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CIRCULATION.

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PRESIDENT ELIOT ON EDUCATION.

Not many years ago the equipment of the best of our Canadian mining schools consisted essentially of "a blackboard and a piece of chalk." There are men still in the prime of life who were pioneers in other branches of applied science in this country. If we consider Canadian history to have begun at the time of the American revolution of 1776, when the people of the northern half of the continent became distinct politically from those of the southern, it took over a hundred years for our people to learn that the old educational system of Europe was not adapted to the needs of a young country. For nearly a century our system of higher education at least was based on that of the old world. Attention was given merely to book-learning, which resulted chiefly in memory training. It is true that the sciences were taught in our universities, but the methods of instruction were similar to those employed in the classics. Practical work was not encouraged. For instance, in 1853, when the late Dr. Chapman began his work as Professor of Mineralogy and Geology in the University of Toronto, his request for laboratory facilities met with refusal from the board of trustees. He was told that practical work was out of place in a university and that he was to teach by book methods.

However, during the latter part of the century referred to, changes of view in methods of education were taking place abroad. Herbert Spencer's "Education" was published in 1860. "It is a vindication of the study of nature and the rightful supremacy of science in education. It proves that the latest and most highly evolved form of knowledge is the best, both for guidance of life and for the discipline of the mental powers." This book had a profound influence. It crystallized the more or less hazy ideas that had begun to be held by certain educationists and others. The controversy is still waged, but much more mildly, as to the comparative merits of the so-called "cultural" studies and science or utilitarian subjects.

Mining engineering can scarcely be said to be classed as a profession in Britain. It is considered *infra dig* for sons of "society people" to take up the study of mining or metallurgy, although Britain owes her standing among the nations as much, if not more, to her engineers and men of science as to any other class. Mining engineering there is classed as a trade and its members as mechanics. It is considered quite proper, however, for a man of the highest social position to occupy the post of dummy director on the board of a mining company.

At the present time the Dominion Government's Royal Commission on Technical Education is holding sessions in various parts of the country. For this reason and owing to the fact that false views concerning the

difference between cultural and practical studies still exert baneful influences, although small compared with formerly, President Eliot's recent address in the University of Toronto "On the Development of the American University during the Last Sixty Years" was timely and of great value.

Dr. Eliot became a student of Harvard College in 1849, when the studies were all "cultural," the only faculty trained being the memory. Since then all his time has been spent in college work. He was president of Harvard, the greatest and oldest of American universities, from 1869 to 1909, when he retired as president-emeritus. His long experience as president and teacher in Boston, "the centre of culture," and his acknowledged high standing, not only as an educationist but as one of the most eminent of Americans, give great weight to his opinions on educational problems in general and especially to his views on the relative cultural values of the various subjects of study.

Parts, at least, of Dr. Eliot's address must have come as a great shock to the sticklers for "cultural" as opposed to utilitarian studies. They must have rubbed their eyes and asked themselves, "Can this be a Harvard man and a Bostonian?" Let us give Dr. Eliot's own words concerning cultural studies: "I think we should have everything taught by utilitarian examples. It has too long been believed that nothing which is useful can be cultural. I would reverse the maxim and say that nothing can be cultural—in a democracy at any rate—which is not useful. Many believe that culture must come from books; that the usefulness of a thing is to its positive detriment; that the fact that it can be applied shows that it is inappropriate material for educative purposes. I believe these views to be fallacious."

Even after the views of Spencer, Eliot and others of the same school of thought have been widely accepted, there have been great practical difficulties in getting the teaching of utilitarian subjects on a proper basis. Classics and other subjects of the memory-training kind have been taught for centuries. Methods of teaching these subjects have been perfected, while the teachers of science or utilitarian subjects have had little experience to draw upon and have employed cruder or more imperfect methods. Naturally when the purely book subjects were better taught in the schools, preparing pupils for entrance to technical institutions or universities, than were the sciences, the latter subjects would attract few of the best pupils. They naturally take up the subjects of study taught by the best teachers. Until within a very few years courses in science or technology have not attracted a fair percentage of students of first rate ability. Science is only now coming into its own. The best students instead of following the older courses of study are entering the science courses in increasing numbers. A good instance of this is found in the case of the University of Toronto. This university has an entrance class in Arts of about four hundred annually. The Prince of Wales prize, for general proficiency in the

subjects of the entrance examination, is competed for each year. Many of the winners of this prize during recent years have chosen a course in science when beginning their university work.

When we consider the vast improvement that has taken place since the study of utilitarian subjects has been taken up in earnest—improvement, we believe, not only in the physical well-being of man, but also in his mental and moral condition—we must join with President Eliot in his optimistic hopes: "Looking forward to the future, and we all like to look forward, I find in the modern development of our universities my chief grounds for hope that democracy means the good of the commonwealth, and that it will ultimately lead the way to the final goal of civilization, the greatest happiness for the greatest possible number."

A EUROPEAN VIEW OF PORCUPINE.

The opinions of disinterested visitors are usually of value. Dr. A. L. Simon, well known in the world of mining, spent some time this year in Porcupine. To the November number of *The Mining Magazine* (London, Eng.), he contributes a general article embodying a description of the summer trail, and his own impressions as to the district. That trail is now practically a thing of the past. The winter road is now in full commission, and a government railway is assured for next summer. Hence this part of Dr. Simon's article is already out of date. Incidentally, also, we can assure Dr. Simon that he need not have expressed doubt as to the special privileges that attach to veteran claims.

Dr. Simon suggests that the absence of a road and of a telegraph line, point to a lack of confidence on the part of the Government of Ontario. We cannot see that the Ontario Government is called upon to display confidence in Porcupine. The Government has recognized a moral obligation in consenting to construct a railway. But the Government is doing this because it desires to help the bona fide operator; it is not animated by a wish to create a boom. It would be distinctly unfair to make capital out of a generous concession to the needs of a mining camp. In so far, however, as the railway will facilitate and cheapen transportation, Porcupine has been given a helping hand at the proper moment.

Dr. Simon, in commenting upon the ore bodies, alludes to the almost complete absence of an appreciable oxidized zone, and to the fact that the country rock exhibits decomposition neither on the walls of the veins nor on the surface. He comments specifically upon two or three well-known properties.

But the most interesting part of his article is the concluding paragraph, in which he holds up to scorn the prices asked for Porcupine properties. After alluding to the rumour that for one property a price of about \$7,500,000 was asked, Dr. Simon proceeds as follows: "These figures are mentioned to emphasize the utter hopelessness of doing any serious business as far as slightly developed property is concerned; but the terms

asked for properties where merely a quartz vein in to be seen or even where nothing has been proved as yet, are similarly unapproachable. The prices asked for claims vary from about \$15,000 to \$350,000. . . . No owner can explain why he asks \$15,000 and not any other sum. The whole idea of purchase at the present time is regarded as a lottery game."

Whilst these strictures are, in the main, just, they are a trifle too sweeping. Owners of Porcupine claims are not lacking who are willing to dispose of their properties on reasonable terms. It is quite true that unreasonable prices and terms are asked for most of the properties. But we frankly believe that the purchaser is more to blame than the vendor. So long as there are people foolish enough to pay disproportionately large prices for undeveloped mining claims, there will be little difficulty in finding persons willing to receive their money.

Dr. Simon's parting fling at the operators who have installed small mills is unjust. He implies clearly that these mills have been erected solely for the purpose of playing the stock-market game. We cannot see that Dr. Simon or any other casual visitor to Porcupine is qualified to pronounce upon the motives actuating the operators in question. And in any case it would have been more in accordance with fair play had Dr. Simon made a direct accusation.

DEVELOPMENTS IN NOVA SCOTIA.

By far the most significant news that has reached us lately from the east is the announcement that the Dominion Steel and Coal Corporation has taken over the Springhill collieries of the Cumberland Coal and Railway Company.

Since both companies have been parties to several previous transactions, this event is hardly a surprise. It is, however, an occurrence that will influence strongly the development of coal mining in Nova Scotia.

Under the old regime the Springhill collieries suffered many vicissitudes. They never could and, apparently, they never would have been brought up to the point of maximum production. It were invidious to allocate the blame for this state of affairs. But facts cannot be blinked. Springhill has lost continuously and enormously through the lack of sympathy between operators and employees.

Trouble has arisen from the refusal of the previous management to deal with the U. M. W. A., and there is little room for disputing the justice of that refusal. We hope and believe that the new owners will live up to their announced policy of ignoring that unwholesome society. But we may also express the hope that many local causes of friction will disappear with the advent of a new management. Mutual concessions there will have to be, and it is but reasonable to suppose that both parties will be only too eager to establish a modus vivendi.

The Springhill collieries produce about 350,000 tons of coal per annum. The coal is somewhat high in sul-

phur, but much of the run-of-mine is lower in ash than the other mainland coals of Nova Scotia, and makes a bright clean coke. The collieries are situated in such a way that they can command a large share of the maritime market and can also compete successfully for a substantial proportion of the Intercolonial Railway contracts. In addition they can make a strong bid to supply the demand in the most northerly sections of the New England States.

Considered in all material aspects, the change of ownership will be beneficial. It should certainly mean better times for Springhill and ampler opportunity for the Glace Bay collieries to exploit the St. Lawrence. Not less important will be the probable expulsion of the U.M.W.A. from its greatest stronghold.

We would not for a moment imply that the new owners of the Cumberland Railway and Coal Company have been seriously influenced by a desire to take a fall out of the U.M.W.A. But we believe that the latter organization cannot and will not survive.

In our news columns will be found the particulars of price paid, etc. These need not be repeated here. All that it is necessary to add is that we consider this last move an indication of a sound and courageous policy.

ENGLISH RAILWAY COAL BILLS.

It is with genuine surprise that we note in English exchanges the fact that the Miners' Eight Hour Act has not augmented the price paid for coal by the principal English railways during the past year. Following are the total expenditures for fourteen large companies:

Year.	Total amount paid for fuel by 14 leading railways.
1903	£4,959,000
1904	4,874,000
1905	4,810,000
1906	5,048,000
1907	6,175,000
1908	6,540,000
1909	5,550,000

The total expenditure by eleven of the largest during the latter half of 1909 was £2,478,000; and for the former half of 1910 the figures are £2,434,000

To determine the factors that had induced this reduction, or that have at least prevented an increase, is not practicable. But it is most gratifying to note that at present there is no sign of prices being enhanced. It appears, also, that new contracts are being placed at favourable figures.

PORCUPINE AND PAPERS.

We wish to felicitate our friend the Toronto Globe upon the constructively sane tone of its remarks concerning Porcupine. It is truly edifying to notice the improvement, not only in the Globe, but in not a few other daily papers.

In discussing new camps like Porcupine it is hard to observe the strict line of common sense. Anything savouring of destructive, or even of instructive, criticism is likely to be resented. Hyperbole is popular; but, in the long run, it is terribly costly. Thus it is with unfeigned appreciation that we read the sincere efforts of our daily contemporaries to warn their readers off the shoals of hysterical speculation.

When, however, a public journal undertakes to advise and to guide and to criticize, the dictates not only of good sense but also of the moral law demand that that journal keep its own skirts clean. Applying this dictum to the case at hand, it is apparent that the paper that warns the public against the blandishments of Porcupine promoters must of necessity refrain from selling its advertising space to mongers of dubious shares. So far as we have observed, our daily journals have not yet erred wittingly—at least as regards Porcupine. They appear to have grasped the fact that they must practice what they preach. Incidentally they may have learned by experience that honesty is the best policy.

A RAILWAY TO PORCUPINE.

Tuesday, November 29, was an eventful day for Northern Ontario. On that day Sir James Whitney announced that the Provincial Government would immediately undertake the construction of a branch of the Temiskaming & Northern Ontario Railway from a point on the main line near Kelso to Porcupine. The distance to be covered is about 31 miles, and the estimated cost of construction is less than \$500,000. It is probable that the road will be ready to operate early next autumn.

All those who are struggling to develop claims in Porcupine will be thoroughly grateful to the Ontario Government. The work of mining will be greatly facili-

tated, and Porcupine will be given a chance to prove itself without costly delays.

But the success of the new railway will not wholly depend upon Porcupine. The farmer is following hard upon the heels of the prospector. A considerable proportion of the territory tapped by the T. & N. O. is admirably suited to agriculture. This fact will certainly influence favourably the future position of the whole line.

The action of the Ontario Government is wholly commendable.

NEWSPAPER COMMENT.

A curious change has come over Canadian newspapers since the early days of Cobalt and Larder Lake. The lessons taught by experience deter self-respecting papers from accepting inspired "mush." Also, the intelligently critical attitude of such papers as the Telegram, News, Star, and Globe, of Toronto, and the Star and the Herald, of Montreal, is distinctly profitable. But one outstanding exemplar of caution and common sense is the Cobalt Nugget. The surroundings of the last named paper must be peculiarly difficult. It is in the very centre of the maelstrom. Up to the present it has refused to soil its pages with unseemly advertisements. Long may it and its larger contemporaries refuse to bow the knee to Baal.

EDITORIAL NOTES.

The declaration of a one per cent. dividend on Granby, though disappointing in size, is in itself encouraging. There seems to have been undue alarm as to the physical condition of the company's mines.

The Cobalt Provincial mine has made its first shipment. Long may they continue.

BOOK REVIEWS.

TESTING FOR METALLURGICAL PROCESSES—BY JAMES A. BARR, B.S., M.E.—200 PAGES—PRICE, \$2 POSTPAID—PUBLISHED BY THE MINING AND SCIENTIFIC PRESS, SAN FRANCISCO, AND THE MINING MAGAZINE, LONDON, 1910.

The problem of hitting upon the right process for any given ore can be partly or wholly solved in the laboratory. Mr. Barr seeks to guide the investigator into the shortest and best paths. Laboratory tests to determine the suitability of ores to amalgamation, chlorination, or cyanidation are outlined. Zinc, copper, silver ores are also included. Concentration tests, furnace tests, the examination of slags, are among the numerous subjects presented. The concluding section, giving data as to the cost of the various kinds of ore treatment, lends added value to the book. Necessarily the book is written for persons who already are acquainted with the principles of chemistry and of metallurgy.

MILL COSTS.

In Mr. J. A. Barr's new book, *Testing for Metallurgical Processes*, published by the Mining and Scientific Press, some very interesting cost data are given.

For instance, in Californian stamp-mills, 10 to 40 stamps, the cost of amalgamation and concentration, is put at from 40 to 50 cents per ton. In Black Hills mills the same figures are given for mills of 200 stamps. Cyanidation costs from 85 cents to \$2 per ton, in plants of from 100 to 200 tons capacity. The corresponding costs for chlorination (barrel process) are from \$3.50 to \$5 per ton.

PRACTICAL STAMP MILLING AND AMALGAMATION—BY H. W. MacFARREN—166 PAGES—INDEXED—ILLUSTRATED—\$2 POSTPAID—MINING AND SCIENTIFIC PRESS—667, HOWARD STREET, SAN FRANCISCO, AND THE MINING MAGAZINE, 819, SALISBURY HOUSE, E.C. LONDON, ENG. 1910.

A book that "goes straight to the details of the practical work" of stamp milling has long been a desideratum. The "how" and the "why" of stamp milling have never received fair treatment. "Practical Stamp Milling and Amalgamation" is a good beginning. In this book of 166 pages an attempt, a very fair attempt, is made to outline the practice and the philosophy of the stamp mill.

All practical and professional work is a function of applied common sense and experience. Sometimes the theorist has too much to say; and sometimes the empiricist has sway. But neither is the man who makes precedent. The stamp mill, probably more than any other human contrivance, has suffered from both. Nevertheless, to-day modern stamp milling is the conjoint product of the practical worker and of the theorist. The mill man, content with fairly good extraction, is not apt to change either the sequence of his stamps or any of the numerous items that go to make up the art of stamp milling. But the theorist is always a disturbing factor. Using the experience and disregarding the conservatism of the mill-man, he treads where angels fear to tread. And sometimes he gets results. Also it is this kind of result that, in the aggregate, constitutes progress. However, all this is beside the point, and is inspired solely by the fact that the reviewer has before him a good and a sound book on the use of the stamp-mill.

If the reader can pardon the preliminary discursus, the reviewer will hasten to make amends by indicating the ground covered by Mr. MacFarren's book. And, to proceed forthwith, the book is divided into ten chapters. Chapter No. 1 touches on the location and design of the stamp-mill, and discusses the rock-breaker, grizzly, ore-bin, battery frame and mortar-block. Chapter No. 2 treats of the integral parts of the mill unit, the mortar, die, shoe, bosshead, tappet, and cam. The third chapter treats of the stem, stem breakage, height of drop, order of drop, etc. Chapter four takes up water supply, rate of drop, weight of stamp, height of discharge, and so on. In this chapter a cursory comparison of the individual stamp and the 5-stamp battery is made. The remaining chapters are devoted to mill practice.

"Practical Stamp Milling and Amalgamation" gives evidence of care, experience, and knowledge. It is a good book.

Correspondence

Editor, CANADIAN MINING JOURNAL:

Sir,—The article on gold production in Nova Scotia, in your issue of December 1st, signed by yourself, has brought up a query in my mind. Some years ago my assistance was asked in connection with a gold mining project in Nova Scotia. At that time I knew nothing of the mines of this Province. Enquiry elicited the fact that a report, supposed to have been unfavourable, had been in the hands of the Government for some time. I could not obtain a copy of this report. But the rumour was in itself discouraging, especially as the report was said to have been made at the request of the Nova Scotian Government. Other circumstances conspired to prevent me from taking up the matter. But my curiosity as to the character of the alleged report has not yet been satisfied.

I enclose my card, which, I think, will identify me sufficiently. As I may in the near future undertake to revive one of the old mines, I wish to sign myself, merely,

QUERY.

EDITOR'S NOTE—Six years ago Mr. T. A. Rickard, now editor of the "Mining Magazine," London, England, made a provisional report upon the gold mines of Nova Scotia. This was done at the request of the Provincial Government. Mr. Rickard was selected for the

work by the Mining Society of Nova Scotia. As to the tenor of that report nothing has been made officially public. The report was withheld from publication for the reason that it contained severe strictures upon certain operating companies.]

Editor CANADIAN MINING JOURNAL:

Sir,—The letter from Mr. Denis, in your issue of Nov. 15th, can hardly be called a reply to my criticism of his report issued by the Mines Branch on the Manganese Deposits of the Maritime Provinces. It is rather a short dissertation of personal characteristics.

It is true I did apply for an opportunity to write up this subject for the Government and had I the opportunity I certainly would have given the industry a just and fair report, but what this has to do with my observations on Mr. Denis' report is not clear, nor do I understand why he should attempt to cover his deficiencies by such personal allusions.

I have, in the past, operated for commercial purposes a few of the Nova Scotia manganese deposits and have examined and reported upon all the known deposits, except one, in the Maritime Provinces and many other deposits, outside of these provinces. All the information gained in this work, was offered free to Mr. Denis. He evidently had no use for it and the result is the publication of the report, which I repeat "is not only misleading but useless and detrimental to the industry."

Until the Mines Branch can explain how they can form an intelligible opinion of the "Canadian Ores of Manganese," from Mr. Denis' examination and his "unpretentious" notes, I will refrain from further criticism and consider the subject closed.

In conclusion I may say that I am, without "useless unpleasantness and ill-feeling, spite or disappointment," charged against me by Mr. Denis,

Yours, etc.,

W. F. JENNISON.

Truro, Nova Scotia,
Nov. 25th, 1910.

Mechanical and Metallurgical Progress on the Rand

In the Consolidated Mines Selection Company's report reference is made to the mechanical and metallurgical progress made on the Rand during the past year in the following terms: "Most of the notable mechanical improvements effected during the past year have been in connection with the increasing popularity of electric power, now rapidly replacing steam in many departments. Amongst the more notable in mining conditions—apart from the tendency towards better housing and general conveniences for both white and coloured employees—may be mentioned that of artificial ventilation, sand-filling in stopes, and greater efficiency in rock drilling. In the department of ore reduction and treatment many new ideas have been and are now being experimented with. Broadly speaking, the progress of the mining industry grows apace and the outlook continues promising. The Union Government will no doubt follow in the steps of the late Transvaal Government in assisting the mines as regards labour supply to the best of their ability in order to keep the finances of the Union in a healthy condition. It may be mentioned that this company has formed a labour department for the benefit of mines under its control, and that same is in charge of an experienced official."

MINING CASE DISMISSED.

Clifford E. Smith, of Brockville, vs. Dr. Hersey, et al.

In the case of Smith vs. Wyandoh, tried before the Honourable Sir John Alexander Boyd, Chancellor of Ontario, at Toronto, the following statements were made by counsel, as appears from official record:

Mr. Cowan: My Lord, in view of your Lordship's suggestion this morning, I am very glad to say that an adjustment has been made in the whole matter between the parties, satisfactory to all of the parties; and I desire, acting as counsel for the plaintiff, to withdraw from the record any and all charges of wrong-doing or fraud that have been made against any of these defendants. I think, however, it is only fair to the plaintiff to say that your Lordship will remember the dates in which the various transactions occurred, the plaintiff being up north and cut off literally from mail and telegraphic communication, that he became naturally suspicious; probably unkind friends may have urged him on, and he felt when he commenced this action that a state of facts existed which he has since learned did not exist. As the case has progressed, and the examinations for discovery have been had of literally all the parties to the transaction, that suspicion has gradually faded away. I have endeavoured to the best of my ability, as counsel for him, at the risk of trying the patience of your Lordship by travelling outside the record, putting the defendants one after the other in the box, to see whether or not there was anything in the charges spread on the record. I feel in duty bound, as counsel, to say that I am convinced that there is not, and the plaintiff authorizes me to make that statement to the Court and to entirely withdraw in the fullest and freest and frankest way all charges of wrong-doing or fraud against Mr. Brook, Dr. Hersey, and the other defendants in this transaction.

Mr. Shepley: I have only to say, my Lord, that there does not seem to be anything necessary for your Lordship to do, beyond noting that the withdrawal of the charges of fraud has been made in the ample fashion in which my learned friend has made it, and dismissing the action without costs.

His Lordship: The record will be then, charges withdrawn.

Mr. Cowan: Your Lordship may observe, there is a counter-claim made against the plaintiff. I suppose that is dismissed without costs?

Mr. Shepley: Yes.

His Lordship: Action and counter-claim dismissed without costs.

I am very glad a settlement has been arrived at in this case. It seemed to me, during the progress of the inquiry, that investigation was needed on some points, but, as Mr. Cowan has said, that has been cleared up very satisfactorily, and I hope nothing has occurred here which will disturb the business and friendly relationships of the parties in the future in any investigations they may have in that very wealthy region.

That will be the judgment of the Court, withdrawn, without costs.

PORCUPINE AND THE MOTHER LODE.

By REGINALD E. HORE, Houghton, Mich.

In the November 26th number of the Mining and Scientific Press the editor comments on an article which appeared in this journal on November 1st, and calls attention to some interesting points of similarity between the Porcupine deposits described by the writer, and the Mother Lode of California. This editorial may prove of interest to readers of the JOURNAL, and as there is in the case of the carbonate rocks even greater simi-

larity than Mr. Bain supposes I add a few remarks concerning their composition:

"Judging from the description by Mr. Hore, the veins of Porcupine greatly resemble the Mother Lode of California, particularly those in Mariposa, Luohumne, Southern Calaveras County, in central Amador County near Jackson, and also at and near Placerville, El Dorado County. In these several localities there are huge masses of the carbonate of lime, magnesia, and iron, commonly known as ankerite, which are seamed with large and small veins of quartz, in much the same manner as that described at Porcupine. In California these great masses of ankerite, some of which are over 300 feet wide, are usually accompanied by an abundance of the green micaceous mineral, mariposite. No mention of mariposite, or any mineral answering its description, is made by Mr. Hore. However, mariposite is sometimes absent in the California ankerite masses. Generally, the ankerite of the Mother Lode is auriferous, though not to a profitable extent. That in Rawhide mine in Tuolumne County, was an exception, some of it being extremely rich in gold."

In view of Mr. Bain's remarks it may be interesting to note that one of the most characteristic minerals of the ferrodolomite at Porcupine, and also at Larder Lake, is a green micaceous mineral similar to mariposite. The mineral is usually present in very small and irregular particles so that it cannot be readily studied optically nor cleanly separated for chemical analysis. The mineral is present in nearly all the darker coloured masses of carbonates and, along with black iron oxides, is the cause of the colour. There are quartz veins in Porcupine which cut through such dark micaceous ferrodolomites, but those deposits described by the writer happen to be in lighter coloured masses which are chiefly carbonates and quartz. A few feet north of the Connell vein, for instance, the carbonate is quite dark in colour with much green mica (mariposite?) and black iron ores. There are a number of masses of similar rock in which the carbonate becomes a minor constituent. Crystals of the latter are larger than the dark particles and give the rock a porphyritic appearance. The carbonate is, however, easily recognized, as it is readily scratched with a knife and effervesces with dilute acid.

VALE ALASKA-YUKON-PACIFIC EXPOSITION.

Announcement has been made publicly that practically 90 per cent. of the dividend to be declared shortly by those who are winding up the affairs of the Alaska-Yukon-Pacific Exposition, so successfully held at Seattle, Washington, U.S.A., last year, will be applied in support of the local tuberculosis hospital. The greater number of the stockholders have already assigned to the hospital their share in the forthcoming dividend, and many others are expected to do likewise. Approximately \$22,000 of the promised subscriptions is still unpaid, but payment of \$3,750 of this amount will soon be made. Until after the settlement of pending litigation, the amount that will be available for disbursement as a dividend can not be definitely ascertained. It is claimed that the percentage of collections made in connection with the A. Y. P. Exposition is greater than that made for any other world's fair yet held.

The site of the A. Y. P. Exposition, on the campus of the University of Washington, has been cleared, and the university authorities are again in possession of it. The value of new buildings acquired by the university, and of improvements made to the grounds, is estimated at approximately \$500,000, so the university has benefited substantially as a result of the holding of the exposition on its lands.

THE STANDARD MINE, SLOCAN DISTRICT, BRITISH COLUMBIA

By E. JACOBS, Victoria, B.C.

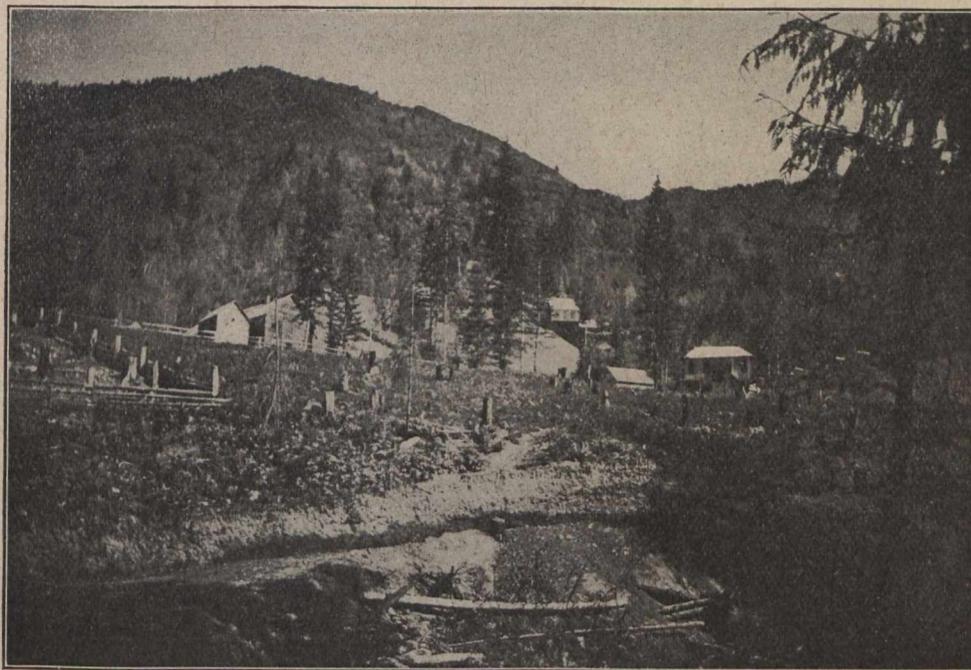
What is probably one of the largest showings of silver-lead ore of good grade yet seen in British Columbia has been opened in the Standard mine, near Silverton, Slocan Lake. It is in the part of the mine opened by No. 5 adit. When I was in the mine last June I saw two drift faces each having four to five feet of solid galena, with fahlerz carrying high value in silver. One vein was 30 feet wide, with four feet of shipping

big ore body by six feet of poor material which does not show in the photograph.

The Standard Group.

The Standard group was described by Mr. Robert R. Hedley, in the Report of the Mining and Metallurgical Industries of Canada, issued by the Mines Branch of the Canada Department of Mines, as follows:

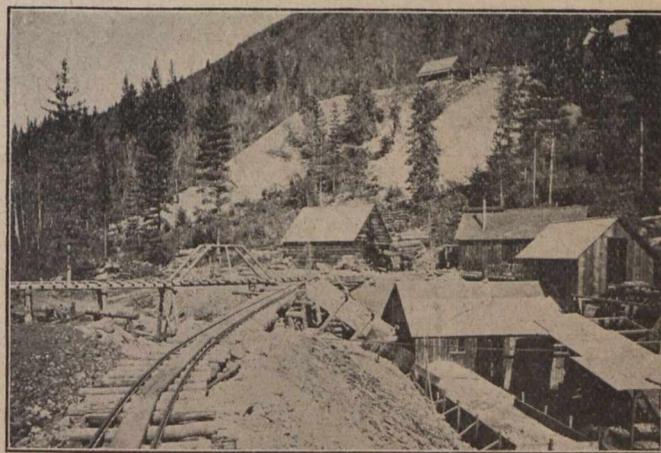
" This property is owned by G. H. Aylard and John



Standard Mine, Slocan, B.C.



Part of Surface Works at Standard Mine, Slocan, B.C.



Standard Mine, Slocan, B.C.

ore, and the remainder mostly concentrating ore containing silver-lead and zinc in quartz. Since then the greater part of the vein has at times been ore of good grade. A photograph taken a few weeks ago showed a face of 20.5 feet of ore, besides which there was two feet of ore on the hanging wall, separated from the

A. Finch, and is situated above Four-Mile Creek, at an altitude of 3,700 feet, in the Slocan mining division. Its development is under the direction of G. H. Aylard, of New Denver. The property comprises the Shuniah, Standard, and Surprise, Crown-granted mineral claims, of 130 acres. The occurrence is a typical series of



Standard Mine, Slocan, Face of No. 5 Adit—shows 20 ft. 6 in. of ore, beside which there is 8 ft. of the Vein not shown in the photograph. This vein is 30 ft wide in places.

lenses, in Slocan slates, with the usual mineralization, galena being most in evidence. It makes an exceptionally clean sorted ore, carrying 60 per cent. lead, and 80 oz. silver per ton. The several upper levels have been worked out, No. 4 being now (December, 1907) the only producing level. This level has developed a very fine shoot of excellent ore, which, however, has not yet been extensively stoped. Two tunnels, at lower levels, are being driven to cut this shoot. The practice is to roughly sort for shipment, and to accumulate the second grade ore, with a view to its subsequent treatment by concentrating. It is hoped that the development of the mine will ere long warrant the erection of a concentrator. There is meanwhile on the dump probably 5,000 tons of second-class ore, which will carry 12 per cent. lead, 10 per cent. zinc, and 20 oz. of silver per ton. Shipments during 1907 aggregated 700 tons."

Development and production have been continued ever since Mr. Hedley obtained the foregoing information. In 1908 the quantity of ore shipped was rather more than 1,200 tons. The record for 1909 was that 2,100 feet of development work was done and nearly 3,000 tons of ore mined, of which 600 tons of sorted ore was sent to the smeltery and the remainder placed on the second-class ore dump. This year's output of first-class ore will be between 1,500 and 1,600 tons, for more than 1,300 tons had been received from the Standard at the Trail smeltery before the close of November. Meanwhile the quantity of concentrating ore awaiting the provision of milling facilities has been largely increased.



Standard Mine, Slocan, B.C. Boarding House, New Ore-sorting House and Dump of Second-class ore

Development work done in 1910 had, by the end of November, exceeded 1,000 feet, to which that done in December must be added. This work was done on levels 5 and 6, and on an intermediate level between 5 and 4. During the greater part of the year No. 5 has been in good ore, and it still is, as shown in the photograph. Practically all the ore shipped since last June has come from this level, the face of which is now about 1,200 feet from the portal of the adit. No. 6 started lower down the hill, is in 1,500 feet, but it has not yet reached the ore shoot which has been so productive in Nos. 4 and 5. It is estimated that by the end of 1910 the face of this adit will still be 150 to 200 feet from where it is expected the ore will be reached.

Alpha and Emily Edith Mines.

Above the Standard group, higher up the same mountain, is the Alpha group, from which ore rich in silver was taken years ago. Below the Standard is the Emily Edith group extending down to Four-Mile Creek. The Emily Edith mine was worked for some time by an English company, which spent much money on it, but eventually stopped work on account of there being so much zinc in the ore. Messrs Aylard and Finch now own the Emily Edith group, too, but they have not yet done much work on it, the Standard requiring their attention for the time being. It is thought that by extending the Emily Edith adits con-



Standard Mine, Slocan, B.C. New Ore-Sorting House and part of mine ere

siderably farther into the mountain, the shoots of silver-lead ore opened on the Standard will be found to continue down into the much deeper ground of the Emily Edith. This, however, can only be proved by doing a lot of development work, the desirability or otherwise of undertaking which will, in large measure, be determined by the results obtained from driving No. 6 level on the Standard.

The Standard an Object Lesson.

The Standard mine affords an object lesson to those who lack faith in the Slocan district. It was long neglected and considered of little value, but after Messrs. Aylard and Finch acquired it they pursued a policy of steady development over several years, with results of a most gratifying character. There are doubtless other properties in the Slocan district that could be made productive if extensive development was first done. Deep-level development has already given a fresh lease of life to several Slocan mines, and it is well within the bounds of reasonable probability that others would eventually become profitable enterprises if deep development on a comparatively large scale were done on them.

Mr. Aylard continues as manager of the Standard group, with Mr. John Vallance as superintendent of the mine. The latter has been mining in the Slocan dis-

trict for about 15 years, so his practical experience has been of much service in the development of the Standard.

MINING AND THE INDUSTRIAL EVOLUTION

(Written for the CANADIAN MINING JOURNAL by R. B. Lamb.)*

THE PAST.

Mining in a crude way was, without doubt, carried on in pre-historic times. Even in the age of barbarism it is probably true that the crudest methods were employed to make use of various metals which were found in conditions easily rendered fit for the modest demands of the early peoples.

It is improbable that there was much, if any, improvement in methods during the patriarchal age. In feudal times the industry assumed larger and more definite proportions through the employment of chattel labour.

In the age immediately preceding the industrial or machinery age, or that period known as the beginning of the age of capitalism, we observe a steady growth in the industry. Beginning with the use of steam, we have organic development in all industries, and mining benefited as abundantly as any other occupation.

In Mexico, among other countries, there remain splendid evidences of the character of work done from one hundred to four hundred years ago. This work was conducted on an extensive scale over long periods, almost entirely without machinery of any kind. The only requisites were an ore body, the ownership of that ore body, and plenty of labour. This labour was slave labour, and the mines were profitable according to the grade of the ore and the amount of labour used under the direction of the miner: so that practically the cost of ore extraction was the amount that would feed, clothe and shelter those employed during the period of extraction, and also maintain them in a state of maximum work efficiency.

"Bocas minas," or stairways, were used for entry and exit. Wooden horse whims were employed for hoisting purposes and for removing water. In later times, iron rods with steel tipped bits were used for drilling purposes. With unrivalled patience these old-time miners persistently followed their ore shoot, often working ores low in metal contents. Reduction plants consisted almost entirely of washing processes, ancient patio process methods, and small crude smelteries.

However, a description of ancient mining, treatment, and equipment methods, is quite unnecessary for the purpose that is in hand. We are hardly concerned with the mining industry earlier than a century ago.

It is the aim of this article to trace in a general way the influence of machinery on the industry of mining, and to enquire into what the industrial age means to the calling in which we are engaged.

Communities, both ancient and modern, have been forced to rely upon the products of the mines for their advancement; and it might with truth be said even for their existence. Mining is the basic industry of our modern world. It is the pioneer work of a vast and complicated industrial system. The miner is the herald of the newer and the coming civilizations.

The histories of the United States, of Australia, and of Africa disclose a rapidity of development (under

conditions unparalleled in the world before) which has been brought about by the pioneering spirit of the mining and mineral industry.

It is not overstating the case to say that California would still be a plodding agricultural district imperfectly acquainted with eastern thought had she not been afflicted with a golden fever.

Tasmania and Australia were declared to be much too profitable for convict settlements by their miner pioneers, and the invitation was extended even unto the outcasts of society to abandon their ways, forget their sentences, and search for gold. The digging days of California and Australia marked the birth of a vast, extensive, and permanent mining industry; an industry not confined to gold alone but spreading itself and including all nature's valuable metals and minerals. We find, in fact, within recent times that the systematic search for metals and minerals has taken place in all countries under all conditions of climatic disadvantages, despite untold discouragements and fearful hardships.

THE PRESENT.

It is our theme to enquire into the causes of this unprecedented activity: this unusual demand for the products and the by-products of the mines; to find out why production has become so enormous; why it will be still greater in the immediate future; and to indicate the revolutionary changes that are rapidly taking place throughout the mining world.

The age in which we live is educational and evolutionary. It is marked by great industrial activities in all branches of human endeavour; and these activities are being daily increased and multiplied. It is only by the use of motor power applied through machines that such activities are possible, and as metals and minerals must be employed in all machines and in all industries we are right in saying that mining is the basic industry; and as such its profits are certain. Men are attracted to it and risk their lives in its development. It is especially alluring on account of the accident of location. When an individual finds an ore body of profitable kind (either by systematic intelligent search or by blind discovery), he is the potential possessor of wealth. By calling machinery to his aid, he becomes stronger, wealthier, and more powerful. It is this fact that has attracted and impelled the mining pioneer.

We will now trace the development of mining by machinery, and return later to a consideration of what organized machinery means to the future of the industry. It was impossible until the invention of the steam engine to make radical changes or real progress in mining methods. The methods of Mexico under Cortez would be the methods of to-day but for the steam engine. It is the steam engine that has made possible the mammoth tool. The steam engine has also made possible the social machine; and it is the steam engine that has made possible the mining industry of our time.

There is no doubt that one of the first steps towards the advancement of the industry along modern lines was the development of better pumping methods and hoist-

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ing facilities. This development can be followed from the days when mines were unwatered by means of chain buckets moved by horse whims. It is unnecessary to go into the history of pumps and pumping methods; suffice it to say that the steam engine made possible the Bob pit pump, the Cornish beam pumping engine, the steam pump underground, the air actuated pump and the electrical pump. Each machine, each application of power to a machine, was a distinct advance over the immediate method before it.

The rapid development of electrical apparatus has made power transmission remarkably simple, and it is now possible to install in the mine with ease, safety, and convenience, pumping machinery of a capacity undreamed of before.

Hoisting has passed through the stages of the hand windlass, the horse whip, the horse whim, and the steam hoist. The electrical hoist and the water hoist have reached a capacity and speed that would have been thought impossible fifteen or even ten years ago.

Pumping and hoisting and the use of modern explosives have simplified and amplified in every respect underground mining methods. The metallurgy of steel and the development of the mammoth machine have made possible "T" rails, modern ore cars, and underground conveying and transportation systems. Mine timber framing machines have made it possible to prepare timber sets on a large scale with great rapidity, and thus it is possible to mine for profitable return ground before untouched.

Underground electric lighting has further facilitated operations; and by again commanding the machine the miner is enabled to ventilate his workings with a measure of success formerly impossible.

The steam engine was followed by the steam hammer. The steam hammer is the pioneer of all great modern tools and itself is the predecessor of the steam pump and the rock drill, both of which are modifications of the steam hammer. It is, however, to the rock drill that we usually attribute the credit for the greatest advance in underground methods, and costs have persistently and consistently fallen as this machine has been modified and improved. The rock drill makes possible a great amount of work at a greatly decreased expenditure of human energy. It increases the mining scope of the particular enterprise engaged upon; it makes for speed in mining operations, and, like all valuable machines, reduces cost. The great advance in underground and surface transportation in and around mines, and in the long distance transportation of supplies and labour to mines, and in carrying the product from mines to distant parts, is no doubt one of the most important features in the evolution of the mining industry or of any other industry.

It is almost unnecessary to point out that any system of transportation is merely an aggregation of machines or an organized machine. The railroad is a machine in the economic sense. The mines must use this machine as their prosperity is directly influenced by the facilities for transportation.

Human labour has been used for ore transportation in mines in barbarous and in modern times. We have seen the gradual replacement of human and mule transportation by hoisting methods. We have seen the wheelbarrow in the stopes replaced by automatic devices, and we have seen the wheelbarrow thrown out of the crosscuts and drifts and the ore car substituted.

We have followed with interest the methods of water and pneumatic transportation. The windlass has given way to the steam hoist, the air winch, and the electrical

hoist. Large stopes have been fitted with belt and gravity conveying systems. The gravity tramway, aerial tramway, and other rope tramways defy mountain ranges, gorges, and valleys, and render transportation easy, expeditious, and vastly cheaper. It is convenient to work all these appliances; but it is also profitable: therefore it is commercially possible.

Hydro-electric power has been called to the aid of the miner. Streams and rivers of the Western mountainous mining sections have been harnessed and their power utilized for transportation in the mines themselves, around the mines, and around the mills, smelteries, refineries, and reduction works where the mines' products are prepared for the user.

All this has meant that more work has been done with greater ease, with greater comfort, with more safety, with less men, and with more profit than ever before. It has, moreover, made it possible to work lower grade ore bodies of greater magnitude than previously for no other reason than that the machine is cheaper than the man. A perfect machine requires only intelligent directing labour and performs the work that many men were required to do in its absence.

Long distance transportation to and from the mines is part and parcel of the mining industry in any nation. You can no more separate the railroad machine as an integral part of the mining business than you can separate the ore body from the industry and retain the industry. The locomotive and the steam railroad are called into service transporting metallic products of the mines to suitable smelting points where coke and fluxes are obtained. These ores are smelted through the metallurgist's skill, and by the agency of his machines the metals are separated from the waste; and again the railroad machine conveys the mines' final burden to the manufacturer.

It is this great transportation system more than any one thing that has made possible the great and increasingly greater scale of mining operations carried on at present.

Before leaving the subject of underground methods it would be well to notice the simplification of stope mining which is indirectly caused through mechanical agencies. The ready facilities for timbering, the rapid transportation methods underground, combined with pumping and blasting methods have modified mining systems, which, while they may not all be safer for the workmen, are certainly simpler, cheaper, and more expeditious.

We should notice here the great influence of electricity on mining in the arid and semi-arid regions. Power has always been a factor in modern methods and some ore bodies were located where steam power was of prohibitive cost, but long distance transmission of electricity generated by water power has solved the problem, and we find mines now being operated in regions that even a few, a very few, years ago were thought impossible and unprofitable.

Of course it is hardly necessary to point out that mining and all its dependent activities are subject to considerations of profit. If any portion of the industry become unprofitable it is eliminated and abolished. The miner expects for the risk of his capital greater profits than in any other modern industrial undertaking—and gets them. It is only as machines are developed and an organization of machines put into use that lower and still lower grade ore bodies are worked with an increasing profit. There is no period in the history of the world that can show such large quantities of all metals being produced as can this period of our own; and there

is no age that can show profits from the industry so large.

Perhaps the best illustration of how machinery renders very profitable that which was formerly unprofitable and worthless is dredging gravels for gold. The gold dredge is a mammoth machine. Dredging may be considered a form of mining and is usually so regarded; but dredging for its success depends entirely upon a machine which has intelligent direction. It does not in any sense depend upon unskilled labour for its profits. It demands the highest type of machine, handled by the most intelligent direction. Profits from dredging operations have been enormous, and it is probably the best illustration in mining of making possible that which seemed impossible.

A form of mining now being largely carried on illustrates the development of lifting material by machinery instead of by hand labour. We have seen the basket replaced by the wheelbarrow for moving ore in a mine. In turn we have seen the wheelbarrow replaced by the ore car. We have seen the ore car replaced by the conveyor, by the steam railroad, and by the electric trolley; and we now witness in some of the most gigantic operations in mining the hand shovel thrown aside for the steam shovel, moving five or more tons of material every dip this mammoth tool makes. Probably no better illustration of intelligent directing labour applied to a complicated tool can be given than the steam shovel. Here we notice that one man operating the shovel and a few others directing its movements have replaced the multitude of ignorant, poorly-paid, unskilled labourers formerly wielding hand shovels. Ill-paid as these individuals were, the time factor alone made their work unsatisfactory. Their methods were slow, clumsy, unorganized, unskilled, and, therefore, unprofitable. No steam implement or tool such as the steam shovel will ever replace hand or any other labour if mass human labour be more profitable than the machine. The machine can only live where it is profitable.

The so-called porphyry copper mines are an illustration of three machines,—the machine of transportation, the machine of disintegration (or the steam shovel), and the washing machine or concentrator. This last machine is an interesting evolution. It has its beginning in the crudest form of washing. Everyone is familiar with the action of water in separating earthy ingredients from one another. This water separation was early applied through simple machines such as the pan, the cradle, the strake, and the sluice. Then we reach the time when machinery and steam were called into service. We find first the older and cruder appliances, such as the various bumping tables. The hand jig (one of the oldest machines) was replaced by the power jig. Then a combination of hydrostatics, mechanics, and power called together the various mechanical tables and implements used to make close separation between mineral and waste material. These have been organized under technical direction into mammoth machines known as concentrators. These organized machines have reached capacities of 6,000 tons of material per day and are yearly becoming greater. They employ comparatively few men and are monuments of human ingenuity and skill.

But this evolution is far from complete. The giant washing machine concentrates several tons of crude ore into one ton of valuable concentrates. These are then taken by the transportation machine direct to the modern smeltery, and here we find a development in the business of separating and reducing the mineral to its

metallic state and its subsequent refining before the manufacturer takes the metal for his purposes.

It is unnecessary here to describe the modern smeltery. It is a mass of machinery organized and highly developed in conjunction with chemical processes. Its plan is laid so that great quantities of material can be quickly and cheaply smelted. Machinery replaces men as in all the other organized machines, and speed becomes the profit-maker as before.

It is interesting to observe the tendency to concentrate a particular operation required by several mines at a point convenient for this work. We have touched upon this matter in the case of smelteries and refineries, but it is not confined to these divisions. At Colorado City an example exists of chemical treatment on a large scale. To this point the refractory tellurium gold ores from Cripple Creek are brought for reduction. If facilities and conditions did not obtain whereby those ores could be handled cheaply and profitably—more profitably than at the mines themselves—the work would not be undertaken at this point. Power transportation and labour are the determining factors here.

By a review of all conditions covering any particular metal or mineral, we find that one or several operations required to fit it for human wants and uses will be carried on at such points, times, and places as will place production at the lowest possible cost and enable the miner to dispose of it at the highest possible price. The factors regulating this are labour, transportation, power and materials. Transportation and power are largely dominant factors and are yearly becoming more so.

In present times the question of the disposal of mine products has greatly occupied the attention of all operators. The metallic as well as non-metallic minerals in seeking a regular and profitable market have called in the services of engineers and organizers of the highest type. Oil flows through pipes, and the system of conveyance and pumping employed challenges the admiration of the world. Non-metallic minerals as coal, mica, talc, gypsum, and so forth are taken in hand by machines and processes directed by technical skill to improve their market chances and increase their usefulness. Consider for a moment how impossible all this would be but for motive power, invention, and organized direction.

THE FUTURE.

The miner of a few centuries ago relied principally on his own resources, as the shoemaker did in the days of Elizabeth. The miner of to-day is an organized specialist. He requires the services of the chemist for his analyses. The geologist explains the rock structure and guides his development. The electrician is at his constant call. The transportation engineer must be at his elbow. Without the metallurgist his vocation would become profitless. The mechanical engineer is his indispensable ally. He calls upon the skilled artizan of every trade, and daily he consults accountants and business organizers whose duty it is to specialize further the industry and increase its returns.

At no previous period was this effort possible. We rejoice in the achievement and regard the machine as our guide and the mechanical tool our master.

Mining as an industry is interdependent on all other industries, as all industries are directly dependent upon mining. There is no line of separation between mechanical engineering and metallurgical engineering. Transportation has become involved and in many instances intricately blended with the working of the mines.

As the machine is exact in its work and universal in its application, we have been called upon to train men to direct its work. Technical schools and schools of mines and science have multiplied like machines, and are training yearly in all civilized countries great numbers of young engineers, electricians, mechanics, geologists, chemists, builders, and so forth, whose business will be to apply science and nature's laws through the products of our shops and foundries.

It is but a few years ago that skilled technical men were scarce, and hence commanded high compensation, but with the increased application of technical knowledge to industry and the use of machinery this highly-paid labour will cease as its rarity vanishes. Moreover, the days of unskilled labour are going and only those trained for work of the kind the industry demands can survive. Machinery demands exactitude, and within the memory of our own time we have seen the business of mining gradually improving in methods. Guesswork is not so frequently indulged in. The inquirer is fortified by scientific training and this he applies to his investigations of new fields and camps through geologists, engineers, and others who are held strictly accountable to him and to the inexorable demands of his machinery governed industry.

We must perceive that the days of wildcatting and purely stock mining will gradually but surely end. Mining will take to itself a more defined, a more intelligent and organized method. It will have a plan: and the embryo of such plan is seen in the development and exploration tendencies of to-day. We will never witness a return to hand methods in mining or in metallurgy. The future is inevitable. We shall find greater machines, greater concentration, greater advances in economical methods, more cost reduction, continued replacing of unskilled labour by machines, and the unabated development and invention of newer, greater, and more complex machines applied to the uses and the business of mining.

Large masses of capital will be directed towards the systematic search of useful metals and minerals and will select and control the valuable deposits. It will consolidate and operate on a vast scale, using only the newest and best machinery for all purposes. More perfect technical control means the certain disappearance of hand labour.

Capital will gather all before it and march to an era of increasing profits in all mining undertakings.

This system of co-operation between financial men, engineers, technical men and skilled workmen will in the course of a not very distant future entirely eliminate competitive methods in the industry. The small operator of to-day is merely the forerunner of the great capitalist who is an organized miner. The smaller operator merely proves up and develops a valuable ore body for his successor. His methods of mining are what may be termed cheap and crude and, being competitive, cannot long exist adjacent to the well-managed, machinery-

driven mine. In the course of time he is bound to be absorbed, consolidated, or swallowed by his greater rival. Competition is warlike and therefore destructive. Trustification is co-operative, and is, therefore, the logical outcome of industrial evolution. Regardless of beliefs, we are bound to admit the facts and observe the benefits of the co-operation which machinery forces upon us. This co-operation is responsible for the consolidations, rings, trusts, and monopolies that have entered industrial mining. We are ever confronted with evidence and indications of greater trusts and consolidations in the immediate future for the mining world. They are as essential as they are inevitable. Industrial evolution has no absolute end. The tendency to increase production, replace men by machines, and take advantage through the agency of trustification for the disposal of products and the regulation of markets is essential to the profits that organized industry demands.

Newer and more intricate machinery will be required which will be more self-operating as time elapses, which will be almost human in its ingenuity and will, therefore, ultimately have the supreme power of eliminating unskilled hand labour, performing its work better than human hands. This is a human demand:—that nature's laws shall be applied through and by machinery and this postulates the co-operative or trust method.

No process or agency of law can possibly destroy the trust. It is the product of industrial evolution.

The machine has its economic masters to-day who will become its slaves to-morrow. Any return to competitive methods would mean disaster and social failure. The advocates of competitive mining methods might as well abolish electricity and go back to the tallow dip; or destroy steam shovels and return to the coal scuttle; blow up the dredge and rejuvenate the sluice box; stop the locomotive and seek the mule; burn the concentrator and return to the cradle; or send a blacksmith hammer to compete with the steam hammer; abolish the stamp battery and drag out the pestle and mortar. In the age of organized machinery competition is absurd and will soon be a matter of history. The conclusion seems to be that organized co-operation by and through the agency of machinery is the principal cause of the unprecedented activity of the mining industry of our time. Co-operation of men and machines gives surer profits, greater profits with greater certainty, than at any age before us. We are forced to admit that the end is not in sight and that greater production than ever will be possible if the human race demands for use the miner's goods and is ready to pay his exactions. We see, therefore, that industrial evolution applies to mining and may in the course of time have a meaning generally unsuspected. At the stage we have reached we can only marvel at the stupendous work accomplished and systematization effected. Thus is mining freed from the glamour of romance and established as the most profitable of human undertakings.

OUR LONDON LETTER

New Union of South Africa Suggests Interesting Statistics—Effect of the New Rich Gold Discoveries in West Australia—Power Equipment of Collieries—Chartered Company's Boast Unwarranted—New Petroleum Mining Book.

(Exclusive correspondence of the CANADIAN MINING JOURNAL.)

London, November 19th, 1910.

The finishing touch to the growth of constitutional government in South Africa has been put by the inau-

guration of the Union of South Africa. High hopes are expected from the concentration of South African Government functions. The London "Times" on November 5th issued a special South African number running to 68 pages, which, amongst other things, gave a complete review of South African mining statistics and matters.

It is said that the minerals at present being worked are gold, diamonds, silver, coal, tin, copper, lead, zinc, asbestos, magnesite, limestone, flint, manganese, etc. The total mineral output from the beginning of the indus-

tries to the end of last December is given as 2,110,000,000 tons, gold accounting for more than half of this figure. The number of workmen employed in the mining industry at June last is given as 31,084 whites and 276,371 Kaffirs—all the Chinese having been repatriated. This is more than double the number of workers for the same month six years ago.

The total salaries and wages paid last year by the Transvaal mines was \$64,041,205, the Kaffir portion being \$26,162,850. The average rate of pay per shift of an average of 8 to 10 hours on the Rand in December last showed that shift bosses received \$6 per day and banksmen \$3.50. Miners on stoping machines received \$5 per day and hand-stoping workers \$4.40 per day. Contract workers on all machines, of course, earned considerably more money. For example, shaft sinkers at daily rates received \$6, while those working by contract earned \$11. Cyaniders earned \$4 per day and slimesmen \$3.50.

The total assets of the Transvaal mines—gold, coal, diamond, and base mineral—at June 30 last year are given as \$631,646,135. Last December the Rand gold mines had 9,327 stamps and 150 tube mills at work, the total yield being nearly \$150,000,000, or a shade over \$7 per ton crushed. As compared with the total world's gold output the gold output of the Transvaal has risen from .03 per cent. in 1885 to 33.05 per cent. at the end of last year.

The largest gold producer on the Rand is the East Rand Proprietary mines. This works 4,312 claims and employed last June 19,309 workers. There were at work also at June 820 stamps, the heaviest weighing 1,750 pounds, and 25 tube mills. The rock hoisted amounted to 2,236,464 tons, and the rock milled was 1,938,338 tons. The gold recovered, including the value of bye-products, was \$13,826,615, and the dividends paid for last year amounted to \$4,651,795. It should be noted, however, that this, though the biggest producer, is not the biggest dividend payer. This distinction is held by the Crown mines, which paid in dividends last year \$6,110,690. The tons given here are all 2,000 pounds each.

The total coal production in Natal and the Transvaal amounted last year to 3,623,656 tons, employing 19,000 workers.

A lot of excitement has been caused here by the recent reports of rich gold discoveries in Western Australia. The Yilgarn goldfields are the centre of the rush and on all the Australian Stock Exchanges companies are being floated daily with quotations rising to substantial premiums. Frank Wilson, the Prime Minister, speaking in the Westralian Parliament, said: "Even Kalgoorlie and the Golden Mile sink into insignificance when one listens to reports regarding this property (the Bullfinch), which bids fair to eclipse anything discovered in the history of the State."

G. P. Doolette, one of the best-known figures in Westralian mining, is the lucky chief proprietor of the Bullfinch mine, the wonderful developments on which have led to the pegging out of claims for miles in all directions. Development work on this property over distances of less than 200 feet laterally and vertically is reported to have opened up ore valued at nearly \$1,250,000. The width of the principal reef runs up to 24 feet and assays of many ounces per ton have been got. A shipment of 60 tons from the mine returned nearly 7 ounces per ton. A parallel reef is stated to assay 35 pennyweights per ton. (One ton here equals 2,240 pounds).

The line of contact between granite and diorite on which the Bullfinch has been discovered runs for at

least 25 to 30 miles across country, so that the scope for prospecting operations can be realized. Of course, the Yilgarn fields are not really new. As a matter of fact, shipments of gold were made from the district as far back as 1889, but the recent Government aid to the water supply of the area has vastly stimulated prospecting, and the advisability of carrying a pipe line from the goldfields' water main is under consideration.

Although so far not a single share of the new flotations is on the London market, no doubt this is a lack which will soon be remedied.

Sam Mavor, Chairman of the Glasgow local section of the Institution of Electrical Engineers, chose for his inaugural address on November 11th the subject of power equipment of collieries. A brief resume of his remarks may not be out of place. He declared that nowhere more than in coal mining had the introduction of electric power been more advantageous. The acceleration in the rate of hauling and winding, especially in the deeper collieries, increased pumping, a higher standard of ventilation, the replacing of manual and animal haulage by mechanical means, and the introduction of coal-cutting machines and face conveyors had all contributed to increase the requirements for power. The screening plant and the washeries, and often by-products recovery plant in connection with coking ovens, had also created a completely new set of conditions, under which the cost of power, formerly regarded as of little moment, had, with the growth in size of power plant, been endowed with considerable importance; further, the competition in the world's coal markets and the rise in wages at home imposed the necessity of checking waste.

The colliery manager now realized that in problems associated with power production the aid of a specialist was indispensable, and the electrical engineer, whose training had enabled him to deal in detail with such problems, had established himself in the premier position in this department of engineering. Therefore the electrical engineer was often entrusted, not only with the planning of the electrical arrangements, but also with the whole scheme of power production and distribution. The field for the power engineer was co-extensive with our coal-fields, and the present extravagance of fuel would be appalling if it were not the measure of opportunities. The mechanical engineering of Continental collieries generally differed from those in this country in respect of the greater elaborateness and the style of the equipment. Such a scale of expenditure in this country would be considered ruinous.

The capital expenditure on Continental collieries amounted not unusually to \$5 per ton of coal produced yearly, whereas in this country the average was about \$2.50. While Continental practice contained a good many suggestions for this country, there were also many warnings, especially in regard to over-elaboration of detail. Multiplication of appliances could be justified only by economies in fuel or in labour, but it was not true that in Continental collieries the output was handled by fewer men than in this country. As a matter of fact the opposite was the case. Foreign visitors were often surprised at the large outputs of many of our collieries with plant that was apparently inadequate, and was handled by men the number of whom would be considered quite inadequate on the Continent.

The explanation lay in the fact that, while Continental colliery managers were engineers rather than pitmen, our managers, although less highly educated, were practical miners, who planned their operations and coal-handling plant with the primary object of saving labour. But if on the Continent there was extravagance in power

equipment, there was surely parsimony in this country; between the two extremes there was room for a middle course, and much might be done at our collieries without risk of exceeding the limits of prudence. Machinery, Mr. Mavor concluded, at the coal face had increased the output per man, and had reduced the ratio of personal accidents.

"Twenty-one years ago," I am reminded, "Queen Victoria affixed her signature to a memorable document. On October 29th, 1889, the British South African Company received the Royal Charter vesting it with administrative powers in Africa from the Transvaal to Tanganyika. In 1890 the company's pioneer column occupied Mashonaland, and in 1893 the power of the Matabele was broken. The trials and difficulties of those early days are now a matter of history. The unknown land of 1889, steeped in barbarism, is the civilized Rhodesia of to-day, with an assured position among the younger British Dominions and with a steadily increasing population of farmers and miners. Then Rhodesia was entered at the risk of life; now the country is a recognized resort for tourists, and the forthcoming visit of the Duke and Duchess of Connaught shows how far removed the conditions of 1889 are from those of to-day."

I trust the achievement of the happy state of affairs thus described will not lull the directors of the Chartered Company into resting on their laurels. During these twenty-one years the company has never paid its shareholders a penny of dividend, while, generally speaking, the various mining and other companies formed to exploit the territories have involved their shareholders in heavy loss.

Beeby Thompson's new book on "Petroleum Mining and Oil Field Development" practically brings up to date the literature of oil well drilling to which so many thousands of practical men are now devoting their attention. The author is at one with those who believe that there are vast stores of petroleum in the British colonies and dependencies by no means inferior to the foreign fields. It is impossible here to deal with the book at length but I note in passing that the author, in discussing the important matter of the selection of a drilling rig, puts forward the opinion that for general prospecting in a new field where little or nothing is known of the geological strata, the Canadian system is one of the safest to adopt; it permits, he says, strata of nearly all kinds to be penetrated, and requires less skilled attention than many other forms of drillers, both in the Dominion and in Galicia where this drill has been vastly improved, will not be likely to acquiesce in the view that it is the acme of simplicity in drilling operations, and, of course, we have not reached a time when, with any tool in any formation, drilling can be conducted without skilled labour and unceasing watchfulness and care.

In the drilling system there is only one reference to the Galician system. This reads: "The Galician system is practically a normal Canadian rig in which light iron rods are used instead of ash poles." This is an unsatisfactory way of disposing of a matter of considerable importance, and scarcely does justice to the well-known ingenuity of the world-famous drillers of the Galician school. The Canadian system has been technically improved by them to work in the deep and difficult formations of the Galician fields, and this has been done to such an extent that it does not require an experienced operator to recognize the superiority of the Galician rig over others of the same system. These rigs work down to 1,400 metres, and it is not an unusual thing for them

to drill the first 1,000 metres in ten months without a day's stoppage.

There is an excellent chapter on contract drilling, a subject which has been warmly discussed in the oil fields of Europe, together with some useful information about Baku, and a reference to oil field fires.

It is announced that a new German asbestos syndicate has just been formed, which includes practically all the German manufacturers. The previous cartel was dissolved at the end of last year, and since then keen competition has prevailed and prices have been reduced very considerably. It is intended to bring about a more profitable state of affairs, and a moderate advance in prices has already been announced. Germany is a very important factor in the asbestos trade, controlling a number of Quebec and Siberian mines, which now practically supply the world's asbestos requirements. The Italian mines are smaller, and the product is not suitable for many purposes, and this applies also to the output of the Griqualand mines. Although the fire-resisting properties of the mineral were known to the ancients, it was not applied commercially until towards the close of the sixties of the last century, when the industry was commenced in America. About the middle of the seventies asbestos works were started in England and Italy, and in the early eighties the first German works were erected. It is in Germany that the industry appears to have made most progress.

Granby Company's Annual Report

The tenth annual general meeting of stockholders in the Granby Consolidated Mining, Smelting and Power Company, Limited, was held in New York on October 4th. The following extract from the statement of accounts for the fiscal year ended June 30th, 1910, will serve to show production and other figures; also the charges as compared with the immediately preceding fiscal year:

	Year ended June 30, 1910.	Increase or decrease,
Copper sold, lbs.	22,570,111	I. 848,583
Silver sold, ounces	355,749	I. 20,228
Gold sold, ounces	48,804	I. 3,043
Receipts from above sales.	\$4,099,925	I. \$116,388
Working expenses and foreign ores purchased	3,534,978	I. 232,576
Balance	\$ 564,947	D. \$116,183
Interest, discount, depreciation, etc.	529,264	I. 361,636
Balance	\$ 35,683	D. \$477,824
Dividends paid	270,000	.....
Deficit	\$ 234,317	I. \$477,824
Previous surplus	\$2,698,687	I. 234,506
Total surplus	\$2,464,370	D. \$234,317

The report states that the amount expended on new construction, and equipment at the smeltery during the year was \$53,634. Mine development was 13,267 lineal feet, diamond drill development, 6,438 lineal feet; Granby ore smelted, 1,175,548 dry tons; custom ore smelted, 21,829 tons.

The average price received for copper sold during the year was 12.91 cents per lb., as compared with 13.22 cents in the immediately preceding fiscal year, and 13.33 cents in 1907-9. Average price received for silver sold

was 52.33 cents per ounce, as compared with 51.25 cents in 1908-9, and 56.25 cents in 1907-8.

The total cost of copper, all expenses paid after deducting the value of gold and silver produced during the year, was 10.34 cents per lb., as against 10 cents in 1908-9.

Attention was called in the report to the sale to shareholders during the year of 13,500 shares of the company's treasury stock, at \$85 per share, it having been decided to capitalize a portion of expenditures incurred during recent years and which outlay was properly chargeable to capital account.

Accompanying the president's report were reports from Dr. Otto Sussman, the mining engineer who examined the company's mines last spring, Mr. Jay P. Graves, vice-president and general manager; Mr. O. B. Smith, mine superintendent, and Mr. W. A. Williams, smeltery superintendent. The most important parts of these reports are the statements of Dr. Sussman and Mr. Smith, respectively, concerning the estimated tonnage of ore available, and the prospects for finding more ore. Dr. Sussman estimates 5,595,000 tons of ore that can be extracted; the average grade of this ore he gives as 1.24 per cent. copper, and 0.04 ounces gold and 0.25 ounces silver per ton. Mr. Smith estimates, as at July 1st, 1910, 6,429,169 tons of ore blocked out, of which 90 per cent., or 5,780,252 tons, can be extracted; the grade Mr. Smith places at 1.25 per cent. copper, and 0.043 ounces gold and 9.925 ounces silver per ton. It will be seen, therefore, that there is so little difference between the two estimates, that either of them may be taken as representing generally the available ore and its average grade. Dr. Sussman says that the ore-bodies in the Old Ironsides-Knob Hill group, which comprise the chief ore-bearing parts of the company's property so far as known, decreased in size from the No. 3 level downward. "The 500-foot level and all the diamond-drill work done on the 500-foot level disclosed no ore. A number of holes were drilled from the 400-foot level downward: all of them after a few feet passed out of the ore and entered barren ground. All the holes drilled from the 300-foot level and from the surface in an attempt to find the downward continuation of the ore-bodies passed out of ore above the lowest workings of the mine; in some cases they did not disclose any ore at all. Consequently, the limits of the ore-bodies in depth have been found to be a few feet below the 400-foot level." Mr. Sussman's conclusion is that the chances of developing any large additional tonnage of ore are "exceedingly slim." Mr. Smith says that the chief mineral claims owned by the company have been fairly well prospected with diamond drills, the drill holes ranging in depth from 200 to 500 feet. In all the holes in which ore was found, the drills passed through the ore into barren ground before drilling was discontinued.

Now, while it may not be stated with positiveness that the Granby Company will not find other bodies of ore than those included in the estimates above quoted, present prospects are not favourable to the expectation that more ore in considerable quantity will be developed. Under the circumstances it would appear that the actual position as to ore reserves of ore has been withheld from shareholders in the company and the public. Last May the JOURNAL published this comment made by its British Columbia correspondent: "The management of the Granby Company has not at any time, so far as has come to my notice, made public any information that would throw doubt on the general belief that the reserves of ore in the company's mines were large and

equal to all demands likely to be made upon them for a longer period than is now suggested they will last at present rate of production." A statement by Mr. A. B. W. Hodges, then local manager for the Granby Company, made at a meeting of the Canadian Mining Institute, at which were present a number of influential geologists and mining engineers from Europe, that "We" (the Granby Company) "have in one of our mines 10,000,000 tons of good ore," was quoted, also a statement printed in a special bulletin of the Institute that at the Granby mines "there is said to be approximately 20,000,000 tons of ore in sight." Surely common honesty demanded that such statements should be contradicted by those in a position to know the truth as to the approximate quantity of ore in sight. Or if it was the belief of the management that such statements were true, the competence of the manager may well be questioned, since about eighteen months later it is stated on excellent authority that the total quantity of ore extractable—not simply from one mine, stated by the then manager to contain 10,000,000 tons, but from the whole group of mines—is less than 6,000,000 tons, not 1,500,000 tons having meanwhile been taken out of the mines. The revelation now made is certainly a great disappointment, and it seems reasonable to conclude that some one or other withheld the truth. It is noteworthy that the reports of the mine superintendent, if he made any, have not heretofore been made public. Judging by the report by that official, now printed, it seems probable the actual position would have been made known earlier had he been permitted to tell it.

It must not be taken for granted, though, that the position of the Granby Company is a desperate or hopeless one. The company at the close of its last fiscal year had cash and copper in hand to the value of approximately \$900,000; it has a five-years' supply of ore working on a scale similar to that of the past year; it owns valuable assets in addition, including a considerable interest in the Crow's Nest Pass Coal Company; it is a going concern with large and modern equipment and a reasonable chance of doing an increasing custom smelting business; and it is in a position to acquire other mines and thus enlarge its sphere of operations. Notwithstanding that confidence in the company has been rudely shaken by reason of unreliable statements as to its reserves of ore having been permitted to go uncontradicted, it may be expected that it will pay dividends as soon as there shall be a fairly good increase in the price of copper—a rise of only one cent a pound would add nearly \$250,000 a year to its net profits at present rate of production—and there is also a fair prospect of an enlargement that will prove profitable and assist in restoring the company to favour among the investing public.

THE LARGEST CUSTOMS SMELTER IN MEXICO.

The Torren Customs Smelter—the largest in Mexico—is situated outside the City of Torreon. The plant is modern and is equipped with nine furnaces for the treatment of silver-lead ores, each with a capacity of 115 tons daily and a copper stack with a capacity of 250 tons daily. There is also a copper converter with a capacity of 15 tons daily. These smelters have ore-buying agencies throughout the mining districts of northern and central Mexico, and have been an important factor in the development of the base metal industry in Mexico.

Unique English Device for Detecting Fire-damp.

BY FRANK C. PERKINS.

The invention shown in the accompanying illustration is a burner adapted to existing miners' safety lamps as devised by Sir H. Cunynghame and Professor Cadman for detecting fire-damp in mines.

This gas-testing device consists of a strip of this asbestos treated with a solution of carbonate of soda (com-



mon washing soda), to which a few drops of hydrochloric acid have been added. The strip of asbestos is held in a horizontal position when in use, 3-16 inch above the flame. The wire supporting the asbestos is carried in a similar manner to a pricker wire through the vessel of the lamp, and when not in use is swung away from the flame.

In order to test for gas the strip of asbestos is brought over the flame, when gas (if in existence) is visible in a cap above. It is stated that in addition to the simpli-

city of the invention and the cost being exceedingly small, it commends itself to the mine manager, as it is unnecessary to reduce the flame while testing for gas, thus avoiding the chance of losing the light.

In using the device without lowering the flame, by means of the trigger the asbestos paper is turned completely over the flame. In the absence of gas, only the yellow flame is seen. When there is gas the cap is easily distinguishable, as it appears above the mantle and is quite sharp. As the percentage of gas increases, the cap becomes higher, until when it is about half-an-inch high there is one per cent. of gas. At two or three per cent. of gas the cap becomes very striking, being easily seen from a considerable distance. The brightness and clearness of the cap may be much improved by a little skilful manipulation, so as to bring the pieces of asbestos into the best position.

In case the piece of asbestos becomes broken or worn by constant use it can be replaced by another readily and without difficulty. It is stated that the usual care must be taken not to keep the lamp longer than necessary in dangerous quantities of air, containing, say, 3 or 3½ per cent. of methane.

It is said that experiments are being conducted by the inventors with a view of standardizing the appearance of the cap, due to various percentages of fire-damp.

Electric Smelting

Bulletin 3 of the Department of Mines entitled "Recent Advances in the Construction of Electric Furnaces for the Production of Pig Iron, Steel, and Zinc," has just been issued. The bulletin opens with a review by Dr. Haanel of present conditions and is followed by translations of several interesting Swedish papers on the subject of electric smelting. The rapid advance made in electric steel furnaces is evident from the fact that in 1904 when the first investigation was made by the Department of Mines there were only four electric furnaces in existence. In 1910 there were 114 furnaces of which 67 were in operation, 11 not working and 36 in the course of erection. Of these furnaces 30 were in Germany, 23 in France, 12 in Italy, 10 in Austria and 10 in the United States. Seventy-seven of them were of the arc type, 55 were induction furnaces and 2 a combination of the arc and resistance furnace. The capacity of furnaces has also greatly enlarged during the past six years, 15 metric tons being the size of the largest. These furnaces are used in the refining of high grade steels.

Notable advancement is also being made in the smelting of iron ore. As Mr. Bennie informed us at the meeting of the Canadian Institute last March, "It is no longer right to say that electric smelting will come; it has come." In a paper by Yngstrom the operation of an electric shaft furnace at Domnarfvet, Sweden, is fully described. The paper opens with a theoretical investigation into the quantity of carbon required. There follows a description of the plant with a reference to the first furnaces built and the reasons for their failures. A full description is given of the operation of the furnaces, methods of charging, consumption of power, electrodes, ore, flux and carbon, analyses of pig iron produced, etc. The conclusions of the author are as follows: "Judging from the results achieved by the experiments at Domnarfvet, the problem of making pig iron from iron ore in the electric furnace seems to be technically as well as commercially solved, but in order to ascertain fully this matter, further experiments ought to be

conducted on a larger scale. The necessary condition for a profitable smelting of iron ore in the electric furnace is that sufficient and cheap electric power is available. The following are some points in favour of the electric furnace:—

- (1) Cheaper cost of erection of the furnace, as blowing engines and hot blast stoves are not required.
- (2) Saving about two-thirds of the fuel required in the blast furnace.
- (3) Fine ore can be handled in the electric furnace without previous briquetting.
- (4) The gas evolved has a high thermal efficiency, being free from nitrogen.
- (5) The possibility of producing directly in the furnace iron with low carbon content.
- (6) Some reduction of labour, as only about one-third of the fuel required in the blast furnace is to be handled.

It will probably prove advisable later on to combine the electric shaft furnace with an electric steel furnace, in which the liquid iron from the shaft furnace could be refined.

Other smelting furnaces are said by the bulletin to be in course of erection in Norway and in India.

Other papers in the bulletin are on:

1. Electric furnaces for the reduction of spelter and zinc oxide.
2. The Fick Electric Reduction furnace.
3. The Fick Electric Steel furnace.

The director of the Department of Mines is to be complimented on the issue of a bulletin of this character giving the authoritative results of foreign practices in electric smelting.

A. B. W.

Cobalt Mines Royalties

During the year 1909 according to the annual report of the Bureau of Mines four Cobalt mines paid the Ontario Government \$338,426.66. Two of these properties have this year received a considerable reduction in their rate of payments, so that it is not likely to be so large. This, of course, takes no account of the royalty paid to

the T. & N. O. Commission, which is another department of the Government.

From the sale of 81 parcels of land on the Gillies Limit \$711,458.30 were obtained. The annual report in this particular of revenue and from sale and royalties reads:

There was received during the ten months from mining royalties the sum of \$338,426.66, as follows:

Crown Reserve Mining Company	\$145,437.46
O'Brien Mine	141,497.15
Temiskaming & Hudson Bay Mining Co...	44,403.26
Chambers-Ferland Mining Company	7,088.79

Total

\$338,426.66

The Crown Reserve pays a royalty of ten per cent. of the value of the ore at the pit's mouth, this being one of the conditions of purchase from the Crown. The O'Brien mine contributes on a basis equal to 25 per cent. of the receipts from the sales of ore, less a proportion of surface expenses, and there is a similar arrangement with the Chambers-Ferland Company. The Temiskaming & Hudson Bay Company pay at the rate of 15 per cent. of the net receipts.

The accruals on account of royalty for the calendar year 1909 were as follows:

Crown Reserve Mining Company	\$160,437.46
O'Brien Mine	141,497.15
Temiskaming & Hudson Bay Mining Co...	52,263.62
Chambers-Ferland Mining Company	16,259.64

Total

\$370,457.87

Of the amount only \$338,426.66 fell due and was paid within the fiscal period.

Up to 31st October, 1909, there has been received by the Department in mining royalties an aggregate of \$779,434.68, as follows:

O'Brien Mines	\$474,357.52
Crown Reserve Mining Company	174,695.31
T. & H. B. Mining Company	123,302.06
Chambers-Ferland Mining Company	7,088.79

Total

\$779,443.68

ROCK CRUSHING PLANT

Of Messrs. Laurin & Leitch.

(Written by PAUL C. VAN ZANDT.)

General Description.

The rock crushing plant of Messrs. Laurin & Leitch, engineers and contractors, Montreal, Canada, is unusually interesting from its enormous capacity of production and remarkable flexibility of operation.

Having obtained from the Montreal Water & Power Company the contract for constructing within four years a reservoir of 43,000,000 gallons at Outremont, one of the city's suburbs, they recognized the advantage of crushing and marketing the rock at the time the excavation is made, instead of piling it on a waste bank, the usual custom in the past.

As the reservoir will be 800 feet long, 400 feet wide and 40 feet deep, formed partly by excavation and

[Editor's Note.—The magnitude of the crushing plant herewith described is our warrant for publishing the following article. The whole plant is a study in the reduction of operating costs.]

partly by enclosing walls, it will be necessary to crush within four years approximately one million tons of hard trap and granite rock and to provide storage for approximately one hundred and fifty thousand tons in various sizes after crushing so that it can be marketed to the best advantage.

The limited time at the disposal of the contractors and the enormous quantity of stone to be removed within that time necessitated the erection of one of the largest rock crushing plants in the world.

Quarry.

The site of the reservoir from which the rock is quarried is upon the north slope of Mount Royal, and quarry operations have been started at the lowest point in the reservoir site, where an excavation of approximately 20 feet has been commenced. From this point the quarry face will be gradually cut back towards the mountain parallel with the lower edge of the reservoir. The rock as fast as quarried is loaded direct by steam

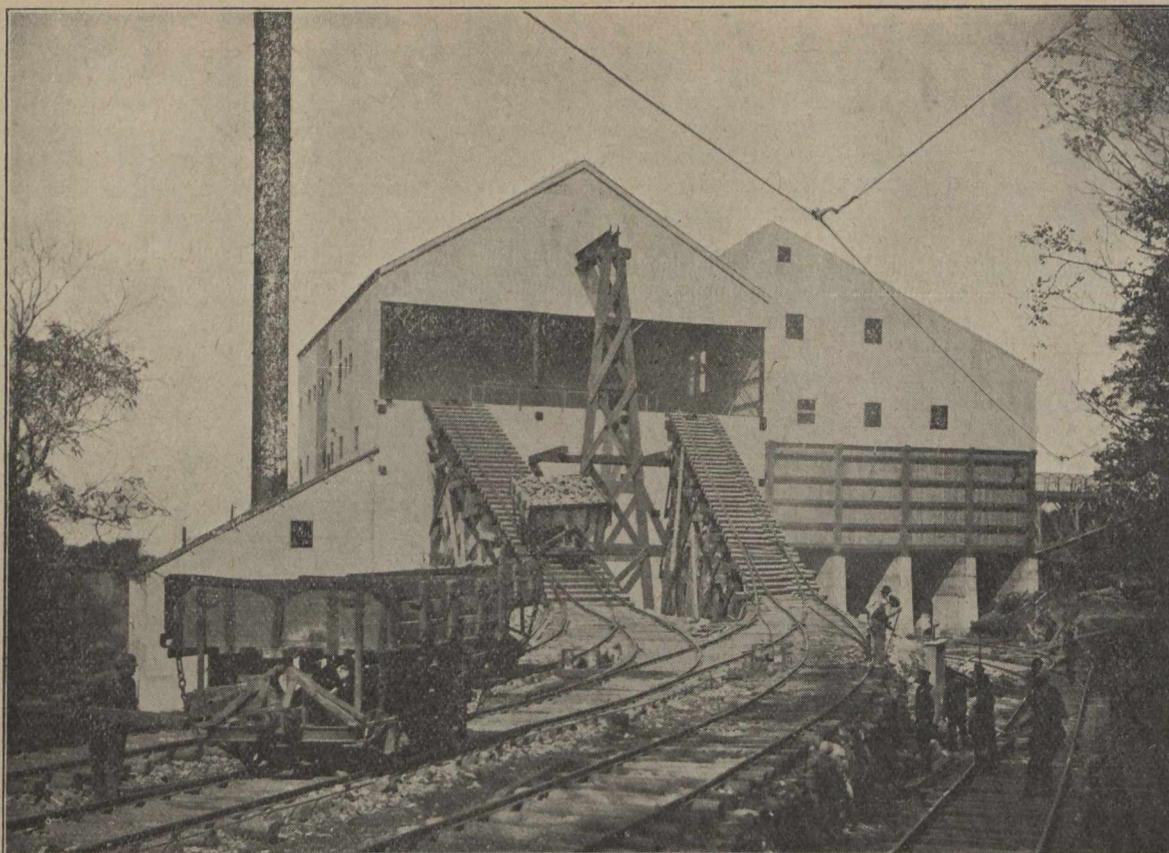


Photo No. 776

shovels into six yardside dump quarry cars, which are made up into trains of four each, to be hauled to the crushing plant. The rock is drilled by Temple electric drills along the quarry face, which is 800 feet in length, and, after blasting, the cars are brought alongside of the steam shovel, close to the bank of blasted rock, by a Shay locomotive which is of the geared type so as to take the grades, pushing the empty cars up to the

to bring the rock from the excavation to the crusher a haulage system has been installed operating in balance, drawing a train of four loaded cars up the haulage incline of about 4 per cent. to the foot of the two incline trestles leading from the ground to the dumping hopper over the large crusher. At the same time, a train of four empty cars is lowered down the haulage incline back to the quarry, balancing in part the up-going load. At the upper end of the haulage incline there is a third track for empty cars, and the trains of loaded cars which are gathered upon first one and then the other of the two outside tracks shown upon the cut accompanying this article, are hauled up these incline trestles of approximately 20 per cent. grade, one at a time and alternately upon each of the two trestles, as shown in photo 776, so that the large crusher is receiving a carload of rock first upon one side and then upon the other, making its operation almost continuous. The empty cars are dropped to the middle track for assembling into trains for the down-going trip on the haulage incline. All the switches shown are spring switches operating automatically, excepting the one that delivers the empty train to first one and then the other of the haulage tracks going back to the quarry.

Crushing Plant.

The crushing plant contains five Allis-Chalmers gyratory crushers. One of these is a No. 21, which is the largest gyratory crusher in use at the present time, having a capacity of 1,000 tons per hour. It has two openings, 42 inches across by 8 feet in length, shown in photo 779, each opening easily capable of receiving a piece of rock 3 feet x 5 feet x 10 feet, weighing 10 tons, which is the limit in size of any single piece that can be loaded by a steam shovel or carried on a single truck. This crusher, shown in photo 757, which weighs 225 tons, has crushed a piece of rock this size in forty

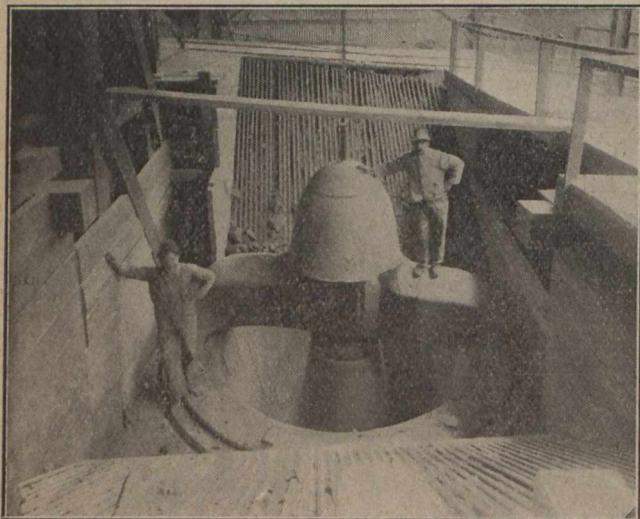


Photo No. 779

quarry face, and bringing the loaded cars from the quarry face to the bottom of the incline haulage system leading from the lowest point in the reservoir to the crushing plant.

Hoisting System.

The crushing plant is situated upon an excellent site about 1,500 feet from the centre of the reservoir, and

seconds down to pieces the size of a man's head and smaller. The primary object of this large crusher and the great advantage in its use is the elimination entirely of hand sledging in the quarry, and almost entirely of the re-drilling and re-blasting of large pieces of rock which may have been broken from the ledge in the quarry by a primary blast. Almost everything that comes down after a blast in the quarry can be loaded at once by the steam shovel and sent up to the

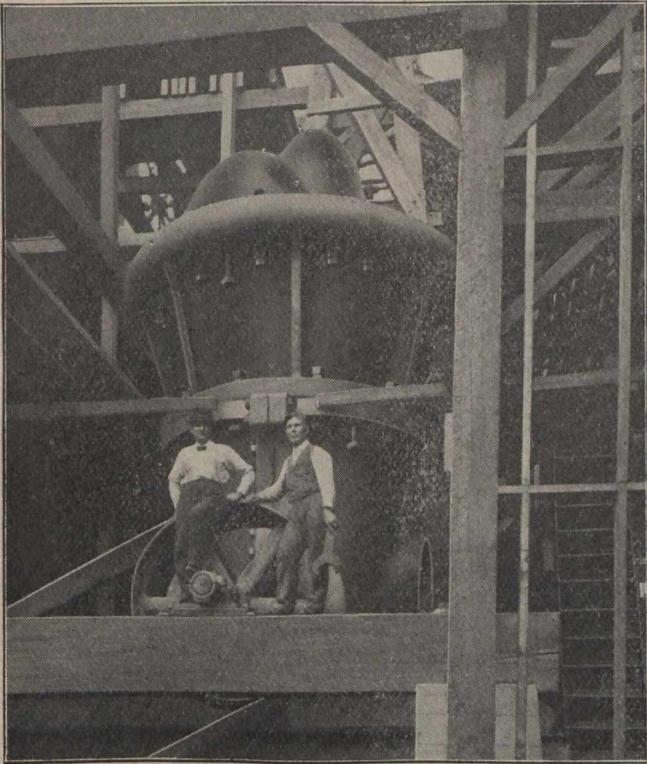


Photo No. 757

crusher without further work being done upon same. As hand-sledging, re-drilling, and re-blasting of pieces once broken from the quarry face, when smaller primary crushers are used, are always the largest items of expense in quarrying, it can readily be seen that the use of so large a crusher effects a great saving, even if we eliminate consideration of its large capacity. This crusher is made with a double discharge, each discharge spout delivering to a No. 18 bucket elevator and each of the two elevators delivering to a 6-foot diameter screen having approximately $2\frac{3}{4}$ -inch openings, shown in photo 762. At this point a rough separation of the rock is made and any incidental fines from the first break that pass these openings are delivered to a cross belt conveyor which, in turn, delivers them to a short elevator and from this to a rotary screen 24 feet long over the rock storage bins. These incidental fines in this way by-pass the secondary crushers and are delivered to the bins direct ready for shipment. The rejects, or oversize, from the 6-foot diameter screens are delivered to two bins which feed six No. 6 Allis-Chalmers gyratory crushers. One of these bins and four of the crushers, shown in photo 760, are installed at the present time and a spout is arranged to take the oversize from one of these 6-foot diameter screens and deliver it direct to the present bin. The rock in this bin runs out of the four corners into the four No. 6 crushers automatically, and these crushing continuously reduce this oversize rock to marketable size ($2\frac{1}{2}$ -inch and smaller), and all four deliver to a common belt con-

veyor, from which the re-crushed rock is received by a No. 8 elevator, which in turn delivers it to two rotary screens 24 feet long, duplicates of the one already mentioned, located alongside of it over the finished rock bins. The smallest product from these three screens consists of rock $\frac{3}{4}$ -inch and smaller, which is divided again upon three shaking screens into dust, $\frac{1}{8}$ -inch product (which is a fine clean sharp sand), $\frac{1}{2}$ -inch product and $\frac{3}{4}$ -inch product. The remaining sections in the 24-foot screens separate the crushed rock into $1\frac{1}{4}$ -inch, 2-inch and $2\frac{1}{2}$ -inch sizes. Each of the above sizes is spouted directly into a compartment in the storage bins, directly beneath the point where it is screened, with the exception of the dust, which is conveyed in a dust-tight screw conveyor to a bin compartment properly covered over. The rock, which is very hard and clean, sizes very accurately, producing the very best of marketable stone.

Storage System.

The storage bins mentioned above have a total capacity of from 2,000 to 3,000 tons, and the bulk of the product is spouted direct from these bins into cars and waggons for shipment. The shipping tracks shown upon the illustration run under three of the compartments, the remaining two being for teams. The spouts and gates from the storage bins are so arranged that any bin may be made to deliver its product to a car or waggon in the compartment on either side as well as the one directly beneath the bin, making it very easy to load more than one size into a car at the same time or to load the same size into two or more cars at the same time. No provision is made for re-crushing any of the different sizes of rock, but the excess of any size that does not market as fast as made is stored on one of four storage piles. The capacity for storage being approximately 150,000 tons, is sufficient to take the entire product of the plant for about 75 working days. When rock is to be stored, the particular size of which there is an excess is drawn from its bin on to a belt conveyor, which carries it out from under the bin to the system of storage conveyors extending over the storage yards. There are two belt conveyors extending under

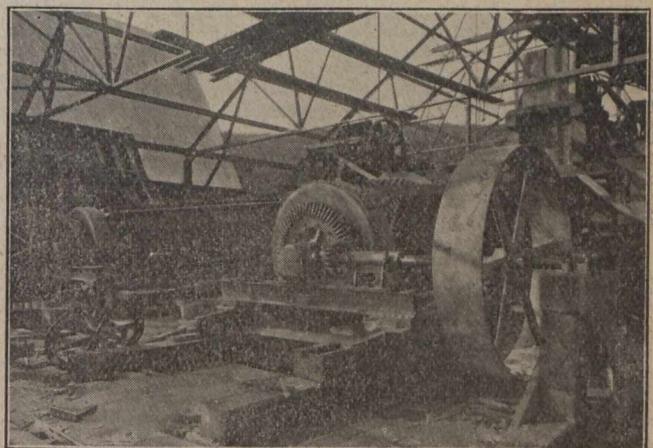


Photo No. 762

the bin, so that two sizes of rock may be piled at the same time, and the conveying system is so arranged that any size can be piled on any pile. The amount of rock to be stored cannot be predetermined and is not the same throughout the year. Moreover, some sizes are marketable only during the summer, while other sizes are marketable during the entire year, thus making the flexibility of the storage system above described of paramount importance. The conveyors used in this

storage system are partly 20-inch and partly 24-inch belt conveyors of the Stephens Adamson make, and the long storage piles are provided with moveable trippers which distribute the rock over the pile where desired. On account of the extreme hardness and sharpness of the rock, the belts are made of the best Diamond Rubber Company's brand, with 3-16-inch rubber cover for the narrower belts and 1/4-inch rubber cover for the wider. One specially interesting feature of the conveying system is the distributing centre, where the two belt conveyors leading out from under the bins deliver

pansion Belliss & Morcom engine, this engine being connected by an English system rope drive to the main line shaft which is, in turn, belted to the various machines mentioned. The belt conveyors are driven by Allis-Chalmers-Bullock induction motors, and the electric current for these (as well as for the Temple drills in the quarry and for lighting) is supplied by 175-k-w. Allis-Chalmers-Bullock generator. This generator is of the belted type, receiving power from the main line shaft, but is placed in the power house in line with a McEwen automatic high speed self-oiling engine of

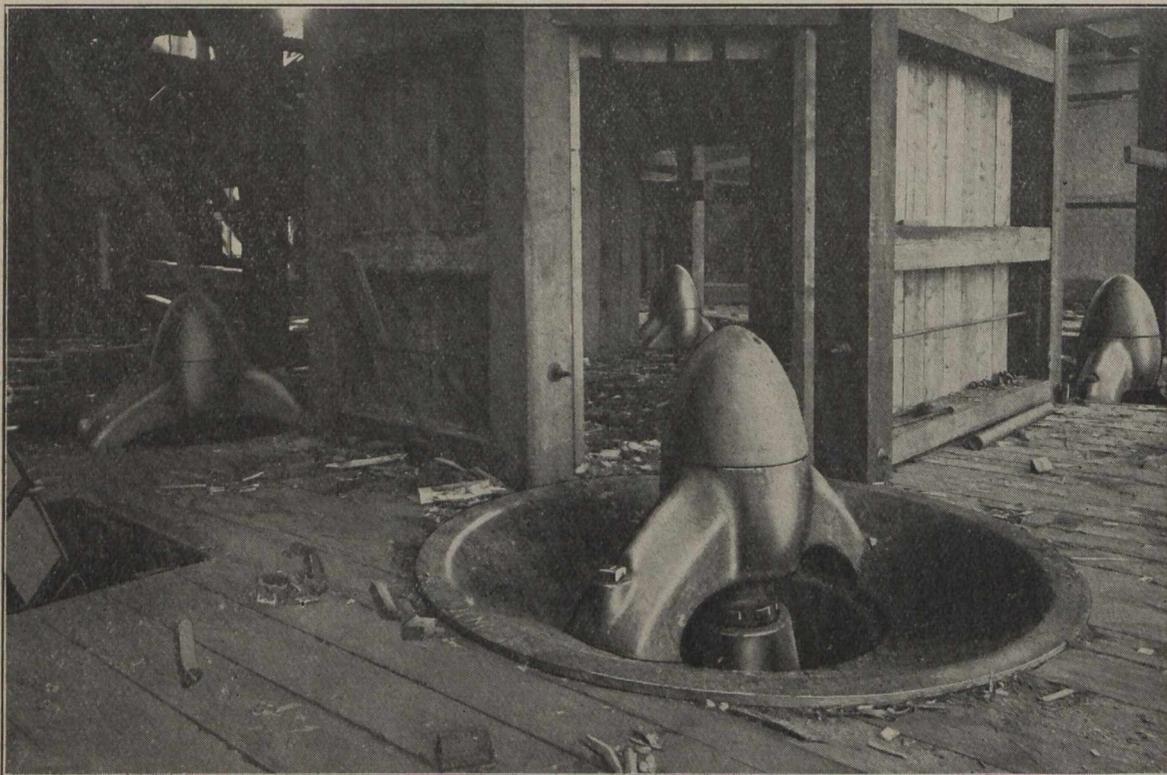


Photo No. 760

the material into two small hoppers, where the product from either of these belt conveyors may be delivered to the same piling conveyor, or to any one of the three piling conveyors, without interfering with the other.

Shipping Arrangements.

The rock loaded directly on the cars from the bins is brought out upon the track shown in the illustration, photo 776, past the scales (which are of the Fairbanks-Morse recording type, printing upon a ticket the gross and tare), and from this point the railroad track leads to the street railway system of Montreal, upon which it can be distributed to any point in the city, or to any railroad or wharf for further shipment. The waggons leave the property from the other side, passing over another set of scales of similar type.

When the rock that has been piled on one of the storage piles is shipped, it is loaded in a railroad car or wagon placed alongside of the pile by steam operated clam shell derrick crane, made by the Bay City Industrial Works, which has a one-yard clam shell bucket upon a 40-foot boom so that it can reach from the car to any point upon the storage pile adjacent to it, so that the additional cost of rock taken from the storage pile when delivered upon cars is only a cent or two more than that delivered direct from the bins.

Power Plant.

The power plant consists of two 250 h.p. Erie City water tube boilers, and one 720 h.p. vertical triple ex-

pression Belliss & Morcom engine, this engine being connected by an English system rope drive to the main line shaft which is, in turn, belted to the various machines mentioned. The belt conveyors are driven by Allis-Chalmers-Bullock induction motors, and the electric current for these (as well as for the Temple drills in the quarry and for lighting) is supplied by 175-k-w. Allis-Chalmers-Bullock generator. This generator is of the belted type, receiving power from the main line shaft, but is placed in the power house in line with a McEwen automatic high speed self-oiling engine of

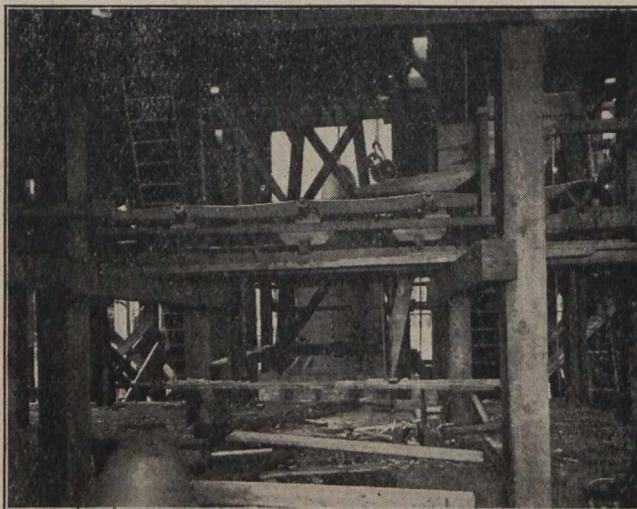
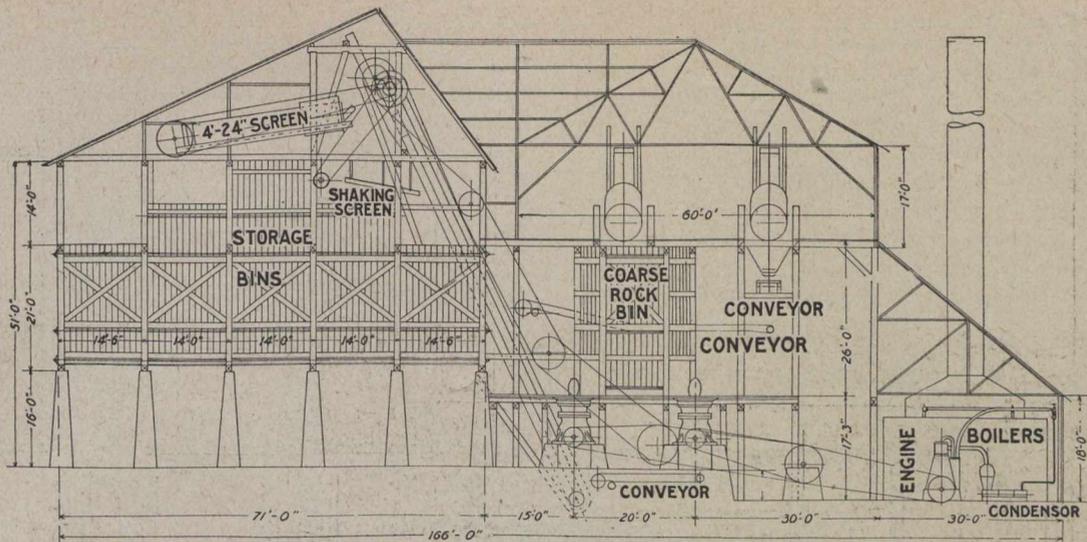


Photo No. 763

pression Belliss & Morcom engine, this engine being connected by an English system rope drive to the main line shaft which is, in turn, belted to the various machines mentioned. The belt conveyors are driven by Allis-Chalmers-Bullock induction motors, and the electric current for these (as well as for the Temple drills in the quarry and for lighting) is supplied by 175-k-w. Allis-Chalmers-Bullock generator. This generator is of the belted type, receiving power from the main line shaft, but is placed in the power house in line with a McEwen automatic high speed self-oiling engine of



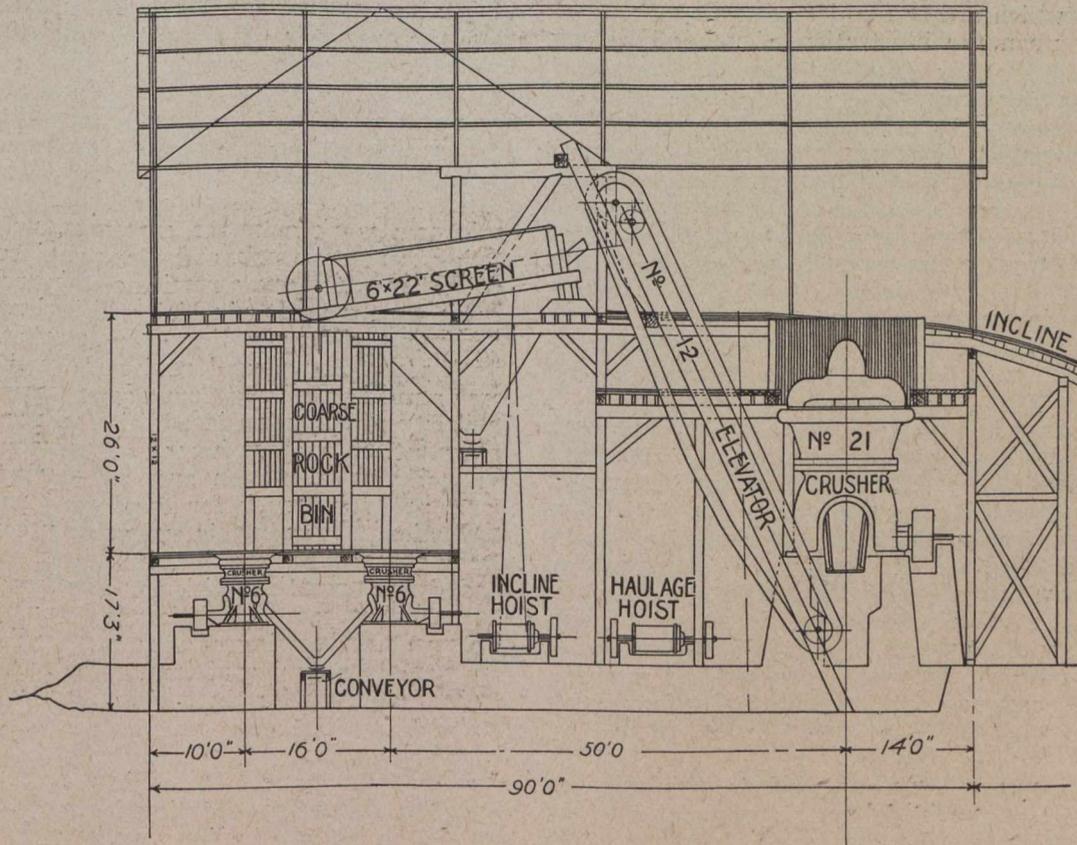
Section showing Conveying, Screening and Storage Equipment

just outside the power house. Condensed steam from the auxiliaries is sent through a water heater and steam pressure upon the boilers is maintained at a constant amount of 160 pounds by an automatic blast arrangement. The steam plant is one of the most economical that can be installed, the advantage of which is seldom appreciated in a rock crushing plant.

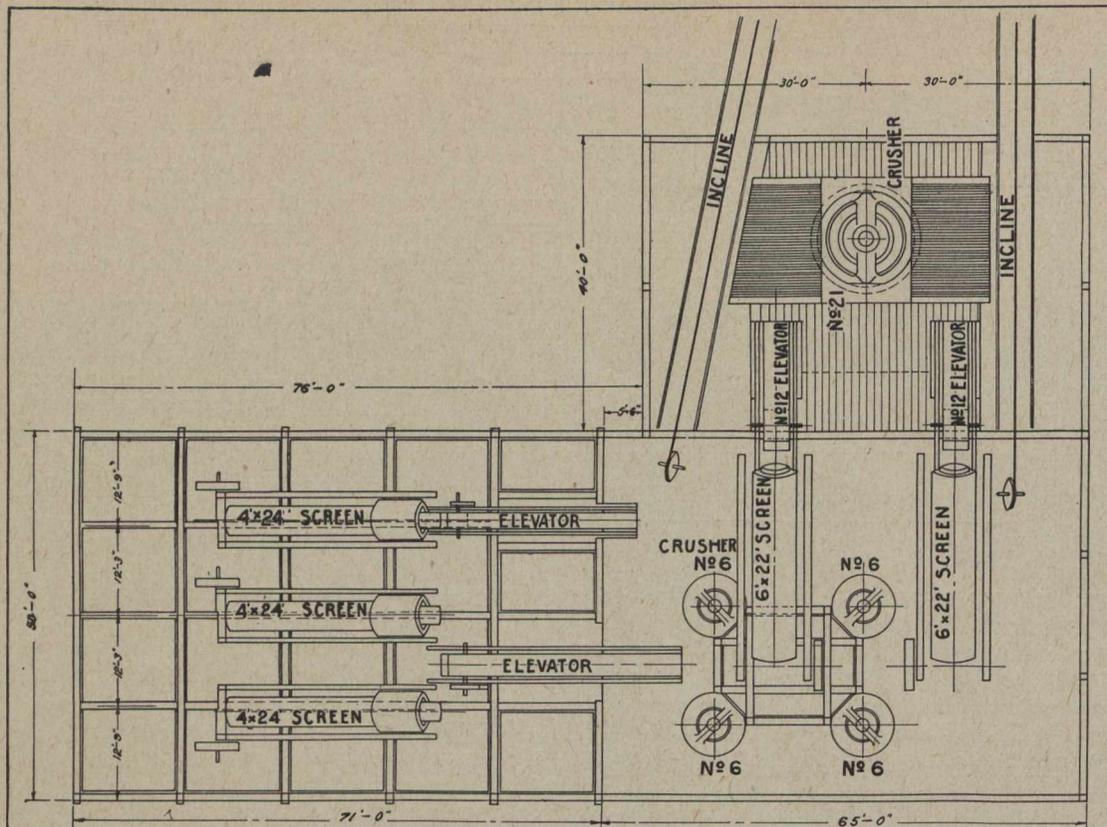
Hoists.

The hoists are of the Allis-Chalmers-Bullock friction type. There are three hoists, one for the haulage system with a 4-foot drum long enough to wind 1,500 feet of rope upon it, which operates the haulage system with two ropes, the down-going cars balancing in part the weight of the up-going loaded cars. The hoist is reversible and operated with a rope speed of 250 feet

per minute, bringing a train of cars from the extreme end of the quarry to the plant, in approximately five minutes. The remaining two hoists are for the two incline trestles, hoisting by a friction band and lowering by a band brake. The speed of these hoists is also 250 feet per minute, bringing a car from the foot of the incline trestles to the crusher hopper in about 45 seconds. The three hoists work in unison and are all controlled by one operator located above the crushing floor at a point where he can see the cars both at the bottom of the incline and at the dumping point. The speed of the hoisting equipment is such that by the time a train of four empty cars has been lowered to the quarry and four loaded cars have been crushed and returned to the empty track, four additional loaded cars have been brought up from the quarry.



Section Showing Crushers



General Plan of Plant

Auxiliary Apparatus.

Over the No. 21 crusher are installed two Yale & Towne triplex chain blocks, of 20-ton capacity each, for handling any of the heavy parts of the crusher should there be occasion to make repairs. The track for these blocks, which are fastened to a trolley or crawl, may be seen upon the illustration, showing how any part may be lifted clear of the building or a new part lifted in. Smaller crawls and chain blocks are provided over the number sixes and elsewhere around the plant. There is a belt conveyor for carrying coal direct from cars to the boiler house. There is a large machine and blacksmith's shop alongside of the plant, provided with a 24-inch x 18-foot lathe, a planer, radial drill, blacksmith's forge, steam hammer and other proper equipment. This shop is driven by an Allis-Chalmers-Bullock induction motor, so that it may also be operated when the crushing plant is not running, receiving current from the generator described in the power house.

Reservoir.

The reservoir, which will be the largest in Montreal, was designed by Mr. Frank H. Pitcher, chief engineer of the Montreal Water & Power Company. Approximately one-half of this reservoir is to be completed first and put into operation, while the remaining half is being completed. The main water pipe leading from this reservoir is now being laid by Messrs. Laurin & Leitch, and consists of a line of 60 inch cast iron pipe, the laying of which, with its valves, etc., is in itself an item of considerable interest, but which is dwarfed in comparison with the quarrying and crushing operations going on.

General.

This plant is unusual in many respects: primarily, on account of its size and initial cost in proportion to the amount of work to be done under this contract. The size of the plant and the excellence of its equipment

result in a saving in the cost of construction of the reservoir and the disposal of the rock taken from it which should pay for the entire equipment. It has sufficient capacity to crush the rock as fast as taken from the quarry, so that the product can be marketed immediately after excavation. The rock is handled but once from the excavation to the marketing, and in this way it is immediately disposed of and is out of the way. The rock is excellent in quality and instead of being thrown away on a waste bank, as was the case of the rock taken from the excavation for the Chicago drainage canal, for example, is made to yield a profit. Messrs. Laurin & Leitch use a very great quantity of crushed rock in their own work on other contracts, noticeably street paving, concrete work, and other engineering work of similar character, and a portion of this rock will be used in this way, the cost of which will be less to them than rock purchased upon the open market. The plant, which was designed and equipped by the engineering force of Allis-Chalmers Company, possesses an unusual flexibility of operation in addition to unusual economy of production, so that it may be operated to suit both the work of excavation and the market for crushed stone, producing rock for the lowest possible cost of production. The plant is exceedingly compact, resulting in the smallest possible buildings, and is well arranged for operating with the smallest crew of men. One man handles the hoisting and haulage equipment, two men the dumping of cars and feeding of crusher, two men the handling of cars at the foot of the incline trestles, one man for the spring floor, one man for the number sixes, one man for the transmission and hoist floor, one engineer, two boiler men, one oiler and two men upon the conveyors, loading, etc., and these men constitute the entire operating force of the plant. One side of the haulage incline may be operated independently of the other if necessary, as can also one of the

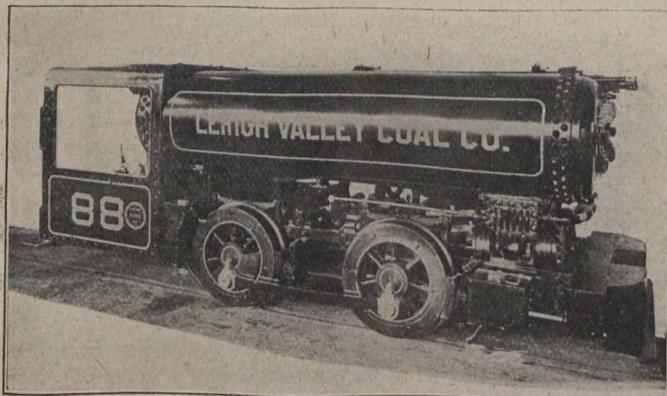
incline trestles. One side of the No. 21 crusher, with its elevator and screen, can be operated independently of or without the other. Any one or all of the number sizes may be cut out temporarily, and when the balance of the plant is shut down rock may still be loaded or piled on the storage piles, or the drills at the quarry may be operated.

A Remarkable Compressed Air Mine Locomotive

BY FRANK C. PERKINS.

The powerful mining locomotive utilizing compressed air as a motive power, shown in the accompanying illustration, is utilized by the Lehigh Valley Coal Company and has a total weight of 18,000 pounds and a tractive force of 3,260 pounds. The storage tank has a pressure of 800 pounds per square inch, while the working pressure is 140 pounds, the air tank capacity being 95 cubic feet.

Compressed air locomotives operate in a similar manner to a steam engine, the cylinders receiving air under



pressure instead of steam. On this air engine the cylinders measure 8 inches in diameter, and have a stroke of 12 inches, the power being transmitted to the driving wheels, which are 28 inches in diameter, in a similar manner to an ordinary locomotive.

This compressed air mine engine was designed for a gauge of 4 feet, and has a wheel base measuring 4 feet in length, the total length of the locomotive, over the bumpers, being 14 feet. The width of the locomotive is 5½ feet and its height only 5 feet 7 inches, these limits being necessary on account of the low and narrow passages encountered in the mine.

Hidden Creek Copper Mine, Observatory Inlet, B.C.

The Spokesman-Review, Spokane, Washington, recently published an interview with Mr. W. Yolen Williams, consulting engineer to the Granby Consolidated Mining, Smelting & Power Company, Limited, as follows:

"It is the general opinion in northern British Columbia that the Hidden Creek mine is destined to be one of the biggest producers in that province. My own judg-

ment from all the surface indications and a study of the deeper development to date, is that I can see little chance for this estimate to be mistaken.

"One feature of the property which impresses me especially is the facility with which mining can be done cheaply, as great depth can be obtained by open cuts. The mine is located within two miles of the company's wharves on Goose Bay, and the site of the projected smelter. The latter is admirable both for convenience in handling ore from the Hidden Creek mine, and for receiving custom ores from the Portland Canal district, northern British Columbia and Alaska generally.

"Before I left the mine the plan of operation for the winter had been outlined. The intention is to continue work on the main crosscut tunnel, which is now 736 feet long, and to concentrate work there so soon as the season necessitates the suspension of surface operations.

"This tunnel cuts the first vein at a vertical depth of about 400 feet from the surface and extends 300 feet beyond that lode. It entered the ore body on an angle and was in ore for 125 feet. Considerable drifting has been done here on the hanging wall side of the vein.

"The winter's work will consist of extending these drifts and thoroughly exploring the ore body by crosscuts, with supplemental diamond drill work, both for depth and distance along the vein.

"At the same time the main crosscut will be driven about 300 feet further ahead, from which point the diamond drill will be used to prove the extent and value of the ore bodies in the second vein.

"The surface showings of both ore bodies, which are known locally as the Cabin and Mammoth bluffs, are large and promising. The Mammoth bluff is the one not yet reached by the tunnel. While both ore showings are of a similar character, the Mammoth bluff shows much the larger ore body and the better grade of ore of the two. Both have been extensively prospected by surface cuts."

The Spokesman-Review added the following information: Mr. Williams was a member of one of two parties sent north about the same time by the Granby Company to resume the development of the Hidden Creek mine, which is located on Goose Bay, Observatory Inlet, the latter being a branch of Portland Canal, which forms the boundary line between British Columbia and Alaska. The two parties included, beside Mr. Williams, Mr. M. K. Rodgers, the former manager of the property, who still retains a one-fifth interest in it; Mr. O. B. Smith, jr., superintendent of the Granby mines at Phoenix, B.C.; Mr. H. McDonald, an engineer long in the employ of the Hidden Creek mine; and Mr. Page Boyle, a diamond drill expert. They were accompanied by a force of miners and three crews of diamond drillers. All arrived at the mine about the same time. Mr. Smith has remained to see the work well started, while Mr. Williams returned to Spokane, in order to look after the development of the Cliff and Consolidated St. Elmo mines at Rossland, B.C., also under bond to the Granby Company.

During the winter a force of twenty men will be kept continuously at work on underground development of the Hidden Creek mine, and it is expected that by spring enough will be known about the property to justify the carrying out of Mr. Jay P. Graves' plan to equip it with a matting plant as a feeder for the Granby Company's smelter at Grand Forks, B.C.

Personal and General

Mr. I. L. Merrill, of Los Angeles, California, president of the Hedley Gold Mining Company, has been spending a week or two looking over the company's Nickel Plate mine and 40-stamp mill at Hedley, Similkameen, B.C.

Mr. A. H. Gracey, of Nelson, left the Kootenay for Spokane, Washington, on his way to Vancouver, B.C., where he will spend the greater part of the winter.

Mr. Ernest Levy, manager of the Le Roi No. 2, Ltd., at Rossland, and the Van Roi Mining Company, the latter operating a silver-lead mine in the Slocan Lake district of British Columbia, recently spent a week at Vancouver and other coast cities.

Mr. Geo. W. Wooster, of Grand Forks, B.C., treasurer of the Granby Consolidated Mining, Smelting & Power Company, was in Seattle, Washington, late in November.

Mr. J. E. McAllister, of Greenwood, B.C., general manager for the British Columbia Copper Company, went to New York lately on a business visit.

Mr. E. A. Bradley, well known in the Revelstoke mining division of British Columbia in connection with hydraulic gold mining in the Big Bend of the Columbia district, has been to Spokane, Washington.

Mr. George H. Aylard, of New Denver, Slocan Lake, B.C., was in Spokane early in the month, on his way to Victoria.

Mr. H. L. Rodgers, manager of the Yankee Girl Mines, has returned to Ymir, B.C., from conferring with the directors of his company, which has its headquarters in New York.

Mr. Wm. Yolen Williams, consulting engineer to the Granby Consolidated Mining, Smelting & Power Company, Limited, returned to Spokane late in November from the Hidden Creek Copper Company's mine, Observatory Inlet, B.C., which mine the Granby Company is further developing under an option of purchase of four-fifths interest in the Hidden Creek Company.

Mr. C. W. Laing has resigned the position of construction engineer for the Dominion Coal Company, and has acquired an interest in the Brown Machinery Company of New Glasgow.

Mr. Richard Kirkby, the mining engineer of the Dominion Coal Company, leaves for England about the middle of December. He will spend Christmas there, and will return to Glace Bay at the end of January. While over in England Mr. Kirkby will inspect colliery plants and coal washeries.

Mr. Reginald E. Hore, of the Michigan College of Mines, and formerly of Toronto, was recently appointed Assistant State Geologist of Michigan. He is now in charge of the Houghton office of the State Survey. During the past summer Mr. Hore worked in the iron districts of Michigan.

Mr. J. B. Woodworth has returned to Toronto from inspecting several mines in the southern states.

SPECIAL CORRESPONDENCE

NOVA SCOTIA.

Glace Bay, General.—The Dominion Coal Company's output for November was 325,174 tons. During the first half of the month the mines worked full time and the rate of production was higher than it had been during the whole of the shipping season. The St. Lawrence season closed about the twentieth, and during the last half of the month the mines have not worked so regularly. Extensive alterations are being made to the screening plant at No. 2 Colliery, for coal from the Phalen Seam. Both Nos. 2 and 9 Collieries were closed down for these alterations for a period of five days. The height of the dump is being very much lowered to eliminate breakage, and a screening plant with shaking screens and picking belts is being installed, which should very considerably improve the product from No. 2 mine.

The total output to the end of November for the eleven months of the year is 3,266,230 tons, comparing with 2,527,422 in 1909, and 3,377,225 in 1908. December output may possibly reach 300,000 tons. The record annual output from the Dominion Coal Company's mines was 3,555,068 tons in 1908, so that it is quite possible that 1910 may break all records for annual production. Taking into consideration the fact that the U. M. W. A. strike was not declared off until the 28th of April, this showing is an exceedingly good one. By the close of the year the contribution to the general output from the new mines in the Victoria-Lingan district will amount to almost a quarter of a million tons. It is only a little over two years since this district was opened up.

The St. Lawrence shipments for the season amounted to 1,227,667 tons, comparing with 961,904 tons during the season of 1909.

Rescue Stations.—Referring to notes on "Rescue Stations in Great Britain," that recently appeared in the Journal, the following account of the use of breathing apparatus may be of interest.

The Denaby and Cadeby Collieries Company operate extensive and deep mines on what was formerly regarded as the Eastern

fringe of the South Yorkshire coalfields. The workings have a high temperature, partly owing to the depth and partly to the tendency of the seam to "gob-fires." As a result of one of these gob-fires, an accumulation of black-damp had made its way from the older Denaby workings to the present workings in the Cadeby mine. In order to clear the ventilation it was necessary to remove some obstructions in the area filled by the black-damp. It was decided to utilize breathing apparatus for this purpose, and a party of four men descended the No. 2 shaft and walked for a distance of one mile to the point where the damp was coming off. They encountered a good many obstructions, and it was necessary to crawl for a considerable distance along old roads with very narrow area. The party succeeded in removing one old brattice stopping and had reached another one when two members of the party asked to go back, stating that their strength was giving out. This was not due to any lack of oxygen, but to the intense heat, which is stated to have been in the neighbourhood of 160 degrees. The party turned back and arrived in the fresh air of the intake after an absence of an hour and a quarter in the old workings. The following day Mr. T. W. Mosby, who was the leader of the first party, with two fresh men and one man who had been a member of the party on the previous day, made another attempt to clear the ventilation. This time, however, they substituted mouthpieces for the helmets that had been used the previous day. Mr. Moseby states that the party felt more comfortable with the mouthpieces and, after working for one hour and a quarter, they succeeded in clearing away all the obstructions, and by six o'clock on the following night some three hundred yards of the Cadeby workings had been cleared of damp.

It may be mentioned that the apparatus used at most rescue stations are now so arranged that they can be used with either the helmet or with the mouth-breathing arrangement. Certain circumstances seem to require the helmet type of apparatus and

other circumstances are more favourable for the mouth-breathing type. In fighting a mine fire where the apparatus party have to face intense heat in their endeavour to get near the flames, there can be no doubt that the helmet type of apparatus is the only one that will afford the necessary protection to the face and head. On the other hand, where a rescue party has to make its way for a long distance through constricted passages in a heated and humid atmosphere, the mouth-breathing arrangement is stated by many experienced men to be preferable, because it admits of free perspiration and enables the head to be kept cooler.

In the working test above referred to, the apparatus used was of the Draeger type and the party had received their training at the Wath Rescue Station. Mr. Mosby's opinion of the usefulness of breathing apparatus, as given to a newspaper reporter, is interesting as being the opinion of a man who knows from experience what he is saying. It is as follows: "If life is in jeopardy in a mine through accumulation of gas, and there is a road for the rescue team to travel on, they will be able to fetch a man out without any danger to themselves; provided, of course, that it can be done under the two hours limit. A lot depends upon the man's stability, and the man with plenty of lung power who is able to stand great exertion and great heat stands the best chance."

ONTARIO.

Cobalt.—In the week ended December 2 over a thousand tons left the camp. This is probably the heaviest week that the camp has known: certainly in silver ounces it was.

The McKinley-Darragh output for November was 320,000 ounces and the estimate for the year is two and a half millions. The Savage is now producing between 50,000 and 60,000 ounces per month.

In November the McKinley-Darragh shipped eleven cars of concentrates.

The shipments for November increase the lead for 1910 as the banner year to almost 3,000 tons, in spite of the large number of mills and the bullion shipped instead of the low grade ore. Twenty-two mines shipped in November, against nineteen in October. The increased production is to some extent due to the higher price of silver, the ore being rushed out while it is still at 55 or 56 cents to the ounce.

November was also the heaviest month for bullion shipments that the camp has known. Four mines put out \$87,243, the Nova Scotia contributing \$32,579.96, the Buffalo 5,750, the O'Brien \$22,932.80, and the Crown Reserve \$24,268.67. Altogether 176 bars were exported in November.

At the annual meeting of the Cobalt branch of the Canadian Mining Institute the following officers were elected for the year: Mr. Chas. A. O'Connell, chairman; Mr. A. A. Cole, secretary-treasurer, and Messrs. Norman Fisher of the Temiskaming, Hugh Park of the Nipissing, and A. E. Culbert of the O'Brien, the committee. Mr. A. A. Cole was nominated as the representative of the Cobalt branch for the General Council of the Institute. The speeches of the evening were by Professor Miller on the International Geological Conference which he attended at Stockholm, Sweden, and Mr. Cyril Knight's very brief impressions of Porcupine's geology.

On its property in Munro, eight miles east of Matheson, the Detroit New Ontario is now installing two fifty horsepower boilers and a four-drill compressor. The intention is to sink to the 400-foot level and to crosscut from that point.

A shaft is being sunk on the Valentines Mines claim at the south end of Cross Lake. It will be put down a hundred feet by contract on the No. 8 vein and afterwards at that level the strong calcite leads discovered on the surface will be cut.

Seven hundred feet north of its No. 3 shaft and 500 feet southwest of its No. 1 the Hargraves has run into high grade ore again at the 375-foot level. The vein will average about three inches wide and may probably run 4,000 ounces to the ton. The find

was made in the long crosscut run from the No. 3 shaft parallel to the Kerr Lake line.

From the winze 65 feet below the 200-foot level of the City of Cobalt a vein of high grade from half an inch to two inches has been struck. The find was made on the Cobalt Townsite boundary and undoubtedly runs into that property.

The Rochester Cobalt is now trying to borrow \$25,000 on the property in order to continue development. Directors can sell 69,000 shares of stock at ten cents each.

The Nipissing will build a big concentrator for its low grade ore, and for the purpose of discovering the best method of treating it, it has erected on its property a large sampling plant. The Nipissing is now concentrating only at the Kendall, where the low grade is handled by the Nipissing Reduction Company.

In addition to the usual three per cent., the McKinley-Darragh has declared for the New Year disbursement a 12 per cent. bonus. The McKinley-Darragh will have paid on January 1, 49 per cent., or \$1,144,914.30.

There is an electric rate war between the Cobalt Hydraulic and the British Canadian Power Company all over Northern Ontario. The Fasken interests within a few weeks have obtained the control of the Cobalt Power Company, the Cobalt Light, Heat & Power Company, and the New Liskeard Power Company. All these companies are supplying power and the Hydraulic air.

The 60 tons shipped by Cobalt Lake will net that company, after freight and treatment charges, somewhere in the neighbourhood of \$10,000.

While there is no possible doubt that the ore reserves of the La Rose Consolidated have almost been doubled by the discoveries on the Lawson, the La Rose and the Princess, it does not seem likely that the dividend will be increased next quarter.

The new lateral vein alone on the La Rose has increased the ore reserves of the company by \$2,000,000.

The new vein on the Lawson continues to show excellent values, and it has been opened up for a distance of 60 feet or more. For that distance at the 200-foot level it averages nine inches and is 4,000 ounce ore and upwards.

Porcupine.—After allowing a private company to commence cutting the right-of-way for an electric railway into the Porcupine the Ontario Government have decided that they will build into Porcupine themselves, and have voted \$450,000 for that purpose. The work done by the Haileybury syndicate holding the charter has been taken over by the Government, and it is said they will be compensated. There will be no loss of time in pushing forward the construction of the railroad.

Few assays from the 100-foot drift on the main vein of the Timmins go below \$15, and many hundreds have been made. A winze is now being sunk below the 100-foot level on ore.

There is a very keen demand for claims in the Porcupine area, New York and English buyers in particular seeking anything in a good location in Tisdale, Whitney, Shaw, the Reserve, and Langmuir.

Very considerable interest is being taken in Langmuir Township, near Night Hawk Lake. Claims have been selling freely there for good sums. Victor Mattson, the Swede, who found Gold Island in Night Hawk Lake, has discovered native silver in a wide dike of calcite and barite. It has been stripped for 1,200 feet and the native shows in several places. It is exciting the greatest interest in the camp.

Several more banks have decided to locate at Porcupine. The Traders is already there and the Bank of Ottawa. Now it is announced that the Imperial Bank and the Bank of Commerce will establish branches this winter and the Royal Bank will also be represented.

Several plants have already been ordered for the Porcupine camp. The Timmins has completed its order for a 30-stamp mill, the Dome has purchased a 12-drill compressor, the Rea Mines have had shipped in a 20-horsepower boiler and a hoist, and the Foley-O'Brien a 4-drill compressor and two 50-horsepower boilers.

New Brunswick capitalists have bought the Walsh claims in the Reserve for \$50,000 with a first deposit of \$2,500. The dike is reported to be 100 feet wide with good free gold showings.

On the Powell claims in Porcupine another good find has been made in the discovery before the snow fell of a 40-foot wide vein of porphyry carrying free gold. Camps have been erected on the Powell claims and a road cut in from the Dome.

There was a very pronounced rush over the Porcupine trail once the route was declared open for sleighing and heavy traffic. The early and severe frost should make the ice good and the going fine.



The Powell Claim

Mr. P. Kirkgaard, head of the Deloro Smelting & Refining Company, has purchased the Feldon claims in Tisdale, the purchase price being \$35,000.

The breaking into articles of freight on transit into the camp and the many wholesale robberies of prospectors' shacks that have occurred in the camp have aroused a very bitter feeling among mining men, and they demand some protection from the law.

The Burns-Goad claims, the centre of the important section in the southwest of Shaw, have been sold to Toronto capitalists for, it is said, \$100,000 with \$5,000 down. The Redstone River section has grown in importance, as has also the whole of Shaw Township, very much in the past two weeks.

There is a rush of stakers into Thomas Township, and some of the claims staked are already disposed of to syndicates who are ready to throw them into companies or to take a gamble with them themselves.

The Hon. Frank Cochrane, Minister of Lands, Forests, and Mines, Mr. J. H. Black, superintendent of the T. & N. O., and Mr. Clement, the chief engineer, have all visited the Porcupine camp within the past two weeks.

South Lorrain.—On November 29th power was turned on from the Beaver Lake substation of the British Canadian Power Company, and the Wettlaufer and the King George are now running with the juice. The company has 1,500 horse-power available for the use of the camp. Only transformers are being established at Beaver Lake, as the company will supply nothing but electricity.

Since the seven tons of high grade ore was shipped from the Bellellen at South Lorrain the drift has been continued on the vein at the 70-foot level for some distance. Another shaft is being sunk on the Little Keeley vein which shows six to eight inches wide of solid smaltite.

Though no official announcement has been made it seems most probable that the Lewisohns have agreed to take up their option on their big block of Wettlaufer stock, which will give them control of the mine. The mine is proving a bonanza.

Gowganda.—There will be at least three shippers from the Gowganda camp this season, with the possibility of two more. The Millerett has ordered a 10-stamp mill completely equipped for fine sampling, and the Reeves-Dobie is expected to have its

new machinery in operation by the end of this month at least.

The Calcite Lake Mining Company has struck into some rich ore at the 92-foot level of its shaft after sinking on a comparatively barren calcite vein. The company is now bagging ore and may ship this winter. Close by the Bishop Gowganda is also getting results. Calcite Lake is eight miles south of Gowganda.

At Gowganda itself the Mann has found a 6-inch vein of 500-ounce ore which the presence of mills in the neighbourhood renders of some value if it does not improve in grade. The Bartlett's new control are stopping out all the silver they can see in order that they may get out a car to continue development with.

At Miller Lake, in addition to the activities of the Millerett, where a good surface discovery was made before the snow fell, the Miller Lake O'Brien has developed into a shipper this summer. At the 80-foot level there is an almost continuous ore body showing high grade for 200 feet, while the vein as drifted on at the 150 is stronger and richer than at the upper level.

Tests made in Toronto show that the dump ore and the low grade in the mine at the Millerett will run 44 ounces to the ton. Concentrates from this ore run 1,400 ounces.

The Morrison, near Miller Lake, is sinking two shafts on its big vein, which up to a short time ago showed mainly bismuth. Now in one of the shafts a small but rich lead of native silver has been cut right in the big calcite lead.

Other sections in the Gowganda district, where various properties have made good, are Hangingstone Lake, where the T. & H. B. Co. has taken up its option on the O'Gorman and Sweet claims; Spawning Lake, where the Thompson Mining Company found a fine surface vein; Shining Tree and Smoothwater. Everything has been held up by bad transportation and the seducing of capital into better advertised fields.

BRITISH COLUMBIA.

The western branch of the Canadian Mining Institute will hold a general meeting of its members at Nanaimo, Vancouver Island, in February, when the papers and discussions will be chiefly on coal mining matters. It is proposed to hold the spring meeting at Trail, where are situated the big smelting works and lead refinery of the Consolidated Mining & Smelting Company of Canada, Ltd. The removal of Mr. A. B. W. Hodges to South America several months ago further reduced the resident representatives of the West, which may yet have to consider itself fortunate to have any at all on the council of the institute. What will be the eventual result of this position, unsatisfactory as it is to many western members, remains to be seen. Last year Ontario and the East rejected every western nominee to the council but one.

Recently declared dividends were as follows: Hedley Gold Mining Company, quarterly distribution at the rate of 12 per cent. per annum; Le Roi No. 2, Ltd., two shillings per share on 120,000 shares; Crow's Nest Pass Coal Company, 1 per cent. Both the Le Roi No. 2 and the Crow's Nest Pass Coal Company paid similar dividends earlier in 1910.

East Kootenay.—More ore has lately been found in the St. Eugene mine, but particulars have not yet been made public. This mine is owned by the Consolidated Mining & Smelting Company, and in the company's last annual report it was stated that the ore reserves were estimated at about 20,000 tons, which was taken to indicate that the ore bodies had been nearly exhausted. The information regarding the finding of more ore is reliable, but whether the ore is in sufficient quantity to be of much importance has not yet been ascertained. However, the improvement in the situation is a little encouraging, even should a further change for the better not take place in the immediate future. It is hoped, though, that persistent exploration will eventually result favourably, and the life of the mine be thereby prolonged.

At the several collieries of Southeast Kootenay much coal is being mined and shipped. The Crow's Nest Pass Coal Company is working two collieries, namely, Coal Creek and Michel; the Hosmer Mines, Ltd., has made a much larger production of coal this year than last; and the Corbin Coal & Coke Company has also considerably increased its total output. There is little being done to further develop the large coal field in the upper Elk River country, which is still without railway or other transportation facilities.

Slocan.—The Rambler-Cariboo will ship ore soon, snow having fallen and the hauling being consequently easier. The Lucky Jim is continuing development work, this including driving another adit. The new opening is only a little above the railway track, so will give greater depth than has yet been reached, the other adits being well up the side of the mountain.

In the Cody neighbourhood, the Noble Five is reported to have found a vein of ore of good width and grade, but particulars have not been made public yet. The long raise from the deep-level tunnel of the Surprise mine to the old workings 800 feet above is more than halfway up, and a fan has been put in the level below to improve the ventilation for the miners.

Near Sandon, the Richmond-Eureka and Hope are both still working, but the Slocan Star has been closed, it is stated, for the winter. Little is being done at mines high up the mountains, for deep snow usually makes it not practicable to work them to advantage in winter. Near New Denver, the Mollie Hughes is being worked, and is sending out an occasional car of ore of good grade.

In the vicinity of Silverton, the Standard, Van Roi, and Hewitt mines remain the most important in the Slocan Lake district. The Standard will resume shipment of ore as soon as the snow shall be deep enough to make a good road; meanwhile, the ground is too soft for heavy hauling. This mine has one of the finest showings of galena ore ever seen in the district; at times there is fully 20 feet of clean ore in the face of No. 5 tunnel. The erection and equipment of the Van Roi concentrating mill is being proceeded with as rapidly as local conditions will permit; it is expected this work will shortly be completed. Much ore has been opened by new workings in the Van Roi mine. The Hewitt has shipped but little ore during recent years, but instead, the management has steadily pushed development work, so as to have large reserves of ore for milling whenever it shall be decided to commence concentrating on as large a scale as milling facilities will allow.

On Ten-Mile Creek, the Ellis Silver Mining Company, of Toronto, working the Eastmont mine, and Mr. S. S. Fowler doing development work on the Enterprise, which he holds under lease from its British owners, are the only ones mining in the district south of Silverton.

Rossland.—Recent developments on the Consolidated Mining & Smelting Company's Centre Star group of mines have been satisfactory. In the War Eagle mine, one of the group, another body of ore containing higher value in gold than much of the ore usually obtained from this group, was lately entered by the diamond drill, at 75 feet below the twelfth level. Development previously done on the twelfth level had proved the existence there of a strong vein, but the ore taken from it was of low grade, so the diamond drill was used to prospect it below the level, with the result that good ore was found. Assays of samples from over a width of 5 feet gave returns up to 3.24 oz. gold per ton, and 0.4 per cent. copper. Of three average samples assayed, two were found to contain gold at the rate of above 3 oz. to the ton. This development is an important one, and it resulted from following down some small streaks of ore first met with above the tenth level. Sinking from the twelfth level is in progress, preparatory to opening a stope in the high-grade ore discovered by diamond drilling, as above mentioned. Stope No. 1168, above the War Eagle eleventh level, which has been opened since the company's annual report, to June 30th last, was made, has been yielding a considerable

tonnage of ore of good quality. In the company's Centre Star mine, too, developments have been generally satisfactory, with pay ore on several levels, though not of so high a grade as that in the War Eagle. Diamond drilling is being continued in the lower levels of this mine, but as yet not much good ore has been found in the bottom of the mine. In both the Idaho and Iron Mask mines stopes are continuing to yield a fair tonnage of ore for smelting.

Progress is being made with deep development by the Le Roi No. 2 Company. The cross-cut driven about 1,000 feet south on the 1,300-foot level some time ago entered a large ore body, but the value of the ore thus far opened is less than was hoped for. There has not yet been time, though, to do any considerable development in the ore. It contains a fair percentage of copper, which is regarded as a promising indication. The greater part of the development so far done on the 1,300-foot level has necessarily been dead work, in consequence of which but little has yet been ascertained concerning the ore-body, but there is believed to be good reason to look for profitable development later.

Ore is still being extracted from some of the old workings of the Le Roi. There have been rumors in circulation relative to prospective buyers of this property, but the liquidator has announced that nothing definite has yet taken place in the direction of its sale. Two properties in the south belt of Rossland camp, namely the Mayflower and the Blue Bird, are looking well, both having opened good showings of galena ore. Further development of these finds is in progress and it is hoped permanent good results will follow. The L. X. L. is being worked in a small way under lease, with profit to the few men working it.

Trail.—The Consolidated Mining & Smelting Company's smeltery is receiving a comparatively large quantity of ore, both from its own mines and those operated by others, the latter being chiefly silver-lead properties, the production of which is much smaller than that of copper mines. The supply of copper ores is being well maintained, but lead ores are not obtainable in such quantity as during the years 1908 and 1909. Several mines that shipped a considerable tonnage in those two years have not latterly been producing, though one or two of them are expected to do so shortly. Meanwhile improvements are being made at the smeltery as occasion calls for them.

Boundary.—Work has been resumed in the Greenwood-Phoenix Tramway Company's tunnel, Greenwood, with 22 men employed. Mr. Duncan McIntosh, manager, has received assurances from Chicago, where the larger shareholders in the company reside, that money will be provided for driving to a distance of at least 3,000 feet. The dimensions of the tunnel are, approximately, 9 by 8 feet. The face has lately been in hard granite, but it is thought less difficult ground is not far ahead, after reaching which progress will be greater than under existing conditions. The tunnel is in about 800 feet.

At the Granby Consolidated M. S. & P. Co's smeltery, Grand Forks, preparations were made last month for blowing in Nos. 7 and 8 blast furnaces, and thereafter operating the smeltery up to its full ordinary capacity. Meanwhile arrangements had been made at the mine to again make the daily output of ore equal to the requirements of the eight blast furnaces. Since the destruction by fire several months ago of the ore-crushing and shipping facilities at the No. 3 tunnel outlet from the mine, the quantity of ore shipped daily has been curtailed. Temporary arrangements have been made to ship from No. 3 by way of the 200-foot level, which has been connected with No. 3 by a raise. On the 200-foot level the ore is trammed to the Victoria shaft, hoisted thence to the surface, and shipped over the Canadian Pacific Railway to Grand Forks. Next spring a new crushing plant and shipping bins will be provided at the outlet from No. 3 tunnel, and after completion of these works it will again be practicable to ship over the Great Northern, which has rail-

way connection with that outlet, though not with the Victoria shaft.

The maximum treatment capacity of the British Columbia Copper Company's smeltery at Greenwood is now about 2,600 tons daily, but the ordinary day's run, with all three furnaces in blast, is, when conditions are favourable, 2,400 to 2,500 tons of ore. Before the enlargement of two of the blast furnaces, about 1,800 tons was the quantity ordinarily smelted with three furnaces operating. The company is trying to maintain an average output of about 36,000 tons per month from its Mother Lode mine; 18,000 tons from the New Dominion Copper Company's Rawhide mine (operated under the same management); 3,500 tons from its Wellington camp mine; 2,500 tons of sulphide ore from the Napoleon mine, near Marcus, Washington; while the remainder of its supply comes from other sources. An aerial tramway, 29,000 feet between terminals, is being constructed, from the company's Lone Star mine, distant from the smeltery eight miles and situated immediately south of the International Boundary line, in the adjoining State of Washington. This tramway will have a carrying capacity of 20 tons an hour. Its lower terminal is at the site of the Boundary Falls smeltery (not now being operated), and connection thence with the smeltery at Greenwood is by C. P. R.

The Consolidated Mining & Smelting Company of Canada, Ltd., beside shipping ore from the Snowshoe mine, which it works under lease, is also preparing to send ore to its smeltery at Trail from its Phoenix Amalgamated group, which adjoins the Granby Company's property on the south. The company is also shipping ore from its No. 7 mine, conveying it over an aerial tramway to bins on the C. P. R. line at Boundary Falls, where it is loaded on cars for Trail.

A first carload of coal has been shipped from the small coal mine being worked three miles west of Midway. Some indications of coal have been discovered on Myers Creek, between Midway and Rock Creek, and prospecting work has shown that a short distance below the surface there is a 4-inch seam of coal which is widening as it is sunk on. A small local organization will ascertain whether or not coal in workable quantity occurs here.

Similkameen.—In the Lower Similkameen, the Hedley Gold Mining Company is completing putting in steam machinery and plant to provide for continuing operating the stamp mill throughout the winter, which has not always been practicable when dependence was placed on water power only. About Princeton, higher up the Similkameen Valley, beside the Princeton colliery, from which coal is being shipped regularly, other coal properties are being opened, these including the coal measures of the United Empire and the Osoyoos Coal Company, both of which are reported to have workable seams of coal. In the Granite Creek district the Columbia Coal & Coke Company, of Winnipeg, has done much development and is putting in power plant; its known coal reserves are large, and its enterprise is well managed and is stated to be adequately financed for development purposes. Another industry, the establishment of which is in hand, is that of manufacturing cement, for which a company has been organized. The extension of the V. V. & E. Ry. from Princeton to Granite Creek, now well on towards completion, is benefitting the district materially.

Coast.—From a London journal it is learned that the annual meeting of the Tyee Copper Company was held in London on November 10th. The chairman was reported to have said: "During the year the price of copper had been even lower than in the previous year, and the effects were such as to hamper the company's business seriously, mine owners having no inducement to proceed with development, to ship ore actively, or to open new mines. Nevertheless, the company had received 21 per cent. more ore than in the previous year. The quantity received, however, had only sufficed to keep the furnaces running 188 days, yet, as the standing charges were the same, whether the furnaces were fully or partially employed, the financial results afforded hope of improvement. Between May 1st and August 1st, 1910, the ore received was 19½ per cent. in excess of the quantity for the corresponding period of 1909. The manager reported that negotiations for the acquisition of an important group of properties had been almost closed. He (the chairman) was sanguine as to the company's future. The report and accounts were unanimously adopted."

GENERAL MINING NEWS.

NOVA SCOTIA.

Springhill, N.S., Dec. 2.—A telegram has been received here from the executive of the Dominion Steel Company to the effect that no change of policy will be made on the part of the company with respect to the strike situation. The United Mine Workers have taken the communication into consideration.

The terms of the acquisition by the Dominion Steel Corporation of a controlling interest in the Cumberland Coal Company at Springhill were made known to-day. There were outstanding \$900,000 six per cent. Cumberland Bonds, for which the Steel Corporation paid \$120, in five per cent. Steel Bonds. For the \$2,000,000 of Cumberland common stock Steel paid \$600,000 par value in Steel common stock, which has a market value of \$360,000. In all, the Cumberland people received in securities about \$1,800,000.

QUEBEC.

Montreal.—Mr. J. H. Plummer has given out the following statement: "It has been arranged that a controlling interest in the stock of the Cumberland Coal & Railway Company will at once be transferred to the leading directors of the Dominion Steel Corporation. There will be for the present no change in the local management. The general policy to be pursued will be that in force in the Dominion Coal Company." This announcement of the President of the Dominion Steel Corporation is of the greatest importance, as it hitches up a valuable prop-

erty with the greatest steel company in the Dominion, and will no doubt bring to an end the unfortunate strike at Springhill, which has been on for over fourteen months. The securities of the acquired company are a bond issue of one million dollars, and two million dollars of stock, and although the directors have taken the controlling interest personally, it will, of course, be eventually merged with the big company. The company's policy is to secure the largest coal areas possible in anticipation of a very great steel industry, and the statement is made that the railway from Springhill Junction to Pugwash will be at once carried on to completion.

Montreal.—At a three-hour meeting of Amalgamated Asbestos directors, Mr. R. M. Aitken, of Kitcat & Aitkin, London, England, was elected a director, representing large English interests. There were present at the meeting Mr. Thomas McDougall, in the chair; Hon. Robert Mackay, H. E. Mitchell, H. H. Melville, Percy P. Cowans, J. McIntyre, Hon. James Beck, and R. M. Aitkin. The organization is now being gradually whipped into shape, and it will be the aim of the directors to extend the scope of the company's operations, and put the pruning knife into the expense accounts. The directors decided to begin upon themselves, and directors' fees were reduced to the vanishing point. Among other things it was decided to change the company's fiscal year in order to make it end December 31, instead of May 31, as at present.

ONTARIO.

Cobalt.—The statement that Little Nipissing mine last week shipped a car of high-grade ore to the amount of 63,000 pounds, is incorrect, the shipment being mostly ore from the Coniagas mine. The car was made up of 17¾ tons from the Coniagas mine and only 13¼ from the Little Nipissing mine.

Toronto, Dec. 2.—The decision of the Ontario Government to extend the T. & N. O. Ry. into the Porcupine gold camp, is expected to give an impetus to wild-cattling operations in the way of mining promotions, and there are evidences that it has already done so. However, it is intimated that the Government will get after the wild-catters with a big stick. Hon. Frank Cochrane, Minister of Lands and Mines, leaves next week for a personal inspection of the projected railway route and the whole Porcupine field as at present developed. It may be taken for granted that the new sections of the Ontario Companies Act dealing with flotations of speculative companies and sales of stock will be rigorously enforced, particularly in so far as they affect the issue of prospectuses, advertisements, commissions, and sales of stock. Under the provisions all commissions paid to sales agents must be authorized by letters patent and disclosed in the prospectus. Shares or capital cannot be directly or indirectly applied in payment of commission except as authorized. No subscriptions for stock shall be binding upon the subscriber unless, prior to subscribing, he shall have received a copy of the prospectus.

Ottawa, Dec. 6.—The advent of winter has caused the small mica mines in the Gattineau district to close down. They are not deep enough to allow of working in cold weather. The mica market is quiet, no big sales or shipments being reported. Local mica men expect a very dull winter, as most of the big firms using the mineral have been well stocked.

Cobalt, Dec. 7.—From four shafts last month the Nipissing mined \$200,851 net and shipped \$398,410 also net, or after estimated treatment and freight charges had been deducted. Of the total of \$200,851, \$84,000 came up the Fourth of July shaft

alone. The month of November was a most noteworthy one for Nipissing in the form of discoveries of new ore underground, and the increasing of ore reserves. The discoveries included the new vein at the Kendall, the discovery of ore at the shaft of the top of No. 12, and the new leads on No. 164. Any one of these would have been important, and have added very considerably to the Nipissing's value.

Cobalt.—It is understood that the Peterson Lake and Nova Scotia directors have entered into an agreement whereby all ore in the disputed territory will be run through the Nova Scotia mill and shipped, the proceeds being retained in the Peterson Lake treasury until the courts decide how it shall be apportioned.

BRITISH COLUMBIA.

Nelson, B.C.—The force of men on the Rambler-Cariboo was doubled December 1st. There are 32 men at work on the mine at present and the management has decided that double the amount can be used. Ore has been opened up on 7, 8, 9 and 10, and drifting is being done on the 1,050 level. Upraises from 9 to 8 and from 12 to 10 are under course of construction, and all the ore that can be handled is being taken out. Winter quarters, which were burned out in the fire this summer, have been rebuilt. The concentrator will be moved down the hill below the compressor and a tram built three miles to McGuigan as soon as the railroad, which was also burned out, has been rebuilt to that point. Over \$9,000 has been expended on the property since the fire.

Phoenix, Nov. 29.—George Gill and Joseph Christian were victims of a premature explosion at the Rawhide mine. Christian will recover, but Gill's chances are very doubtful. They were setting off a blast in the mine and the fuse when lit ran very rapidly to the dynamite, which was discharged prematurely with the men but a few feet away. Both men were badly burned and bruised by flying rocks and now lie in the hospital.

MINING NEWS OF THE WORLD.

GREAT BRITAIN.

There has been issued from the Home Office Part III. of the General Report and Statistics for 1909 dealing with Mines and Quarries. Mr. R. A. S. Redmayne, Chief Inspector of Mines, states that the average price of metals for the year showed little alteration compared with the figures for 1908, but towards the close of 1909 there were signs of improvement, especially in the case of tin, which was more than £20 per ton higher in December than in the preceding January.

The report states that the total value of the minerals raised during the year amounted to £119,394,486, a decrease of £10,609,184 as compared with 1908. This decrease is mainly accounted for by the decreased value of coal. The total output of coal was 263,774,312 tons, and the value £106,274,900, showing an increase of 2,245,517 tons and a decrease of £10,323,948 respectively on the figures for 1908. The average price of coal was 8s 0.7d per ton in 1909, as compared with 8s 11d in 1908. The quantity of coal exported, exclusive of coke and manufactured fuel and of coal shipped for the use of steamers engaged in foreign trade, was 63,076,799 tons, an increase of more than half a million tons on the exports for 1908. France received over 10 2.5 million tons, Germany over 9 2.3 million tons, Italy over 9 million tons, Sweden nearly 4 million tons, Russia nearly 3 1.3 million tons, Egypt, Spain and Denmark each over 2½ million tons, and the Netherlands and the Argentine each over 2 millions. Adding the 3,246,300 tons exported in the form of coke and manufactured fuel, and the 19,713,907 tons shipped for the use of British and foreign steamers engaged in foreign trade, the total quan-

tity of coal which left the country was 86,037,006 tons. The amount of coal remaining for home consumption was 177,737,306 tons, or 3.949 tons per head of the population. The quantity of coke obtained in the year was 18,867,149 tons, valued at £11,896,913; and 1,511,645 tons of briquettes, valued at £978,498. The combined values of the output of clay and shale, igneous rocks, limestone, oil shale, salt, sandstone and slate for 1909 exceeded 7¾ millions sterling. Of the metallic minerals raised in the United Kingdom, iron ore took the lead, the output being 14,979,979 tons, valued at £3,689,777. The ore yielded 4,802,163 tons of iron, or more than one-half of the total quantity of pig-iron made in the country. Gold, lead, silver and tin all show an increase from British ores, whilst copper, iron and zinc each exhibit a decrease in the production for 1909, as compared with the preceding year.

The official returns of British salt shipments for last month show a total of 48,880 tons, an increase of 12,469 tons. The chief increases are 5,000 tons United States, 3,000 tons Sweden and Norway, 1,000 tons Holland and 1,600 tons Denmark. Liverpool increased its shipments by 3,000 tons, Runcorn, Weston and the Ship Canal were 5,000 tons better. Middlesbrough shows an increase of 4,667 tons. Fleetwood fell away by 1,956 tons. The ten months' salt trade totals 773,979 tons, an increase of over 75,000 tons.

The South Wales coal strike was marked by several important features late in November. On the one hand there was a report, on the authority of Mr. Matt Morgan, that he, with Mr. W. Abraham, the miners' President, and Mr. Onions, the treasurer, are to meet Mr. Askwith, of the Board of Trade, in London,

with a view to the continuance of the peace negotiations. On the other hand, the general conference called by the strikers and held at Cardiff decided to request all the lodges in the coal field to send delegates with a mandate to vote for or against a general strike throughout Wales. The vote on this point will be taken at the adjourned conference at Cardiff. The conference of November 21st, which was repudiated by the Miners' Federation, who recommended all Federationists to abstain from attendance, was of a fairly representative character, being attended by 100 delegates from almost every part of the coal field. This policy of a general strike was strongly recommended but most of the delegates said they could not vote on that question, as their lodges had not given them a mandate to that effect. In that way the conference came to be adjourned, in order that the lodges might be specifically asked to instruct their delegates upon the question of a general strike. The whole morning was spent in receiving reports from the collieries in the affected area. These were generally to the effect that the workmen were idle because they "refused to work for wages and under conditions that no self-respecting men should tolerate." They alleged that the "oppression of the employers had become intolerable," that the conditions were "inhuman," and that when workmen, after hard and honest toil, had failed to realize more than a few pence per day, the employers had chosen to brand them as loafers, or told them to limit their families to suit their scanty earnings.

BELGIUM.

The imports of petroleum products into Belgium during August amounted to 21,471 tons, compared with 19,810 tons in August, 1909. For the eight months to the end of August the total imports were 135,825 tons, against 242,589 tons for the corresponding period of last year.

AUSTRIA.

The Austrian Government has communicated to the press the following statement which is of considerable interest to all shareholders in oil producing companies operating in Galicia: "The Government proposes to open an investigation for the purpose of discussing the crisis in the petroleum industry. This investigation is now fixed by the Ministry of Commerce for Monday, 28th instant, at 10 a.m., in the session hall of the Vienna Chamber of Commerce. Invitations to take part in this have been sent to representatives of the crude oil producers, refiners, wholesale and retail dealers in oil and a series of oil experts. With each invitation was enclosed a sheet of questions, marking out the following programme for the discussions: 1. The present position of crude oil production, of the refining industry and the trade in kerosene. 2. The situation as to prices from the consumer's point of view. 3. Is it necessary at the present time to introduce any special measures to place the mineral oil industry on a sound footing? In case of an affirmative reply, what measures are suitable for the purpose, which do not entail the burdening of the consumer by excessively enhanced prices? 4. What attitude should be taken with regard to the export business, and what means should be adopted in its support?"

RUSSIA.

The total production on the four main areas of the Baku district during September amounted to 37,100,000 poods, against 43,700,000 poods produced during September, 1909, and 43,200,000 during August, 1910. The total production for the nine months of this year amounts to 364,200,000 poods, against 368,000,000 poods produced during the corresponding period in the preceding year.

SOUTH AFRICA.

A cablegram from Johannesburg states that during October the mines of the Rand alone (that is, excluding outside mines)

crushed 1,868,718 tons, the average yield per ton being 28s, the working costs per ton 17s 9d, the profit per ton 10s 3d, and the aggregate profit £952,161.

AFRICA—GOLD COAST.

The Governor of the Gold Coast reports that the output of gold from the colony, including Ashanti, during the month of October amounted to 13,954 ozs, values at £58,008.

UNITED STATES.

Cripple Creek, Colo., Dec. 1.—The report on output and total bullion value of ores from the Cripple Creek mining district in November shows 74,180 tons treated, some 20,000 tons being handled by mills in the district. The average value per ton ranged from \$3.5 to \$65. The total value was \$1,381,050. There was a general increase in the amount of ore handled at the several mills. The tonnage this month is about 4,000 tons more than last month and the gross bullion value is about \$45,000 greater than that of October.

Cripple Creek, Colo., Dec. 3.—In November 60 cars were shipped out by the leasers and company from the Hull City shaft of the Vindicator Consolidated Company's estate. Of this amount 45 cars were shipped by lessees, the grade of ore being milling class, while 15 cars were shipped by the company from this shaft with better results. There are 10 sets of lessees in the shaft and all are in ore. Each contributes about the same amount toward the output. The 60 cars totalled better than 1,500 tons. A good deal of development work is being done by the company, especially on the lower levels.

Ouray, Colo., Dec. 1.—The regular quarterly dividend of a shilling a share, or 20 per cent. yearly, declared by the Camp Bird, Limited, attracts attention periodically to the earnings of a typical Colorado gold mine, but these dividend statements fall considerably short in representing the actual profits of the undertaking. Up to the end of the fiscal year ended April 30, 1910, the total of dividends paid was £1,287,000 (approximately \$6,253,000) or 155 per cent. In five of the eight years since the acquisition of the property by the present owners the dividends were 20 per cent.; in the other three they were 27½, 15, and 12½ per cent. The smaller dividends for two years are accounted for by the heavy expense for construction made necessary by the destruction of the mill.

Butte, Mont.—The Butte district is maintaining its output of copper at 23,000,000 to 24,000,000 pounds a month, and about 22,000,000 pounds of that represents the production of the two Anaconda Company smelters. In November the total production was 23,700,000 pounds. The Anaconda Company changes its output of various mines to meet exigencies. At present the mines of the Butte Coalition department are at the lowest point of ore production in several years.

Antlers, Okla., Nov. 28.—Fourteen miners were killed or entombed in a mine 20 miles north of here to-day. Five bodies have been recovered. Nine men were entombed in the mine and Secretary Thomas of the mining company, says there is no doubt that all were killed. The five men whose bodies have been recovered were thrown from the mouth of the mine more than 100 feet into the air. The cause of the explosion has not been determined but it is believed to have resulted from gas formation. The mine is the property of the Choctaw Asphalt Company, of St. Louis.

Washington.—Expressing it as his opinion that the want of cheap fuel and the delay in opening the Alaska coal fields are the strongest adverse factors in the present problem of territorial progress, Governor Walter F. Clark, of Alaska, in his annual report to the Secretary of the Interior, declares that "the ill-advised policy of forbidding all development of the large coal resources of Alaska, or of placing such restrictions upon development as to make the embarkation of private capital approximated 19,000 tons. This is about the average for the past four months."

tal impossible, is to be deprecated, while the policy of conservation by proper use is to be encouraged. This coal," he says, "is needed for the industries of the territory and for the physical comfort of our people, and on no account should it be withheld from those uses." The present impossibility of mining coal, either under title or lease, he explains is in a measure responsible for the suspension of one of the principal railroads. This has caused a general feeling of discouragement over the business situation in those parts of Alaska where development and settlement ought to be going on most rapidly. Governor Clark says it appeared in public discussions of the subject that the opposition to opening the Alaska coal fields "springs chiefly from two sources—those persons who fear a monopoly and those who would have this coal held as a reserve supply for the

future." He further says that while the present coal-land law is not a good one "it certainly lends no hope to monopolists, but rather is calculated to discourage the embarkation of capital."

ALASKA.

Valdez, Alaska, Dec. 3.—The wild scramble for claims continues here. With the near approach of cold weather, the amateur as well as the seasoned prospector, is making use of every minute of daylight to place his monuments on unstaked ground. The snowfall along the coast range in this section is very heavy, and once the white blanket covers the hills, prospecting and claim staking will be at an end. Realizing the necessity of quick action, those who have not placed their names on location monuments are scouring the hills in search of paying lodes.

STATISTICS AND RETURNS

N. S. STEEL AND COAL—NOVEMBER.

The Nova Scotia Steel & Coal Company reports for November and for the year to date as follows: Coal mined—In November, 77,450 tons; year to date, 787,788 tons; increase over same date in 1909, 35,500 tons. Iron ore mined—November, 57,362 tons; year to date, 459,000 tons; increase, 39,500 tons. Pig iron made—November, 7,550; year to date, 60,894 tons; increase, 7,700 tons. Steel ingots cast—In November, 8,274 tons; year to date, 69,331 tons; increase, 10,200 tons. Billets cogged—In November, 6,376 tons; year to date, 53,079 tons; increase over 1909, 4,700 tons. Bars and plate rolled—In November, 4,487 tons; year to date, 45,597 tons; increase, 4,600 tons. Number of axles shipped—November, 2,099; year to date, 31,845; increase over 1909, 7,800.

DOMINION IRON AND STEEL OUTPUT.

The production of the Dominion Iron & Steel Company, Limited, for November was as follows: Pig iron, 23,122 tons; steel ingots, 26,625 tons; blooms, 23,083 tons; rails, 13,425 tons; rods, 7,488 tons; shipments, 19,925 tons. The output of coal at the Dominion Coal Company, Limited, collieries for the month was 325,000 tons.

COBALT ORE SHIPMENTS.

Following are the shipments from the Cobalt camp for the week ending December 2nd, and those from January 1st, 1910, to date. The shipments were made up of 15 cars of high grade and 16 cars of low grade ore.

	Ore in lbs. Dec. 2.	Ore in lbs. Since Jan. 1.
Beaver	54,160	280,377
Buffalo	61,490	2,238,478
City of Cobalt .....	.....	608,875
Chambers-Ferland	64,000	1,655,300
Cobalt Central .....	.....	293,286
Cobalt Lake .....	.....	415,200
Cobalt Townsite .....	.....	665,120
Colonial .....	.....	309,730
Coniagas	74,880	2,145,416
Crown Reserve .....	.....	5,526,840
Drummond	460,000	2,884,200
Hargraves .....	.....	564,070
Hudson Bay .....	.....	481,215
Kerr Lake	254,570	9,494,728
King Edward .....	.....	263,406
La Rose	259,250	10,010,141
McKinley-Darragh	202,100	4,147,149
Nipissing	398,380	12,040,787
O'Brien .....	.....	1,179,360
Peterson Lake (Little Nip) ..	63,580	561,000
Provincial	40,000	105,000
Right-of-Way	80,460	1,749,747
Rochester .....	.....	60,750

Silver Cliff	321,400
Standard Cobalt	258,951
Temiskaming	1,973,350
Trethewey	1,000,890
Waldman	63,992
Wyandoh	48,300

Ore shipments for the week ending December 2 were 2,012,870 pounds, or 1,006 tons.

Total shipments from January 1 to December 2 were 61,347,058 pounds, or 30,673 tons.

COBALT BULLION SHIPMENTS.

The bullion shipments from Cobalt for the month of November were the largest in the history of the camp. One hundred and seventy-six bars were shipped, the weight being 157,556 ounces, and the value declared at \$87,243.41.

The total shipments to date now read as follows:

	Ounces.	Value.
O'Brien	301,770	\$169,824
Nova Scotia	129,999	77,250
Buffalo	110,924	56,749
Temiskaming	68,230	33,794
SCrown Reserve	60,931	32,891
Crown Res (Silver Leaf) ..	3,728	1,173
La Rose	44,057	23,339
Cobalt Gem	10,800	5,800
Beaver	3,168	1,820
Colonial	1,008	623
Campbell & Deyell's sampl- ing works, name of mine not disclosed	1,264	539
	<hr/> 735,879	<hr/> \$403,802

COBALT SHIPMENTS BY MONTHS.

Ore shipments from Cobalt camp for the month of November were 3,864.68 tons, divided among 22 mines, and for the eleven months 29,993.06 tons, a gain over the same period last year of 2,936 tons, not including \$403,802 worth of bullion shipped, a very substantial increase.

The gain of November, 1910, over November, 1909, amounted to 1,400 tons.

The shipments by months for the first eleven months of the year now read:

January	2,025.06
February	2,248.99
March	2,594.78
April	2,814.08
May	2,243.17
June	2,917.00
July	3,168.46
August	3,111.89

September	2,183.10
October	2,876.85
November	3,864.68
Total	29,993.06

McKinley-Darragh's November output was over 320,000 ozs, and the management confidently expects that the total production of silver for the year will be over two and a half million ounces.

TORONTO MARKETS.

December 8.—(Quotations from Canada Metal Co., Toronto).

- Spelter, 5.50 cents per lb.
- Lead, 3.70 cents per lb.
- Antimony, 8 to 8½ cents per lb.
- Tin, 40 cents per lb.
- Copper, casting, 13.50 cents per lb.
- Electrolytic, 13.50 cents per lb.
- Ingot brass, 8 to 12½ cents per lb.

Pig Iron (Quotations from Drummond McCall Co., Toronto).

- Summerlee No. 1, \$23.00 (f.o.b. Toronto).
- Summerlee No. 2, \$22.50 (f.o.b. Toronto).
- Midland No. 1, \$20.00 (f.o.b. Toronto).
- Hamilton No. 1, \$19.00 (f.o.b. Hamilton).
- Hamilton No. 2, \$18.50 (f.o.b. Hamilton).
- Clarence, \$20.00 (f.o.b. Toronto).
- Cleveland, \$20.00 (f.o.b. Toronto).
- Coal, anthracite, \$5.50 to \$6.75.
- Coal, bituminous, \$3.50 to \$4.50 for 1¼-inch lump.

Coke.

- December 6.—Connellsville Coke (f.o.b. ovens).
- Furnace coke, prompt, \$1.40 to \$1.50 per ton.
- Foundry coke, prompt, \$2.00 to \$2.15 per ton.

December 6.—Tin (Straits), 37.95 cents.

- Copper, Prime Lake, 13.00 cents.
- Electrolytic copper, 12.85 cents.
- Copper wire, 14.25 cents.
- Lead, 4.50 cents.
- Spelter, 5.95 cents.
- Sheet zinc (f.o.b. smelter), 7.75 cents.
- Antimony, Cookson's, 7.75 cents.
- Aluminium, 22.75 to 23.00 cents.
- Nickel, 40.00 to 45.00 cents.
- Platinum, ordinary, \$39.50 per ounce.
- Platinum, hard, \$41.50 per ounce.
- Quicksilver, \$42.00 per 75-lb. flask.
- Bismuth, \$1.95 per lb.

SILVER PRICES.

		New York	London.
		cents.	pence.
November	23.....	55½	25 1/8
"	24.....	Holiday	25 7/8
"	25.....	54 7/8	25 1/8
"	26.....	55 1/8	25 7/8
"	28.....	55 1/8	25 7/8
"	29.....	55 1/4	25 1/2
"	30.....	55	25 3/8
December	1.....	55	25 3/8
"	2.....	55	25 3/8
"	3.....	55	25 3/8
"	5.....	54 7/8	25 1/8
"	6.....	54 1/4	25 1/8

SHARE MARKET.

(Courtesy of Warren, Gzowski & Co.)

Miscellaneous—December 8th, 1910.

	Bid.	Ask.
Amalgamated Asbestos	12	..

Black Lake Asbestos	17	19
Dominion Coal .....	..	62
Dominion Steel .....	..	62
Dominion Steel Corp.	59 3/4	60
Granby	37	38
Consolidated Mining	50	60
Nova Scotia Steel .....	..	86 1/4
Crow's Nest Pass .....	..	77

Cobalt Stocks.—December 8th, 1910.

Amalgamated .....	.01	.03
Bailey .....	.07 1/2	.07 5/8
Beaver Consolidated .....	.27 1/4	.27 3/4
Buffalo	2.00	2.50
Chambers-Ferland .....	.14	.14 1/2
City of Cobalt .....	.19 3/4	.20 1/4
Cobalt Central .....	.08 3/8	.08 3/4
Cobalt Lake .....	.13 3/4	.14
Coniagas	4.86	..
Crown Reserve	2.67	2.69
Foster .....	.04	.07
Gifford .....	.03	.03 3/4
Great Northern .....	.09 5/8	.09 3/4
Green Meehan .....	.01 3/4	.02
Hargraves .....	.27 3/4	.28 1/4
Hudson Bay	104.00	110.00
John Black .....	.02 1/2	.03 1/2
Kerr Lake	6.50	6.80
La Rose	4.47	4.55
Little Nipissing .....	.16 3/4	.16 3/8
McKinley	1.36	1.37
Nancy Helen .....	.02 1/2	.04 1/2
Nipissing	10.70	10.90
Nova Scotia .....	.20	.21 1/2
Ophir .....	.14	.25
Otisse .....	.01 3/4	.02 1/8
Peterson Lake .....	.17 3/8	.17 3/8
Right of Way .....	.27	.28
Rochester .....	.06 3/8	.06 1/2
Silver Leaf .....	.05 1/4	.05 1/2
Silver Bar .....	.01 1/2	.04
Silver Queen .....	.04	.06
Temiskaming .....	.90 1/2	.91
Trethewey	1.24	1.25
Watts	3 sellers	..
Wettlaufer	1.05	1.07

New York Curb—December 8th, 1910.

Boston Copper .....	..	..
British Columbia Copper	6 3/8	6 1/2
Butte Coalition	17 1/2	18
Canadian Mines .....	..	..
Chino Copper	20 5/8	20 7/8
Davis-Daly Copper	1 3/8	1 5/8
Ely Consolidated	37	38
Gila Copper .....	..	..
Giroux Mining	6 1/2	6 5/8
Goldfield Consolidated	8 3/8	8 1/2
Green-Canadian	6 3/4	6 7/8
Harcuvar Copper .....	..	..
Inspiration Copper	9 1/8	9 1/8
Miami Copper	19 3/4	19 7/8
New Baltic Copper	6	8
Nevada Con. Copper	18 3/4	19
Ohio Copper	1 1/2	1 3/8
Rawhide Coalition	4 3/4	5
Ray Central	1 1/8	1 7/8
Ray Consolidated	18 3/8	18 1/2
Union Mines	3/4	1 1/8
Yukon Gold	3 7/8	4