$100,000 in prospecting both the old and new Ymir leads. Several diamond drills are now at work and the force will be increased.

On the old vein it is the intention to push the drills some 500 or 600 feet below the present 1,000 foot level.

Trail.—During January the Trail smelter treated 6,452,624 lbs. of lead ore, which produced 2,979,631 lbs. of lead. The principal shippers were the St. Eugene with 2,752,952 lbs. ore producing 1,650,715 lbs lead; the Reco with 595,639 lbs. ore producing 237,292 lbs. lead; and the Blue Bell with 552,821 lbs. ore producing 351,885 lbs. lead.

Hosmer.—The tunnel on the Hosmer Coal Mines Company's property has now reached a depth of 4,150 feet from the entrance. To reach the limit of their grounds the company will have to drive their tunnel 7,980 feet, but it is thought all workable seams in the series will have been cut before that. There are 14 to 16 seams of coal and the tunnel is now approaching No. 9, so there are five seams still to be cut.

Ten more coke ovens are being built, making a total of 80 ovens in commission.

Nelson.—William Maher has bonded the Echo group at Sheep Creek to a party of Nelson, Rossland and Trail operators.

The decision of the United States Supreme Court that the duty on zinc ores imported into the United States is illegal

will likely make things hum in the Slocan. The court has ruled that duties paid on zinc ores must be refunded. The Whitewater, Ruth, Lucky Jim and other properties have been large shippers of zinc to the United States, and this decision means much to them. It is expected that the Lucky Jim, Blue Bell, Bosun, and Jackson will resume active operations in the immediate future.

A strike has been made in the Summit mine of a pay streak three feet wide, showing gold values of \$470 per ton. The Summit has been a small shipper for two years, but a good deal of development has been done.

Kaslo.—The Wagner mine has been bonded for a large sum to D. C. Corbin, in conjunction with the C. P. R.

The Maestro, at Ainsworth, is being steadily operated by H. Gregerich and Grant King. Some ore is being taken out and regular shipments are being maintained.

The old Payne mine at Sandon is to be thoroughly gone over and tested with diamond drills. A group of Montreal men are behind the project, and if the drilling shows satisfactory results

it will probably cause a revival of mining activity around Sandon.

Owing to the demoralized condition of the K. and S. railroad the February shipments were very small, but the output for March will probably be heavy.

The Flint mine is again on the shipping list.

Nanaimo.—The Nanaimo-Vancouver Coal Company has met with very encouraging results in the development of its property. Two large seams have been struck, the upper one four feet thick, and the lower one seven and a half feet. The company has also twelve feet of fire clay on the property. The property is at present under bond to eastern parties.

Some 4,000 acres of coal lands in the Cedar, Cranberry and Oyster districts, adjacent to Nanaimo, have been purchased by a big syndicate.

Vancouver.—The Ingenika-Findlay River Development Co. has acquired the copper claims held by the Moresby Island Developing Co., and a gang of men has been sent north to develop the properties.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

The export duty on diamonds from Damaraland will be altered to one-third ad valorem on sale prices, and not 1s 3d, as reported.

In order to encourage research work with radium a new institute is being formed to be called the Royal British Radium Institute. The council contains distinguished names, such as Sir William Ramsay, Sir Frederick Treves, and Prof. J. J. Thompson.

The principal source of radium is the mineral pitchblende, which is found principally in Bohemia and Cornwall.

The coal owners of Notts and Derbyshire are combining for the purpose of building a rescue station, which is to be erected close to the Sherwood Colliery, Mansfield. The Duke of Portland has given a site and the estimated cost of the building is £1,500.

GERMANY.

An international syndicate in which Germany, France, and Great Britain are principally interested, has been formed for the exploration of the iron ore deposits in Morocco.

CHINA.

A concession has been granted by the Chinese Government to work mines in Hainan, near Hong Kong. It has been known for some time that there are large deposits of gold, tin, coal and iron in Hainan, and it is said that the concession is a valuable one.

AUSTRALASIA.

Owing to labour troubles and the unsatisfactory condition of the market the famous Broken Hill Mine, one of the largest producers of lead in the world, shut down for an indefinite time on March 15th.

The employees of the State of Western Australia are vigorously opposing proposed amendments to the Workers' Compen-

sation Act. The employers claim that it is really class legislation, and that the Government should not interfere with private enterprise. The proposed amendments, among other things, will make employers liable for accidents caused by wilful misconduct, and classes certain diseases peculiar to worker's callings, such as miners' complaint, etc., as accidents.

A new smelting process to treat refractory ores, to extract gold and silver from ore, containing besides the precious metals, also arsenic, zinc, galena, antimony, and traces of copper, has been put in operation at the Moruya Gold and Silver Syndicate's mine. The process is known as the Oxy-Hydro smelting process.

The dredging industry in New Zealand has been steadily decreasing. During 1908 several companies went into liquidation, and others did not pay expenses. The total gold yield has been on the down grade for several years.

BELGIUM.

A plant for the electrical production of steel has just been put down at the works of the Cockerill Company at Seraing, Belgium.

SOUTH AFRICA.

The difficulties caused recently by the flooding of the Witwatersrand mines are pretty well over. The flooding increased the amount of water dealt with by the Knights Deep mine from 1,000,000 gallons to 1,700,000 gallons in 24 hours. At the Knights mine 24 natives were imprisoned by the floods, but were rescued with great difficulty.

The number of Chinese labourers in the Rand mines decreased last year by 21,574.

A shipment of 6,000 tons of Transvaal coal has been sent to India. This is the first shipment of Transvaal coal ever sent there.

Rhodesia is a county of small mines. Analysis of a recent return shows that 33 per cent. of the gold output came from mills of five stamps or less; 52 per cent. from mines having

from 5 to 10 stamps, and only 15 per cent. from mines having more than 10 stamps each.

operations, but as soon as the surplus water has drained off work will be resumed.

UNITED STATES.

The Fink smelting plant at Garfield, Utah, has been started again and experiments are to be carried on for some time.

The Engineering and Mining Journal estimates the production of platinum in the United States during 1908 as 510 oz. The production during 1907 was 357 ounces.

The Pennsylvania Steel Company has announced a reduction in wages of approximately ten per cent. to take place April 1st.

Owing to recent heavy rains in California a large number of placer and quartz properties have been compelled to suspend

MEXICO.

The production of the Cananea Con. Copper Co. is averaging a trifle over 67 tons per day, and the output for February was 3,752,000 lbs., the highest since the resumption of operations. Various improvements are under way, but no effort will be made to push the yield beyond the 4,000,000 lb. mark until the demand for copper is firmer.

The International Oil and Gas Co. of Indianapolis, Ind., is soon to begin drilling for oil in the eastern part of Chihuahua. The company has oil rights over nearly 10,000,000 acres.

Legal difficulties with the people who furnish the wood used as fuel at a number of the mines in Taviche, Oaxaca, are making it difficult to obtain necessary fuel before the rainy season sets in.

COMPANY NOTES.

DOMINION COAL PAYS 1 PER CENT.

Directors of the Dominion Coal Company have declared the regularly quarterly dividend of 1 per cent. payable April 1st, to shareholders of record March 19th.

When the Privy Council judgment was announced there was a feeling that the Coal dividend might be postponed. The announcement now comes, therefore, as a surprise to many.

ANOTHER BUFFALO DIVIDEND.

The Buffalo Mines Company has declared the regular quarterly dividend of 5 per cent., payable April 1st, and an extra dividend of 3 per cent., payable May 15th.

The previous dividend was of 5 per cent., and an extra of 1 per cent. each month for the quarter, payable January 2nd.

COBALT CENTRAL CUTS DIVIDEND.

Cobalt Central has declared a quarterly dividend of 1 per cent., a reduction of 1 per cent., as compared with the preceding quarter. The dividend is payable May 15th, to stock of record of April 15th.

CROWN RESERVE DIVIDEND.

The directors of the Crown Reserve Mining Co. have declared the regular quarterly dividend of 6 per cent., with a bonus of 9 per cent., making a total disbursement of 15 per cent. for the quarter ending March 31st, 1909. This is almost double the last payment, which was 16 per cent. for the six months ending December 31st, 1908.

It is said that after the quarterly disbursement there will be a surplus of \$50,000, which will be carried to the reserve fund, bringing that fund up to the total of \$397,000.

TEMISKAMING MINING CO.

The annual meeting of the Temiskaming Mining Co., Ltd., was held in Toronto on February 20th.

The mine's production during its fiscal year amounted to \$31,000 tons, which produced 1,026,285 ounces of silver, of a net value of \$494,211.46. The cost of production during the year has averaged 82.5 cents per ounce.

The quarterly production shows that it has been increasing gradually, as shown below:—

	Ounces.	Value.
February to April.....	103,690.19	\$45,193.15
May to July	220,401.28	108,341.57
August to October	314,287.82	150,288.63
November to January	387,906.60	190,388.11
Totals	1,026,285.89	\$494,211.46

At the present time there are 16,000 tons of ore on the Temiskaming dumps, having an estimated value of one-quarter million dollars. This ore is to be concentrated during the present year at an expenditure of probably \$100,000.

On January 31st the company had as cash in hand and cash value of ore in transit \$122,761.07. The next dividend will be paid on April 1st.

The small plant that has been used is now being kept as an auxiliary plant, and the new plant, with its greatly increased capacity, will enable the management not only to do much more extensive mining, but to develop the mine and block out ore.

No. 1 shaft has been continued to the 250 foot level, and the new No. 2 shaft is down below the 200 foot level, and is to be continued farther.

From shaft No. 1 there have been 1,648 feet of drifting, 519 feet of cross-cutting, 587 feet of sinking and raising.

At the 200 foot level 258 feet of drifting has been done and 469 feet of similar work at the 250 foot level.

The officers for the current year are: Burr E. Cartwright, President; R. T. Shillington, M.L.A., Vice-President; Alex. Fasken, Secretary-Treasurer. Richard A. Cartwright, of Brockport, Pa., and Joseph L. Wheeler, of Marion, S.C., are the other directors, and Norman R. Fisher, M.E., is the general manager and engineer in charge.

CROW'S NEST PASS ANNUAL MEETING.

Several changes were made in the directorate of the Crow's Nest Pass Coal Co. at the annual meeting held recently in Toronto.

At the meeting President G. G. S. Lindsay, Vice-President Senator Jaffray, Third Managing Director Sir Henry M. Pellatt and Mr. E. R. Wood, all residents of Toronto, declined further to serve on the Board, though urged to do so.

The directors chosen were: Elias Rogers, Toronto; Col. Clough, New York; J. P. Graves, Spokane; W. F. Robertson, Granby, Que.; E. C. Whitney and H. B. McGiverin, M.P., Ottawa, and R. N. Young, Secretary of the company.

CITY OF COBALT DIVIDEND.

A 3 per cent. quarterly dividend, payable April 15th, has been declared by the directors of the City of Cobalt Mining Co. The dividend is 3 per cent. on the new capitalization of \$1,500,000, and is therefore equal to 9 per cent. on the old capitalization of \$500,000.

LE ROI NO. 2 COMPANY.

The eighth annual meeting of the Le Roi No. 2 Company was held in London, England, on February 26th.

The accounts show a balance in favor of profit and loss of £53,053 2s 6d, after writing off £19,795 2s 10d as depreciation on development, machinery, plant, buildings, etc. Out of this dividends of 6s per share, absorbing £37,800 have been paid, and the directors recommend that £10,000 be placed in the general reserve account.

The tonnage shipped amounted to 29,648 tons of an average value of \$23.60 per ton. Diamond drilling has confirmed the existence at a depth of about 1,200 feet, of what is undoubtedly the continuation of the south vein of the Le Roi mine.

In order to open up this ore body, it has been decided to continue the sinking of the main shaft from the 900 foot level. This will be greatly facilitated by the fact that the company have leased the Nickel Plate compressor, which will furnish the requisite amount of air.

The reports of the consulting engineers, Messrs. Hill and Stewart is substantially as follows: The total footage accomplished is 4,572.1 feet.

The greater portion of the development work has been done on the 300 foot level. Connection has been made with the California workings during the year; a distance of 309 feet, having been driven from the Josie 500 foot level for this purpose. This connection has improved the ventilation of both mines.

The work on the 700 foot level of the Josie has been directed towards opening up the Hamilton vein. The work has located the downward continuation of the East Hamilton shoot. This ore body is now being opened up from the 703 stope, but to make the work continuous a raise will have to be put up to connect with the 500 foot level on account of the ventilation.

The development during the year has been 3,902.1 feet of drifts, 400.5 feet of cross-cuts and 269.5 feet of raises and winzes, or a total of 4,572.1 feet, as compared with 2,793.1 feet last year. The development work has cost \$58,603.17 for driving and cross-cutting, and \$6,196.55 for raising, or \$14,172 per foot, as compared with \$14,576 last year.

During the year 3,606.5 feet were drilled in the Josie, and 3,833 feet in No. 1 mine, by the diamond drill. The work cost in labor and material \$2,39 per foot, as against \$2.61 per foot last year.

The most important discovery during the year with the diamond drill was the downward continuation of the south Le Roi vein, located at a depth of 1,200 feet close to the boundary of the Annie claim of the Le Roi Mining Co.

During the year five new stopes have been opened up on the Hamilton vein, and preparations are now being made to open up another in the east tramway tunnel. Three of these stopes are situated on the 300 foot level and two on the 700 foot level.

During the year 15,044.5 tons have been crushed, averaging .107 ounces gold, .137 ounces silver and 4.6 per cent. copper.

The tails from the above have been worth .032 ounces gold and .42 per cent. copper. The cost of milling this year has been \$1.14 per ton, as compared with \$1.37 last year, when 11,840 tons were milled.

The total amount of ore and waste raised from the mine was: Mixed ore, 40,034 tons, second-class and mill ore, 5,453 tons; actual waste, 12,215 tons. After hand-picking the output resolved into: Shipping ore, 29,648 tons; concentrating ore milled, 13,139 tons; concentrating ore placed on dump, 2,700; total of shipping ore and concentrating ore milled and placed on dump, 45,487 tons; waste, 12,215 tons.

The stoping costs amounted to \$175,765.68. The cost per dry ton of ore mined was \$3.60. There has been written off for depreciation \$83,145.61, averaging \$1.71 per ton. This makes the total cost of mining \$5.31 per ton. The gross value of the ore was \$699,740.77 or \$23.601 per ton. The values in the ore were: gold, \$19,194; silver, .379; copper, \$4.028.

The receipts from the smelter amounted to \$535,245.55, or \$18.053 per ton. The total smelting charges on the above, direct and indirect, have been \$5.548 per ton.

During the current year efforts will be chiefly devoted to the development of the property at depth, in order to open up and extract the ore now proved by the drill to enter the company's ground at a depth of 1,200 feet. The retimbering of the main shaft must also be undertaken in order to preserve it in the effective state necessary in view of the prolonged life of the mine which the successful development at great depth must naturally entail.

NICOLA VALLEY COAL AND COKE CO. REPORT.

The annual report of the Nicola Valley Coal and Coke Co. shows that the mines are being developed on a large scale, and that the market is growing rapidly.

The improvements to equipment at the mine above ground are as follows: Tipple house, trestle and chute at No. 4 mine; four cottages, powder magazine, fire hall and blacksmith shop, etc; extensions to waterworks system, and various works of minor importance.

The company have five workable seams, having a total thickness of 49 feet. Four of these seams are at present being worked. The Jewel seam (18 feet 6 inches thick) has been developed the most. The main tunnel has been driven nearly 1,300 feet, and is well timbered and laid with track for the whole length.

The following are the directors for the present year: John Hendry, President; Alex. McLaren, Vice-President; W. H. Armstrong, Managing Director and General Manager; J. J. Plommer, Secretary-Treasurer; R. P. McLennan, F. R. Stewart, Geo. E. Trorey, H. B. Wright, L. N. Mackechnie, M.D., Directors.

LA ROSE CONSOLIDATED MINES COMPANY.

Notice is hereby given that a dividend of 3 per cent. for the quarter ending 28th February, 1909, and a bonus of 1 per cent. has been declared upon the outstanding capital stock of the company, and will be paid on the 20th day of April, 1909, to shareholders of record at the close of business on 1st April, 1909.

By order of the Directors, the transfer books will be closed from the close of business on 1st April, 1909, and remain closed until 10 a.m. on 27th April, 1909.

Dated the 22nd day of March, 1909.

LA ROSE CONSOLIDATED MINES COMPANY.

Per D. A. DUNLAP,

Secretary-Treasurer.

STATISTICS AND RETURNS.

COBALT ORE SHIPMENTS.

Following are the weekly shipments from the Cobalt camp, and those from January 1 1909, to date:—

	Week ending Mar. 6.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo	45,210	178,220
Coniagas	62,500	334,405
Crown Reserve	62,220	967,920
Chambers-Ferland	60,000	202,000
City of Cobalt	75,000	465,930
La Rose	195,000	2,462,340
Nipissing	384,410	2,161,688
Peterson Lake	51,400	132,960
Trethewey	60,000	402,930
T. & H. B.	60,000	444,060

Ore shipments to March 6, 1909, are 9,903,287 pounds, or 4,951 tons. The total shipments for week ending March 6 were 1,055,740 pounds, or 527 tons.

	Week ending Mar. 13.	Since Jan. 1.
	Ore in lbs.	Ore in lbs.
Buffalo		178,220
Coniagas	61,000	395,405
Crown Reserve	100,000	1,067,920
Cobalt Central		121,755
Chambers-Ferland		202,000
City of Cobalt	60,000	525,930
Kerr Lake	60,045	265,142
King Edward		53,920
La Rose	207,800	2,670,140
McKinley-Darragh	56,800	364,880
Nipissing	260,961	2,422,649
Nova Scotia		401,390
Nancy Helen		40,000
Peterson Lake		132,960
O'Brien	64,100	191,980
Right of Way		495,085
Silver Queen		65,000
Temiskaming		370,000
Trethewey	65,000	467,930
T. & H. B.	60,000	504,060
Muggley Con.		72,900

Ore shipments to March 6, 1909, are 10,958,993 pounds, or 5,479 tons. The total shipments for week ending March 6 were 1,055,706 pounds, or 527 tons.

CROW'S NEST PASS OUTPUT.

The output of the collieries of the Crow's Nest Pass Company for the week ending March 12th was 16,423 tons, a daily average of 2,737 tons.

The output for the week ending March 19th was 17,936 tons, a daily average of 2,989 tons.

BRITISH COLUMBIA ORE SHIPMENTS.

The following are the ore shipments for the week ending March 5th and year to date:—

Boundary Shipments.

Granby	21,016	175,809
Mother Lode	7,728	80,136
Snowshoe	4,142	32,838
Other mines		2,094
Total	32,886	290,877

Rossland Shipments.

Le Roi	2,479	7,849
Centre Star	3,485	21,953
Le Roi No. 2	1,045	5,651
Le Roi No. 2, milled	260	2,080
Other mines		5,462
Total	7,269	42,995

Slocan-Kootenay Shipments.

Total 2,990 30,149
The total shipments for the past week were 43,145 tons, and for the year to date 264,021 tons.

Consolidated Co.'s Receipts.

Trail, B.C.

Richmond Eureka	164	780
Centre Star	3,485	21,853
Snowshoe	2,292	18,821
Reco	63	578
St. Eugene	174	2,919
Le Roi No. 2	1,045	5,674
Emerald	37	422
Standard	61	772
First Thought	31	164
Other mines		2,208
Total	7,397	54,371

Granby Smelter Receipts.

Grand Forks, B.C.

Granby	21,016	154,472
Other mines		85,580
Total	21,016	240,052

B. C. Copper Co.'s Receipts.

Greenwood, B.C.		
Mother Lode	7,728	72,829
Snowshoe	1,850	9,820
Other mines		1,843
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Total	9,578	84,492

Le Roi Smelter Receipts.

Northport, Wash.		
Le Roi	2,479	7,849
Other mines	814	2,594
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Total	3,293	10,443

The total smelter receipts for the past week were 41,084 tons, and for the year to date 399,358 tons.

The following are the ore shipments for the week ending March 13th and year to date:—

Boundary Shipments.

Granby	15,488	190,262
Mother Lode	8,786	79,870
Snowshoe	1,681	20,502
Other mines		1,543
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Total	25,955	293,177

Rossland Shipments.

Centre Star	4,412	26,265
Le Roi No. 2, milled	260	2,440
Le Roi No. 2	453	6,124
Le Roi	611	8,460
Other mines		92
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Total	5,736	43,381

Slocan-Kootenay Shipments.

Total	3,639	33,687
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The total shipments for the past week were 35,430 tons, and for the year to date 370,236 tons.

Granby Smelter Receipts.

Grand Forks, B.C.		
Total	15,488	191,262

B. C. Copper Co.'s Receipts.

Greenwood, B.C.		
Mother Lode	8,786	79,870
Other mines		1,483
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Total	8,786	81,353

Consolidated Co.'s Receipts.

Trail, B.C.		
Total	7,674	62,068

Le Roi Smelter Receipts.

Northport, Wash.		
Le Roi	611	8,460
Other mines	299	3,222
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Total	910	11,682

The total smelter receipts for the past week were 32,858 tons, and for the year to date 346,365 tons.

MARKET REPORTS.

Silver Prices.

	New York	London.
	Cents.	Pence.
March 8.....	50¼	23½
“ 9.....	50⅝	23 5-16
“ 10.....	50¾	23 3-16
“ 11.....	50¾	23 3-16
“ 12.....	50½	23¼
“ 13.....	50¾	23 5-16
“ 15.....	50¾	23 5-16
“ 16.....	50¾	23¾
“ 17.....	50½	23¼
“ 18.....	50½	23¼
“ 19.....	50½	23¼
“ 20.....	50¾	23 5-16

March 19.—Connellsville coke, f.o.b. ovens:—
Furnace coke, prompt, \$1.50 to \$1.60.
Foundry coke, prompt, \$2 to \$2.15.

Metals.

March 19.—Tin, Straits, 28.50 cents.
Copper, prime Lake, 12.75 cents.
Lake, arsenical brands, —
Electrolytic copper, 12.25 to 12.35 cents.
Copper wire, 14.25 cents.
Lead, 4.05 cents.
Spelter, 4.85 cents.
Sheet zinc, 7.25 cents.
Antimony, Cookson's, 7.90 cents.
Aluminium, 22 to 24 cents.
Nickel, 40 to 47 cents.
Platinum, \$22.50 to \$23.50 per ounce.
Bismuth, \$1.75 per lb.
Quicksilver, \$45 to \$46 per 75 lb. flask.