CANADIAN MINING JOURNAL

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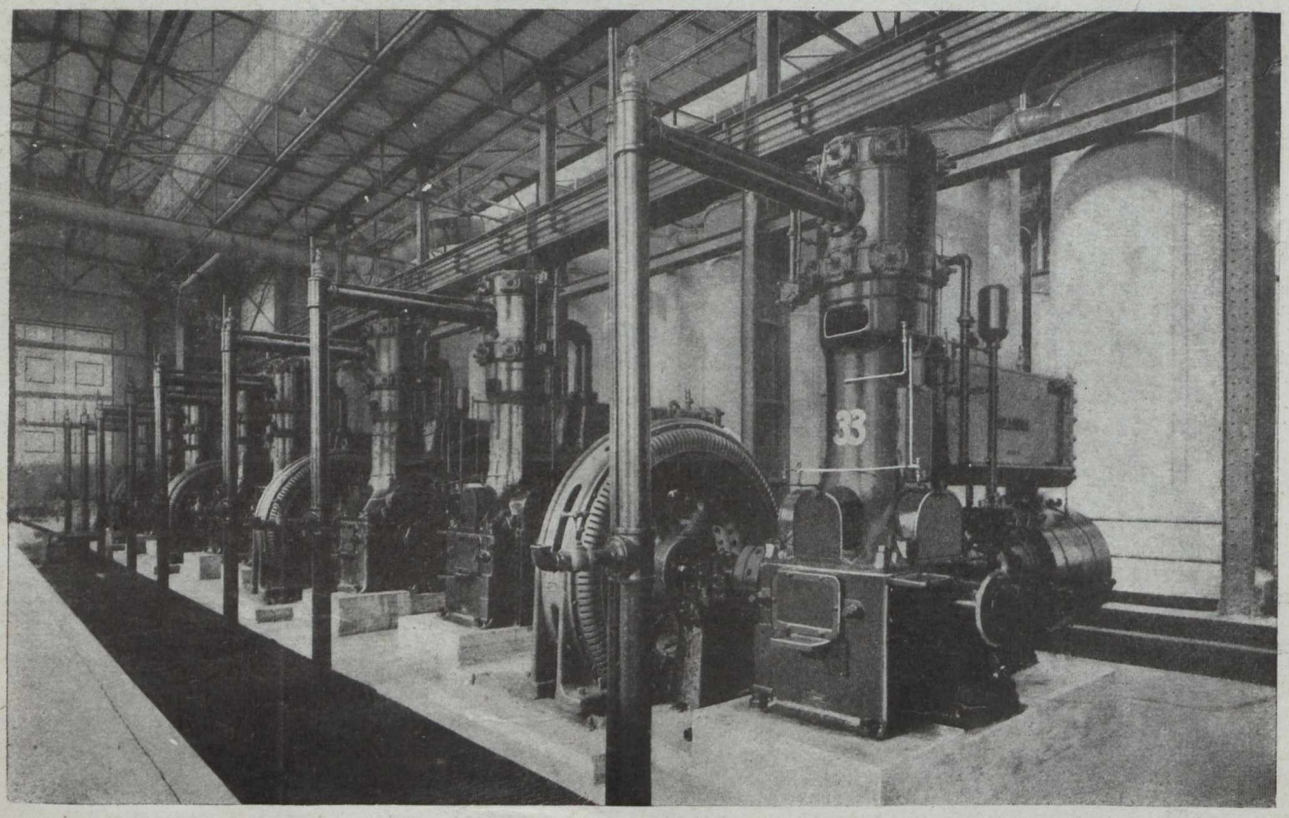

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A Weekly Journal devoted to the Science and practice of the Mining, Metallurgical and Allied Industries with an Up-to-date Review of existing conditions.

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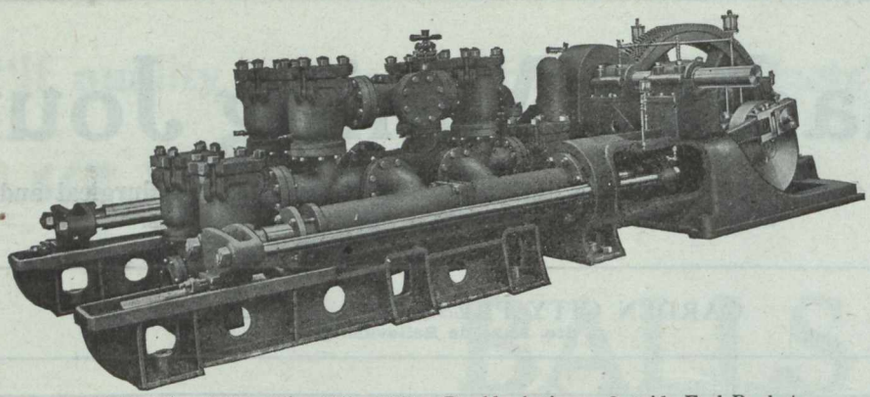

Gould Fig. 1612. Size 6½" x 20". Double-Acting. Outside End Packed Horizontal Duplex Plunger Pump. For High Pressure Service

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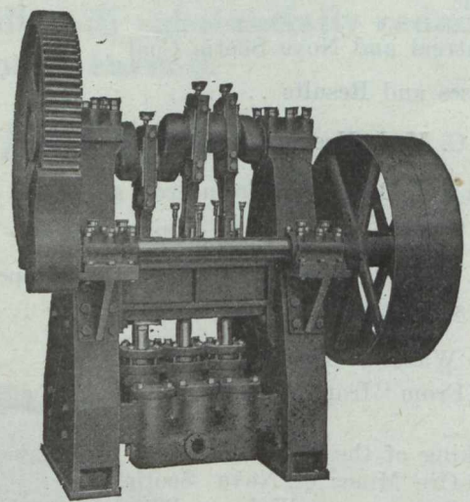

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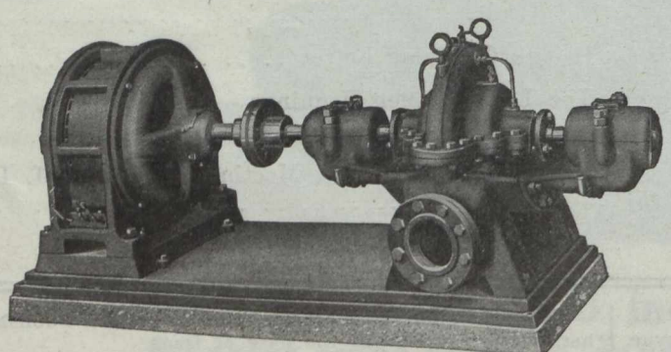

Goulds Fig. 3030. Single Stage, Double Suction Centrifugal Pump, direct connected to an open type motor

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EDITORIAL

Montreal and Nova Scotia Coal

The Montreal City Council recently adopted a resolution which, after stating that a large portion of the coal used in Canada is imported from the United States at prices which are continually increasing, with frequent shortages occurring which may become permanent, requests the federal government to encourage by all possible means the intensive operation of Canadian coal mines. Such a policy, it is urged would remove the danger of interrupted or inadequate coal supply, and would provide much additional employment. This resolution is encouraging as an indication of the tardy realization by the general public of Canada's mendicant and defenceless position in regard to coal supply. As the Montreal resolution rightly suggests, Canada's regrettable position in assuming inability to be self-supporting in coal supply, is entirely needless, and is due to an ill-informed public opinion, which, it is most pleasing to observe, is in process of correction. The vicinity of Montreal alone is annually purchasing three million tons of bituminous coal from the United States that could and should undoubtedly be supplied from Nova Scotia. As the recipient of a large tonnage of coal from the United States, instead of being the distributing centre for a similar quantity of coal from Nova Scotia, Montreal is not only paying out money at high exchange rates unnecessarily, but is missing the revenue which it would earn from the distribution of Nova Scotian coal, and from the disbursements made by ocean-going vessels using the Port of Montreal.

Causes and Results

The report of the Deputy Minister of Mines for the year 1919 shows that Ontario mines produced 505,963 oz. gold valued at $10,451,688 and 11,383,905 oz. silver valued at $12,913,316. The producing companies are for the most part operating at Cobalt, Porcupine and Kirkland Lake. Most of them made profits on the year's operations and are expected to make profits this year. Gold and silver mining has become in Ontario a flourishing industry. The chief producers can present reports that will please the shareholders. Most of the producing corporations are now in very satisfactory circumstances and able to finance exploratory work on other properties than their own and thus possibly continue mining operations after the properties which they were formed to operate fail as sources of ore.

It is well to note that these successful corporations and their substantial treasuries are the result, not the cause, of the development of mineral deposits. The producing mines were not discovered or developed by work done with money supplied by long established mining corporations. The early history of each of the mines that has been the source of wealth of the big corporations is the history of individual efforts of men who were ready to venture their money and time in an efforts to make mines out of prospects. The speculators made the mines. After preliminary development they formed corporations in which they kept substantial interests and then sold part of the stock to the public. These corporations, at the time of their organization, had to depend for their life on very doubtful sources of income. They were speculative enterprises. It is true that some of them have reached a stage of development which permits the owners of shares to breathe easily; but the fact remains that the men who took up the Nipissing, Hollinger and other great properties and found the money to develop them were taking chances that would cause a great outcry from corporation shareholders if taken by directors on behalf of a corporation.

It is true that our mining corporations are in a splendid position to undertake the development of new discoveries, and it is to be expected that some will do this. Many of them have already spent considerable sums of money in the search for new properties and a few have had some success. The most notable success has been in cases where the corporations undertook development of properties adjoining or near their own. When it is borne in mind that the producing companies have organization and experience in their favor, it is reasonable to expect that activity in developing new properties will become more and more the work of big mining corporations. The fact remains, however, that up to date they are the effect and not the cause of development of new fields—R.E.H.

INSTITUTE NEEDS PRESS BUREAU.

The annual meeting of the Canadian Mining Institute was a success in many ways, but it evidently did not attract much attention on the part of the public. Topics of interest to thousands of people were discussed and yet the local newspapers presented very poor reports of the meeting. It may be taken for granted that the press is ready to publish information about mines and mining that is likely to interest the general reader. Whose fault is it that full accounts of the more important discussions were not published each day of the meeting? It seems to me that the fault lies with the Institute rather than with the newspaper publishers. The reporters find it difficult to obtain desired information and so they spend little time at the meetings and the publishers are not even aware that important discussions by well informed persons are taking place.

The average reader of newspapers would find little to interest him in a purely technical mining or metallurgical paper, and the press is well advised in giving little space to the papers of this class. Many of the items on the program, however, were of such a nature that any enterprising newspaper publisher would be pleased to present full accounts of them to his readers.

It would seem desirable that the Institute should take steps to see that its meetings be more adequately reported in the newspapers. To accomplish this the Institute should advise the publishers of the fact that good copy is obtainable at the meetings, and should see to it that it is obtainable. Press notices calling public attention to items of general interest should be sent out freely by the Institute during the week preceeding the meeting, and summary accounts of papers presented and discussions at each session should be prepared by the Institute to form a basis for the reporters' daily stories. It is hardly to be expected that the ordinary daily newspaper reported will be able to present a good account of an Institute meeting if he is not given more help than has been the custom in the past. We have been leaving publicity for Institute meetings too much to chance. Is it not worth while to have organized publicity?—R.E.H.

We congratulate the "Engineering and Mining Journal" on its feat in reporting the Toronto Meeting of the Canadian Mining Institute, ending on the 11th, in its issue of the 13th March. Not only was the Institute Meeting reported, by using the telegraph wires, but the issue of the 13th contained articles on the Dolly Varden Mine in British Columbia, and on the Mandy Mine in Northern Manitoba, of which Mr. Spurr, the Editor of the "Engineering and Mining Journal" was one of the discoverers. While the "Canadian Mining Journal" is not unaware of importance of the "Engineering and Mining Journal" as a competitor in the correct reporting of Canadian mining news, it would we consider, be ungracious not to express pleasure at the quick publicity given to the Toronto Meeting, and the compliment to the growing importance of Canadian mining implied in the large amount of space devoted to description of Canadian mines and Canadian mining problems. Particularly pleasing is the editorial statement that: "Canada's record in the mining "and metallurgical industry is one to which she can "point with pride, for it is largely through the efforts "of her own men that progress has been made. Her "technical schools, such as McGill, Toronto, and "Queen's, about which we hear little on this side of "the line, have produced some brilliant men." Might we, however, suggest that the three universities named regard technical education as only one part of their activities.

IRON ORE BOUNTIES.

At the Annual Meeting of the Canadian Mining Institute the Minister of Mines for Ontario said that the Provincial Government had not committed itself to granting a bounty on iron ore, and did not feel disposed to take this course. He expressed the belief that when it became really necessary that domestic iron ores should be mined, the value of the large deposits of ore in Ontario would become apparent.

The point made by Mr. Mills lies entirely in the question as to when it becomes "really necessary" to develop our own iron-ore deposits. There is a school of thought in Canada which conceives that we should draw to the fullest extent upon the resources of the United States for the purpose of conserving Canadian resources, and the people who hold this viewpoint usually have in mind coal and iron. The fallacy in their argument is a little elusive, but we do not think it represents the most robust type of Canadian thought. Iron ore deposits, particularly those of the type found in Ontario, are not like a reservoir ready and waiting to be tapped. Their development will in any case be a slow process, and much work must be done, both in the prospecting field, in the laboratory and in the full-scale experiments of the iron and steel works of Canada, before these deposits will be in a position to yield ore on a commercial scale.

As we understand it, those who are requesting a bounty desire it to be paid upon the quantity of pig-iron or steel made in Canadian furnaces from domestic ores, and, as been previously pointed out in "Iron and Steel," unless the proposal to develop Canadian iron ores is economically sound, it will not succeed, and the amount the Government would be required to disburse would in such event be negligible, whereas if the bounty were earned, the resultant impetus to industry would be such as to far outweigh and thoroughly justify the cost of the bounty.

The Minister of Mines suggested that the offer of the British Columbia Government to pay a bounty of

three dollars per ton on pig-iron produced in that province from British Columbia ores had not evoked the response it should, but the offer has had one beneficial result, namely to arouse interest in the subject, and, as a direct result of that offer, there is now proceeding in British Columbia precisely that process of preliminary investigation which yields exact information, and which must always precede any worth-while commercial undertaking.

It is also fair to point out to those who believe in reserving our resources by taking immediate advantage of more advantageous conditions existing in the United States, that the possession of undeveloped resources is in the actual effect equivalent to non-possession of such resources.

There already exists in Ontario a pioneer enterprise in the beneficiation of siderite, namely at the Helen Mine. The Algoma Steel Corporation has proved the presence of immense tonnages of siderite, and has also proved the commercial possibility of its utilization by beneficiation. For its work in this direction, the Algoma Corporation deserves the thanks of Ontario.

Coming as he does from Port Arthur,, where the question of beneficiation of iron ores is a live question, the Minister of Mines is probably well acquainted with the reasons urged for a bounty on iron ore, or as we believe it should be put, a bounty on pig-iron, and we trust that Mr. Mills's very definite statement that the Ontario Government does not favour such a course is not the last word on the matter. The whole question of the development of the iron ores of Ontario is worthy of study. That Canada should provide from domestic mines only 4.6 per cent of the ore fed to Canadian blast-furnaces is not a condition that should be perpetuated longer than is unavoidable.— From "Iron and Steel of Canada".

THE LEGAL STATUS OF WORKMEN'S COMPENSATION BOARDS.

The Manitoba Court of Appeal has reversed the judgment of Mr. Justice Mathers holding the Workmen's Compensation Board to be a Court, and the appointment of its members by the Ontario Government to transgress the prerogative of the Federal Government in the appointment of judges. It is stated that a further appeal will be lodged with the Supreme Court of Canada.

The wide powers given to Workmen's Compensation Boards are disliked by lawyers, as witness the report of the Law Reform Committee of the Ontario Bar Association that the Workmen's Compensation Board of Ontario is "one of the most autocratic institutions in the Province, and absolutely independent of all government jurisdiction except by special legislative enactments."

It was doubtless the deliberate intention of those who framed the Ontario Act to make the Compensation Board an entirely independent body, charged with the duty of making decisions not subject to judicial review. This is a logical sequence to the acceptance of the root principle of workmen's compensation as viewed in Ontario, to wit, that compensation for injuries arising in and out of the course of employment is an inherent right of the workmen, not to be questioned, and, in the intent of the Act, merely assessable as to amount of compensation payment. The scale of compensation being laid down by the Act, it is held that the function of the Board is merely to disburse the sum prescribed in the schedule. As trustees for the proper disbursement of prescribed compensation payments, the Compensation Board is also charged with the collection and custody of funds raised by statutory assessment on the payrolls of employers coming within the scope of the Act. These duties of Compensation Boards so completely dispense with the necessity for outside legal assistance that to those who have not accepted this root principle of workmen's compensation the self-contained status of Workmen's Compensation Boards presents an autocratic aspect.

It should be pointed out, however, that there are two aspects to the unreviewable nature of the Compensation Board's decisions. The Board may award compensation in cases where the employer may consider it unjustified, but may also refuse compensation to workmen claiming injury at work. If the workmen cannot prove his case he can make no appeal from the judgment of the Board, and it is understood that this is one aspect of the unappealable nature of the decisions that is objected to.

Criticism is also made of the fact that the Ontario Compensation Board—and this is true of other Boards —handles its own investments without government oversight.

There is a good deal to be said in favour of governmental audit and accounting of the accumulated funds of Compensation Boards, as these funds will in the course of years reach a very large maximum aggregate. Any such government oversight should, however, we believe, be in the direction of further safeguarding of these funds as intact accumulations of securities, and should not contemplate any merging of the funds into the general treasury of any province, nor, to anticipate a future probability, in the Treasury of the Dominion of Canada.

While, as an effective, equitable and economical method of administrating workmen's compensation, the Compensation Boards can hardly be bettered, it cannot be gainsaid that there is something repugnant to the tested traditions of British judicial bodies, or of administrative bodies charged with quasi-judicial functions, that these should not be subject to review, writ of error, or superior accounting of trust monies. Discussion of these unusual powers of the Compensation Boards is likely to grow with the growth of their duties and the funds entrusted to their care, two certainties of the future.

THE WABANA IRON ORE DEPOSITS.

The description in this issue, by Mr. R. E. Chambers, of the sinking of the submarine slopes of the Nova Scotia Steel and Coal Company, at Wabana, Newfoundland, is of timely interest. These slopes have achieved the maximum penetration of the unique submarine iron-ore deposit, and Mr. Chambers's detailed account of the successful completion of the haulage slopes will appeal to such readers of this periodical as are engaged in the mining end of the iron and steel industry, but will more particularly interest those concerned with the operation of steel works in Canada because these slopes have definitely proved the existence and accessibility of a seam of iron ore, at a distance exceeding two miles from land, averaging from 17 feet to 30 feet in thickness.

The Wabana deposit has no parallel. As a coal seam, the mineral which is above all others distinguished by its regularity and persistence of deposition over large areas, the Wabana deposit would be notable for these last-named characteristics; but as an iron-ore deposit we believe it to be unique. As to the probable extent of the deposit, nothing can be said except that the probability of its continuance beyond the known limit of mining is conceded by all who have studied the deposit. It may also be added that the limit of mining has not been tested, and is therefore unknown. Col. Thos. Cantley, before the Mining Society of Nova Scotia put this aspect of the Wabana deposit with precision is stating that "The volume of ore is so great "as to present a new feature in mining, to this extent, "that it will make practically no difference, not only "to this generation, but to several generations to come, "as to what rate of extraction is carried on at Wa-"bana."

There is excellent reason to believe that the recent interest taken by large British ironfounders and shipbuilders in the steel incorporations in Nova Scotia was attracted more by a desire to acquire the Wabana iron-ore deposit than by any other reason, although additional reasons are not lacking either in number or cogency.

When large United States' steel interests commence in an impressive manner to undertake the concentration and beneficiation of the comparatively lean magnetites of the Eastern Mesaba range in Minnesota, the implication is fairly plain. The marketability of lean iron-ores is first-hand evidence of the scarcity of richer ores. The Wabana deposit is gradually coming to be recognised as one of the most impressive reserves of iron-ore of high iron-content remaining in the temperate zone.

The relative value of an iron-ore depends to a large extent on its accessibility and geographical position. As a point of distribution of iron-ore to be used within the British Empire, the position of Wabana could not be bettered. The rapidity and moderate cost with which Wabana ore could be delivered in British ports by the use of modern freighters of large capacity and quick steaming capacity is obvious, if modern unloading plants were provided in Britain.

A good deal has been mooted about the Imperial character of the motives which are said to actuate those who desire to consolidate the control of the Wabana ores, and while these motives have no doubt played their part in bringing Wabana to the attention of British statesmen following the visit of the Dominions Royal Commission to Wabana in August 1914, we venture to believe that what is really actuating the British enquiries is a realisation of the intrinsically valuable business asset that possession of the Wabana ore deposit will be to any combination of ironfounders and shipbuilders that require iron ore in very large tonnages.

Some idea of the height of the ore-seam at the point where it is tapped by the haulage slopes may be obtained from a photograph accompanying Mr. Chambers's article which shows a mechanical loader, electrically driven, but of the familiar type of boom and bucket that is chiefly associated with a railway steam-shovel, working two miles from shore.

The whole production of the Scotia slopes is today loaded into the mine cars by mechanical shovels of several types, with a negligible exception of the tonnage handled by four pairs of men.

No man has had more to do with the discovery and development of the Wabana iron-ore deposit than Mr. R. E. Chambers, and we believe the readers of "Iron & Steel" will welcome his authoritative and first-hand account of a unique engineering achievment in an ore deposit that stands alone.—From "Iron and Steel of Canada."

INSTITUTION OF MINING AND METALLURGY WAR MEMORIAL. GIFTS OF MALACHITE REQUESTED.

The Institution of Mining and Metallurgy has decided to raise a fund of about £4,000 for the purpose of "commemorating the services of members of the In-"stitution in the Great War, and perpetuating the "memory of those who made the Great Sacrifice."

As already announced in the "Journal," Lt. Col. Peter N. Nissen, D.S.O., has prepared a design for the figure, which has been accepted, and he will model the figure and the friezes. These will be executed in bronze, and the pedestal base in malachite, with four silver-alloy plates upon which an appropriate inscription and the Roll of Honor will be engraved.

The Council states that it has been fortunate in receiving gifts of specimens of malachite to be used as parts of the base-pedestal, but these are insuffricient for the purpose, and it is suggested that members who may possess specimens should place them at the disposal of the Council.

The Sinking of Wabana No. 3 Slopes, Newfoundland

By R. E. CHAMBERS.*

(Published concurrently in "Iron & Steel of Canada")

During the year 1919, there was completed at Wabana, Newfoundland, a pair of slopes, the construction of which means much to the steel industry of Nova Scotia, as it assures to the Nova Scotia Steel and Coal Company a permanent supply of iron ore of enormous extent. This ore had been previously opened up by slopes, driven for a distance of 4,000 feet through the sub-marine ore of the Dominion Company into the areas of the Scotia Company, and for a further distance of 3,000 feet into the Scotia areas, these being termed the No. 2 slopes. But according to the agreement made between the two Companies the No. 2 slopes were to be surrendered at the close of the year 1918, and the ore from the Scotia submarine areas was to be mined through a new set of slopes to be completed by that time. Although a very formidable undertaking extending over several years, these slopes were completed at the time specified and are now producing 1200 tons of ore per day.

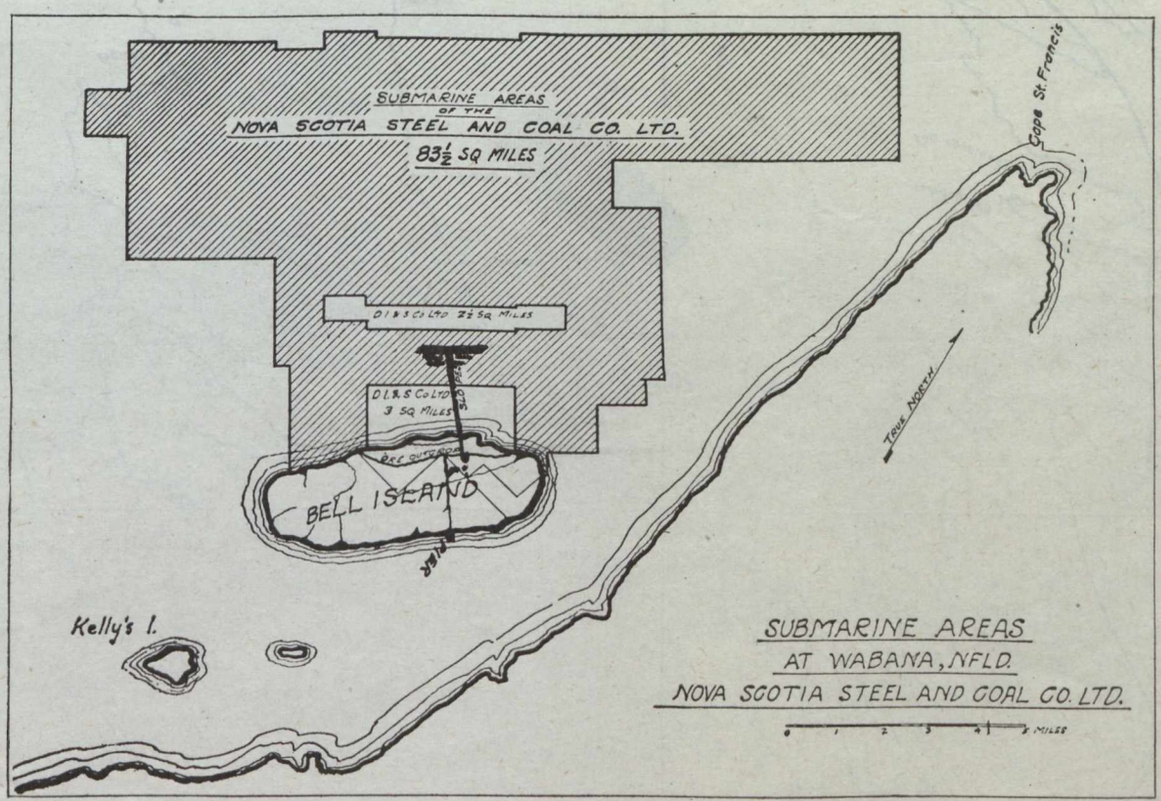
The construction of the No. 2 slopes was described in an article published in Vol. 12 of the Journal of the Canadian Mining Institute. It is to the second set now known as the No. 3 slopes of the Nova Scotia Steel and Coal Company, that the present reference is made.

* Mining Engineer and Director of the Nova Scotia Steel and Coal Co., New Glasgow.

Briefly, the work consisted in driving two parallel slopes, each two miles long, and each with a cross section of 10 ft. by 17 feet at an average grade of about 13 per cent from the main level of the Scotia submarine mine to the surface near the outcrop of the lower bed of ore. The total time occupied was not phenomenally short being about 5 years. The work was, however, much delayed during the period of the war by shortage of labor and other drawbacks, being for certain periods entirely discontinued.

The speed of driving for certain monthly periods, while labor was plentiful, was more creditable. The average advance over monthly periods was over 12 feet per day in the West slope and over 11 feet per day in the East slope. While for level tunnels this is not a record, yet when the large dimensions of the slopes, the descending grade of 13 per cent, the handling of a considerable quantity of water, a somewhat faulted ground and other adverse condiions, are taken into consideration, the speed above referred to is rather exceptional. It is not, however, with the object of claiming any record, that this is written. But having been asked for a description of the work. there are two principal reasons which appear sufficient for endeavoring to comply.

First:—To emphasize the fact that the completion of these slopes assures to the Nova Scotia Steel and Coal



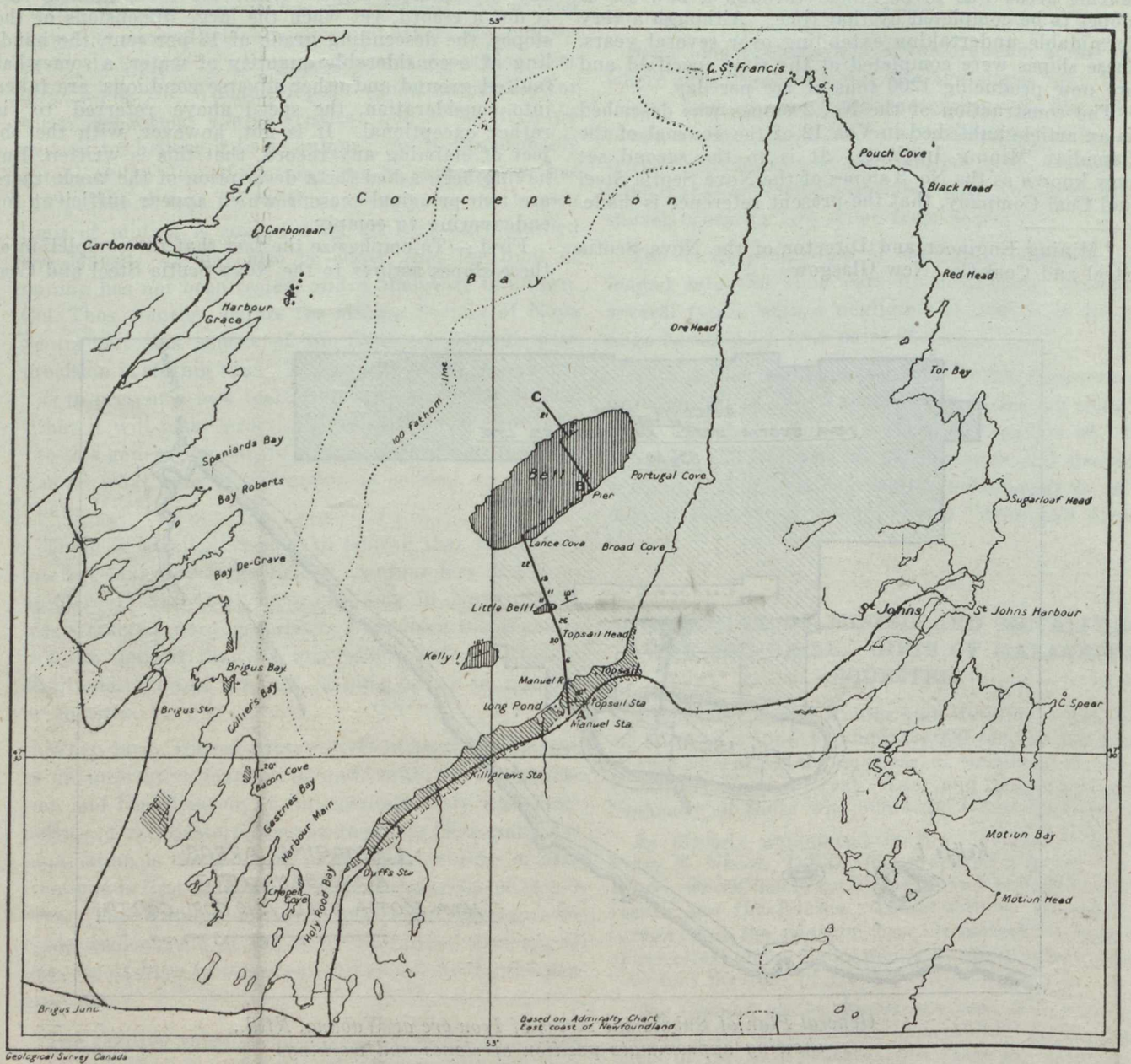
General Plan of Submarine Areas of Iron-ore at Wabana, Nfld., showing approximate position of slopes and workings.

Company an ample supply of ore for the future. The ore has been found to extend to the farthest working yet reached. These workings are two miles to the dip from the outcrop of the bed, and the slopes are among the longest known, yet the ore extends below their deepest point. During the past 24 years the blast furnaces of the Scotia and Dominion Companies on Sydney Harbour have been supplied and several millions of tons exported in addition, from an area of about two square miles of the ore field.

The submarine holdings of the Scotia Company cover an area of about 83 square miles, and of the Dominion Company 5½ square miles. The same geological conditions are believed to extend over the greater part of these areas. The Scotia slopes are now working at a capacity of 1200 tons per day; with improved labor conditions this can be much increased. While the ore beds vary in thickness over different parts of the field, the thickest section known is in the submarine mine of the Scotia Company two miles from the outcrop. Attempts to reduce to exact figures the ore tonnage of this field are necessarily connected with uncertainty, but it is evident that in the enormous area of the Scotia Company, above referred to, there is an ample supply for all their future requirements. The geological conditions peculiar to the ore field are believed to extend to the dip a much greater additional distance than the slopes are now driven, and the evidences indicate that on the strike the ore will extend for many miles, placing the Scotia Company in a most favorable position for ore.

This result has not been obtained without much effort in many fields.

In many, we may say most cases, such investigation has been unproductive, but in the case of the Wabana deposit and some others which warrant future consideration, the result has fully justified the energy and the somewhat large sums of money expected in ex-



Position of Bell Island with reference to Mainland. — White Areas are Pre-Cambrian, Perpendicular Hatching denotes Ordovician, and Cross Hatching denotes Cambrian rocks.

ploration, development work and equipment. The Scotia Company is now in the happy position of being independent as to the future ore supply for themselves, and if required, for others, and in the opinion of all mining experts who have studied the question, of owning one of the largest iron ore mines on the North American Continent and its outliers.

Second: The successful construction of these slopes, apart from the element of luck, which continued most favorable, was largely due to the faithful and energetic efforts of the mining staff under me during the period in question, and I wish to give some public recognition of this service. During the several years in question the work was followed with undiminished energy and intelligence by the various heads of departments and the staff generally. It is not practicable to give a full list of those to whom credit is due. This would include the members of the office, mechanical and surveying staffs and many of the workmen, but I would like to mention the following names, and hope others taking a less prominent part, but who performed their duties faithfully, will pardon the omission and understand that with 200 men engaged in the work, it is not practicable to publish all.

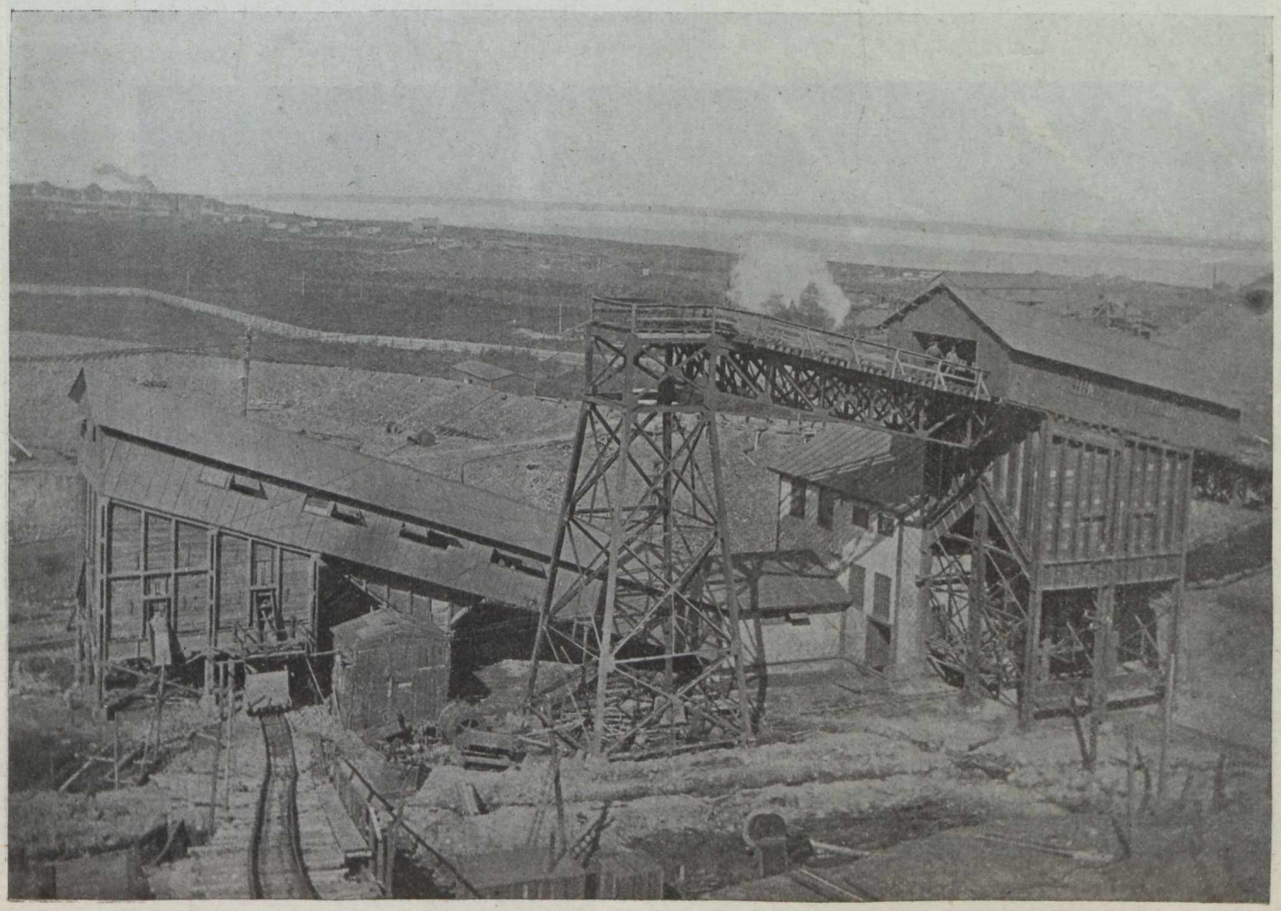
Staff Connected with No. 3 Wabana Slopes.

1. A. R. Chambers, in general charge.*
2. C. B. Archibald, in charge locally.
3. F. Burrows, late resident manager
4. L. McLean, underground manager.
5. T. Gray, Asst. Underground Manager.
6. C. Main, Mechanical Superintendent.
7. R G. Watson, Mechanical Superintendent.
8. Wm. Lindsay, Mechanical Department.
9. Wm. McGrath, Mechanical Department.
10. Thos. Blackwood, Sinking Foreman.
11. M. J. Murphy, Sinking Foreman.
12. J. B. Gilliatt, Chief Surveyor.
13. John Harvey, Heading Boss.
14. John Gunn, Heading Boss.
15. Fred Droken, Heading Boss
16. Fred Noftall, Heading Boss
17. Reid Proudfoot, Accountant.

The number identifies the persons shown on the accompanying photographs.

The improved efficiency in driving these slopes in comparison with other similar work previously done is attributal to two principal causes, viz.:

A system of tramming was adopted, by which the muck at the face was more quickly disposed of after blasting. The crosscuts, which were located at about 1200 feet intervals, were driven at an angle of about 30 degrees with the centre line or slopes instead of at right angles, as in the previous slopes. This enabled a hoisting engine of large capacity stationed at the surface deckhead to tram from both the East and West Slopes with very little delay of trips. Smaller electric engines did the tramming at the immediate faces, and assembled the trips for the longer hoist to the deck. By fans of ample capacity connected to 18-inch spiral rivetted pipe extending below the last crosscut driven, an ample volume of air was supplied to the working faces, enabling work to be resumed at a comparatively short time after blasting, and helped to maintain the energy and efficiency of the workmen.



View of Dockhead, Ore Bins and Picking-Belt House at No. 3 Scotia Slopes.

Bonus System of Payment to Workmen.

Another factor, which contributed largely to increased efficiency was a well adjusted bonus system. All foremen and laborers underground received an advance in their wages varying up to 75 per cent, according to the advance made per week. This bonus system was largely responsible for the continued interest and effort on the part of all concerned, and contributed much to the successful completion of the work. There being a time limit, it was necessary to excavate from both ends, necessitating very careful surveying to ensure the proper connections. In the final break-through the error was found to be so small as to be inappreciable.

Rate of Progress.

The cross section of the slopes is 10′ x 15′ inside timbers, which necessitated about 11′ x 17′ of excavation. The total length driven in the West Slope is 11,233 ft. and in the East Slope 10,755 ft. The best week's work in the West Slope was 83 feet for the week ending April 15th, 1918 and in the East Slope 81 feet for the week ending April 8th, 1917.

The best months advance for the West Heading was 344 feet in April, 1917, and for the East Heading 285 feet in, October, 1916.

The total excavation for both slopes was 127,613 cu. yds. with an overbreak of 11,315 yards or 8.8 per cent.

Power Plant.

A most important factor in work of this description is a careful preliminary study of the plant required and it is false economy to endeavor to save on this item. Fortunately in this case, the Mine having been in operation for many years with a large accumulation of various machines, the purchase of such new material was not necessary, but even in cases where new purchases are necessary, machines of ample capacity should be secured for drilling, hoisting, pumping and ventilation.

The followng is a brief resume of the plant required and used for this work and for help in the preparation of which acknowledgment is made of the assistance of the officials at the Mine.

The regular mining plant supplied the requirements for Boilers, Electric Power, Compressors and some other items, and it being impossible to separate the two services the whole plant is referred to in the lists of those three services.

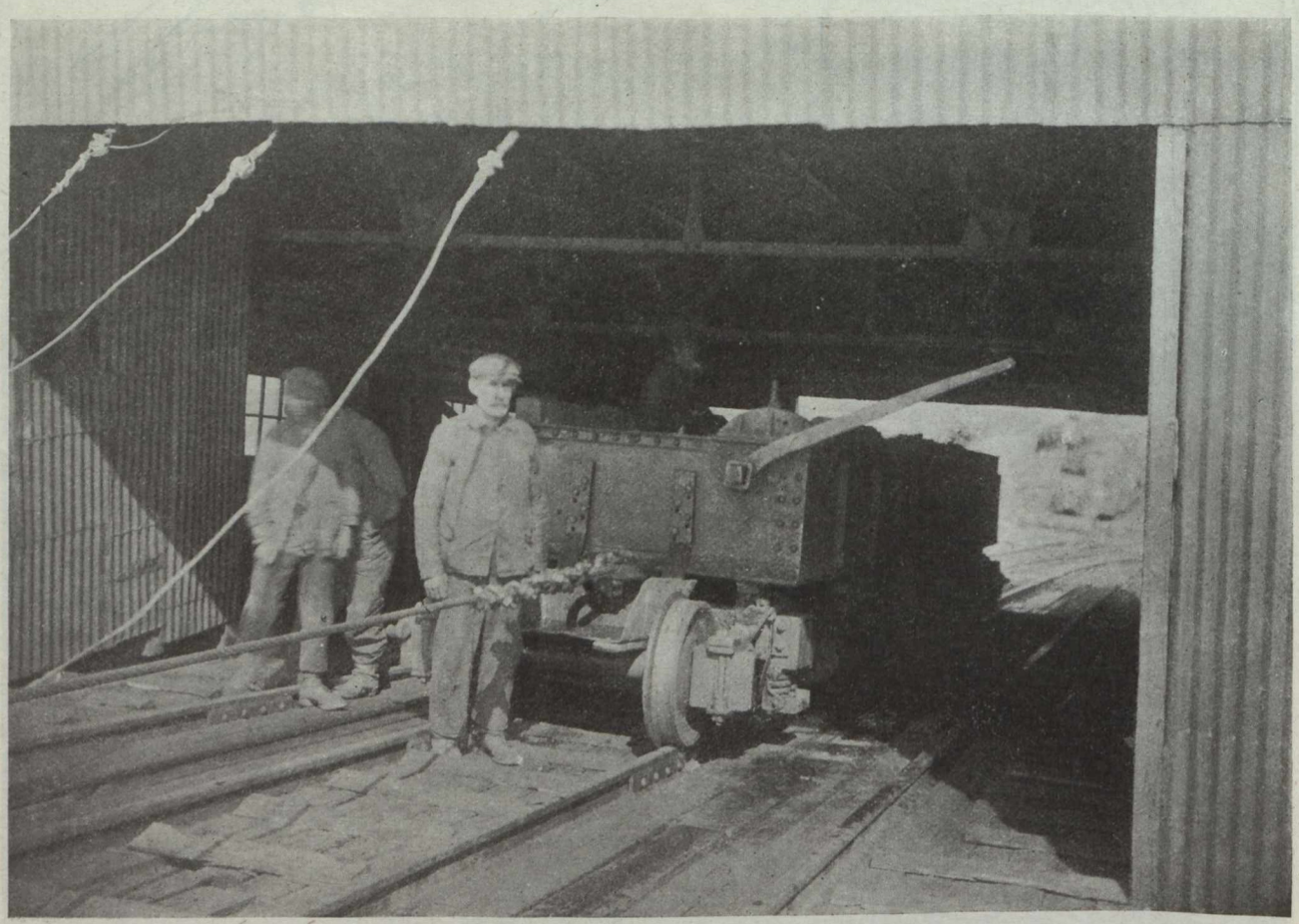
Boilers.

Steam was obtained from boilers of the general mining plant consisting in part of 3 batteries (6 boilers) Sterling water-tube boilers, 231 h.p. each, 1 boiler 200 lbs. pressure 100 degrees superheat with chain-grate stokers.

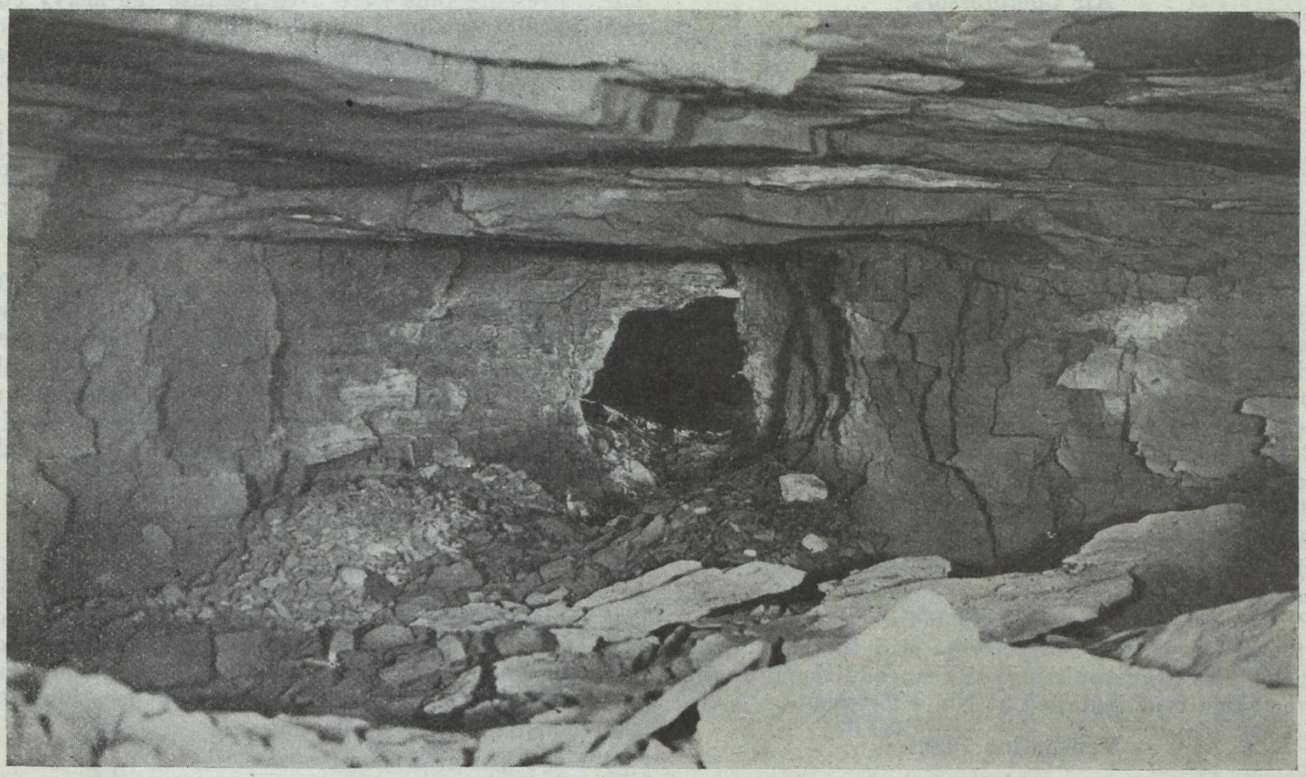
At the central air-plant, 1 batttery (2 boilers) same dimensions hand fired, and 1 battery (2 boilers) at the old submarine or No. 2 Slopes.

Electric Plant.

Electric power also from the general mining plant consisted of 2 Brown-Boveri, 3 phase, 60 cycle, 500 K. W. generators, 6,800 volts, driven by Belliss & Morcom triple expansion condensing engines.



Main Slope Ore-Car. Makes the trip of two miles in five minutes with 20 tons of ore.



View of Break-through of the Slopes. This took place in No. 3 West, at 7,500 ft. down from the surface, or two-thirds of distance.

Another View of Deckhead, etc., at No. 3 Slopes.

Air Compressors.

1 Walker duplex Cross Compound 3,500 cubic feet per minute capacity.

1 Nordberg duplex cross-compound of 2,700 cu. ft. per minute capacity.

1 Reavell electric Single-Stage, 4 cylinder of 500 cu. ft. per minute capacity.

1 Sulivan electric of 625 cu. ft. per minute capacity.

Hoisting Engines.

In the early stages of sinking a Lidgerwood 10 x 12 steam hoist converted to an electric with 52 H.P. Westinghouse motor at the West Slope and one of similar capacity at the East Slope were sufficient. As the face advanced however, it was necessary to install a 112 H.P. single-drum Lidgerwood at the West Slope freeing the one previously in use, for handling the rock to the waste dump on the surface.

Subsequently a 50 H.P. electric hoist was set up near each face for handling and assembling the trips. Still greater depth necessitated an electric hoist with 2-112 H.P. motors at the surface and before the completion of the slopes it was necessary to still further supplement this by stage hoisting with an additional engine of the same type installed at No. 4 Crosscut.

Ventilation Plant.

Very careful preliminary study was given to this as a result of which a 48″ Sturtevant fan was installed at the air shaft to produce a circulation of 15,000 cu. ft. of air through the Slopes and lowest crosscut; the upper crosscut being of course, built off as the lower was connected.

In driving below the lowest crosscut by installing between each face and the lowest crosscut a 20 H.P. electric fan of 5,000 feet capacity each, connected by spiral rivetted pipe of 15 inch and 18 inch diameter, it was found possible to advance the faces 1,200 feet beyond each crosscut before driving the following one. Pressure fans were used because the heavy current of air blowing from the end of the ventilation pipe was found to sweep the working face and clean the atmosphere much more quickly than the exhaust method.

This installation enabled the dynamite smoke to be cleared from the faces promptly after blasting, permitting work to be resumed with a minimum of delay.

Drills.

At the start the U. D. Sullivan piston drill was sufficient. As the work advanced however and some quartzite bands of extreme hardness were encountered, it was necessary to change to the D. R. 6 water-tube bit, self-rotating hammer drills. These latter proved eminently satisfactory and while somewhat expensive in maintenance were a very important factor in the successful completion of the work.

Pumps and Pipes.

Although it was expected that much water might be encountered in these slopes, this was fortunately not realized, the quantity being considerable but not excessive. In anticipation of contingencies however, a pretty complete installation of pumps was made and without going into particulars of their location, etc., they consisted of the following:

4 No. 6 Cameron Pumps.

1 18 x 18 x 29 Jeansville Pump.

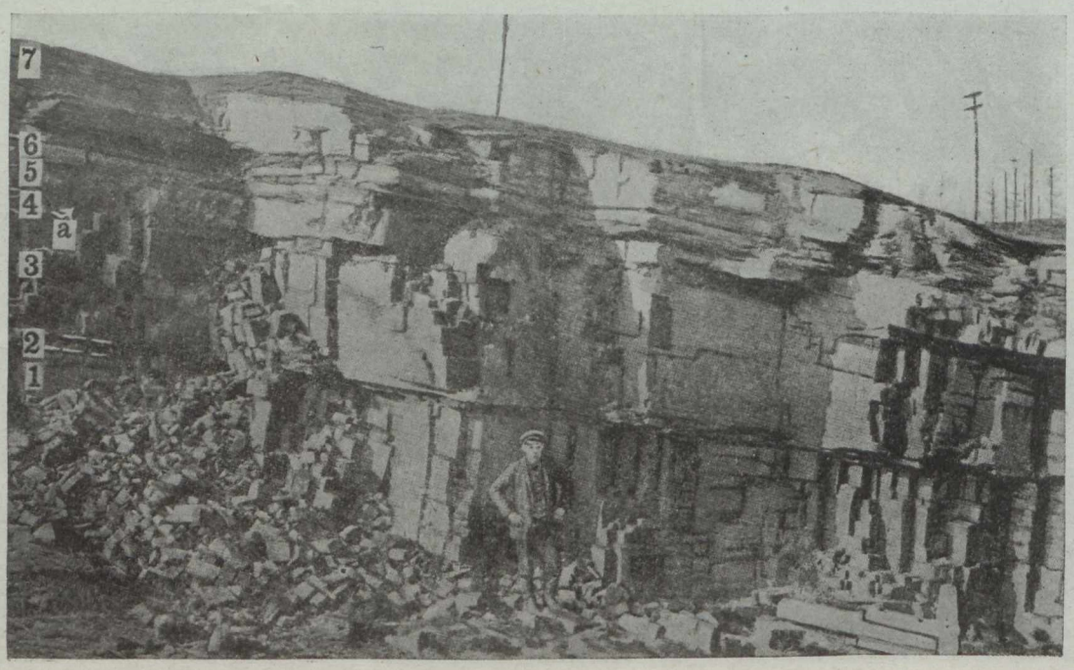
2 10 H.P. 2 Stage Allis Chalmers Centrifugal Pumps. and as spares,

1 No. 6 Cameron.

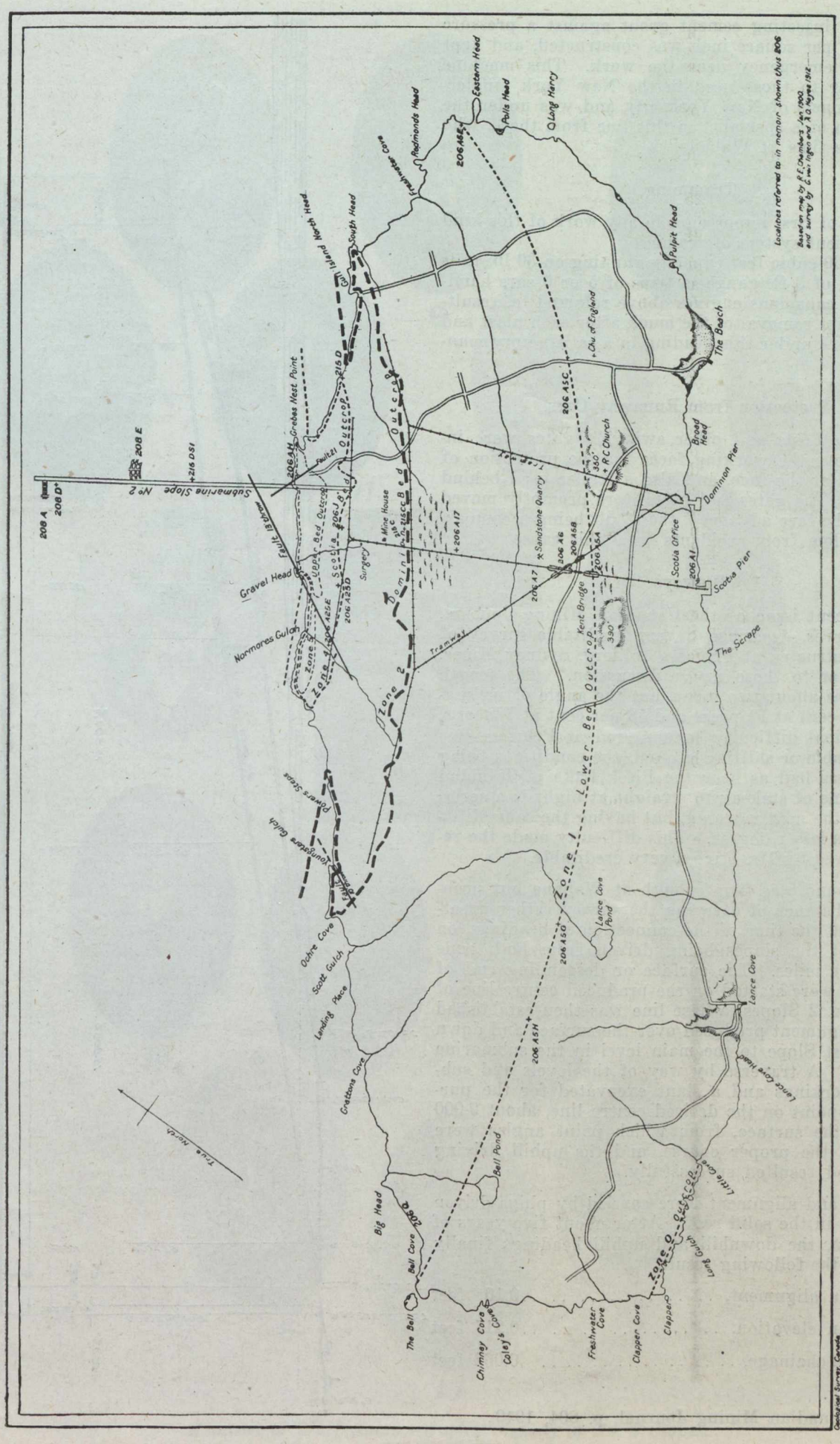
1 12 x 15 x 13 Knowles Sinking Pump.

Two 8″ pipe lines were carried along as the slopes progressed, these being supplemented by the necessary branches and extensions of smaller diameter.

In event of meeting a very large flow of water, which it was proper to provide for, a grouting machine



Surface Stripping on the Dominion Ore-bed, showing regular dip of seam, and characteristic cubical fracture of ore.



Outcrops of Ore-Beds on Bell Island.

capable of injecting cement grout against a pressure of 600 lbs. per square inch was constructed, and kept ready for emergency near the work. This machine was similar to those used in the New York underground tunnels of New York city and was under the supervision of a specialist in this line from there, who spent some time at Wabana.

Tramming.

Perhaps of first importance in any work of this kind is an efficient system of tramming.

Cars of 30 cubic feet capacity running on 30 lb. rails with track of 3 ft. gauge in trips of 5 or 6 cars handled by the capacious engines above referred to, resulted in prompt removal of the muck after each blast and did the work under this heading in a satisfactory manner.

Protection from Runaway Cars.

Sampson Posts and other swinging gates were installed above the working faces for the protection of the miners at the face, and also a trailer used behind each trip. The gates and posts were promptly moved ahead as the face advanced, the result being a comparative freedom from accidents from this cause.

Surveys.

In a recent issue of the Canadian Mining Journal, James Purves, described a very creditable survey of slopes constructed at Princess Colliery, Sydney Mines, very similar to those under discussion.* The length of both was about two miles, but the angle of inclination 5 per cent at Princess and 13 per cent at Wabana. The principal difficulty encountered at Princess was from unstable or shifting ground, the conditions being not quite as bad as near the Pitch Lake in Trinidad where a line of stakes run straight at night is a series of curves the next morning, but having the same difficulties in a lesser degree. This difficulty made the result achieved by Mr. Purves very creditable.

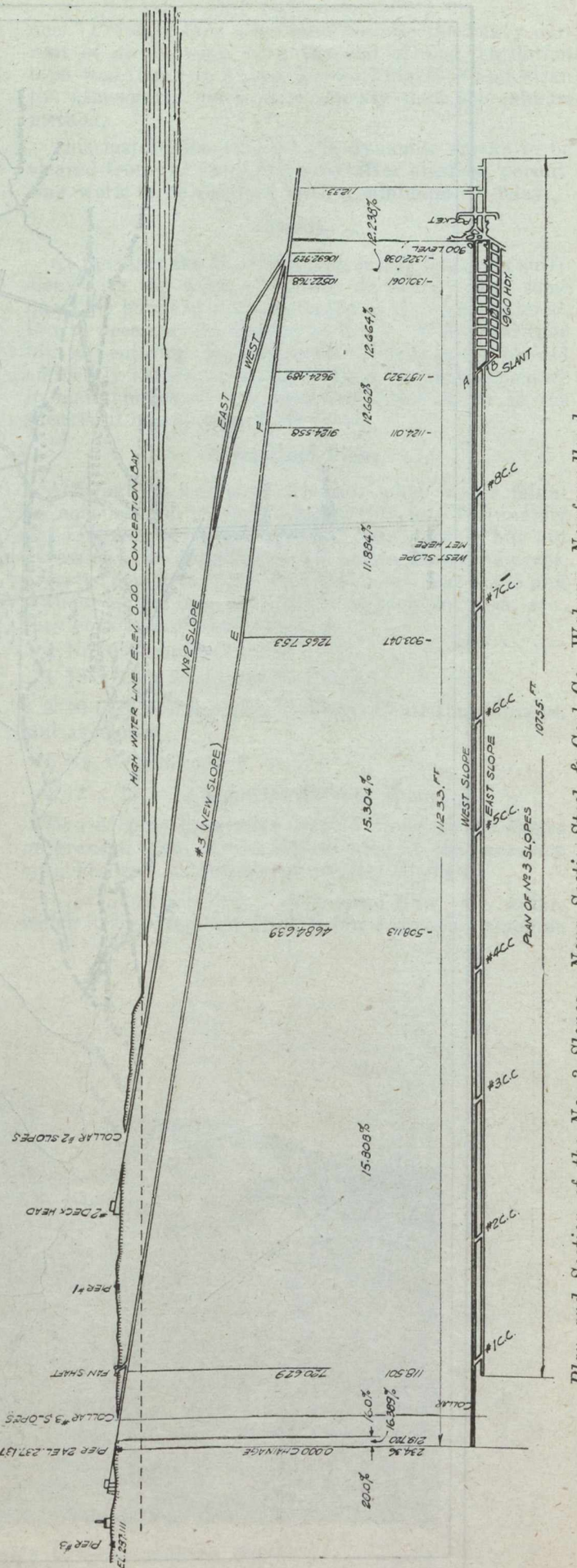
The ground was firm enough at Wabana but probably the distance of carrying the survey rather greater, being at the time of the connection of headings, on account of the slopes being driven from both ends about four miles. The surface or descending end of the slopes were started on the produced centre line of the old No. 2 Slopes, a base line was then established and its alignment produced over the surface and down No. 2 West Slope to the main level in the submarine workings. A traverse by way of the levels and submarine workings and a slant excavated for the purpose to a point on the desired centre line, about 9,000 ft. from the surface, from which point angles were turned to the proper course, and the uphill driving commenced resulted successfully.

Grades and alignment were carried by plugs driven into holes in the solid roof. After about five years of excavation, the downhill and uphill headings finally met with the following result.

Error in alignment, ... 0.10 feet

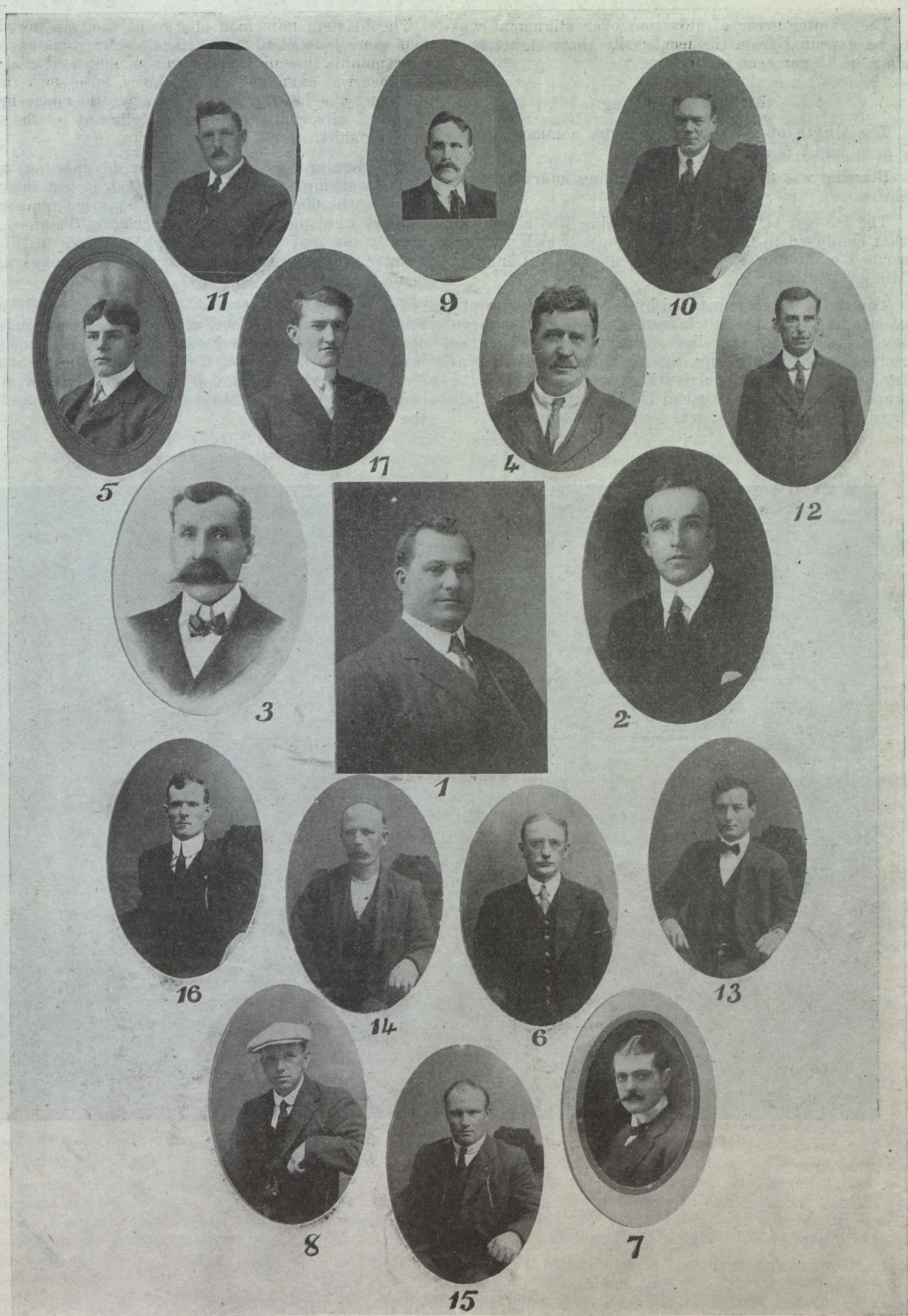
Error in elevation, ... 0.217 feet

Error in chainage, ... 0.062 feet



Plan and Section of the No. 3 Slopes.—Nova Scotia Steel & Coal Co., Wabana, Newfoundland.

* See Canadian Mining Journal, p. 804, 1919.



Members of Staff connected with Sinking of No. 3 Slopes.
See page 243 for index to names.

The greater error of elevation over alignment was to be expected from the necessarily short sights in a slope of 13 per cent inclination.

Method of Working.

The length of shifts was 10 hours commencing at 7 a. m. and 7 p. m.

Blasting was done in the intervening hours between shifts.

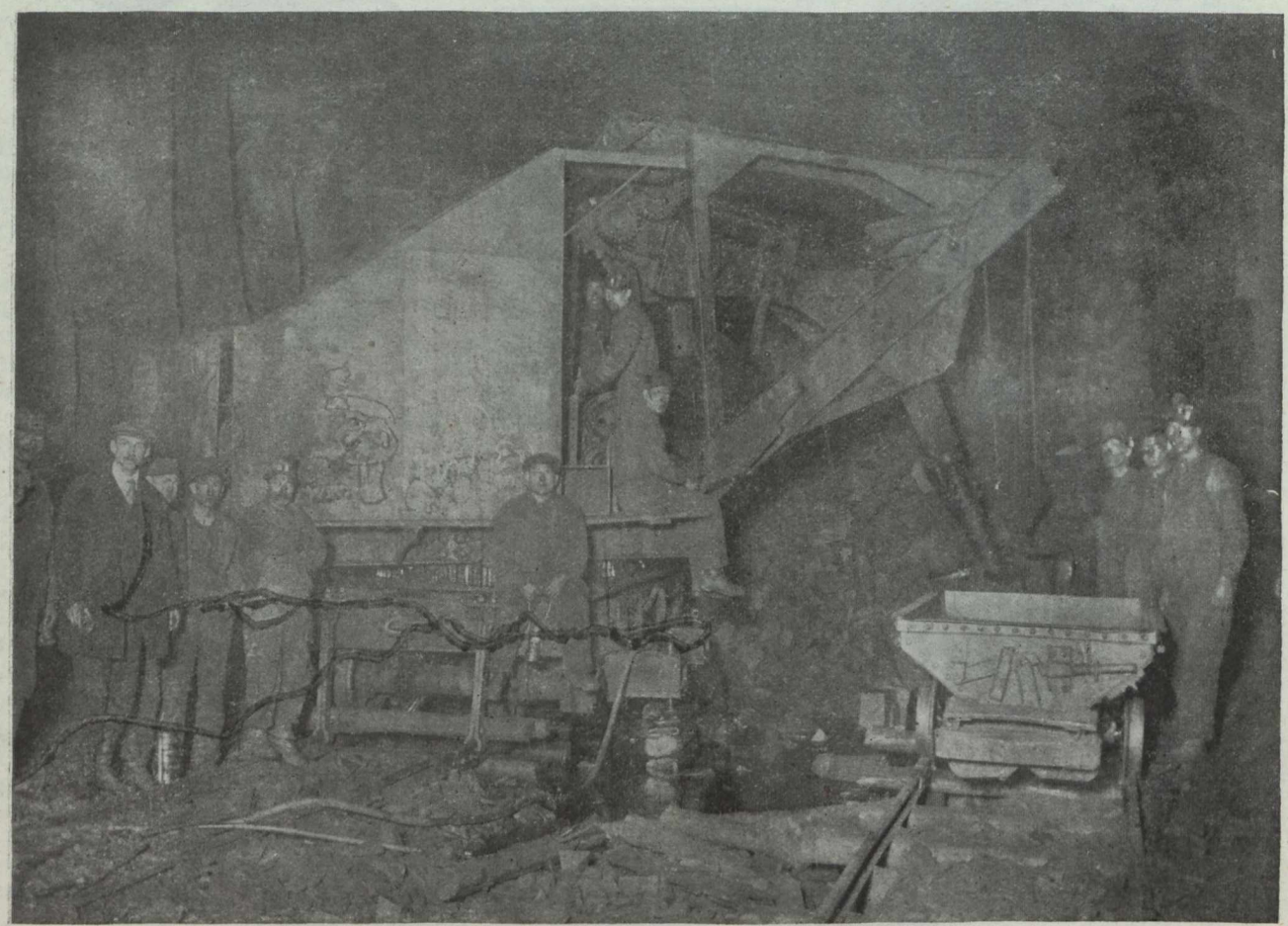
The method of drilling and blasting was similar to that employed in driving No. 2 Slopes, which was described in Volume 12, of the Journal of the Canadian Mining Institute.

The shifts were commenced by the preparatory work of cleaning back the muck from the face and connecting up air and water lines. This accomplished the routine work of drilling, mucking and timbering as far forward as practicable without interfering with the work at the face, was rushed till the accumulated pile from the previous blast was sent to the surface.

The blasters now took charge as soon as the shift men were hoisted to the surface. After blasting and a reasonable time allowed for the smoke to clear away, the face was examined for missholes, loose rock taken down by the face cleaners, and after the place being reported safe, the same routine followed by the succeeding shift.

The regular timbering was kept advanced as near to the working face as possible, which in practice was found to be 60 or 70 feet. Where required temporary timbers were put in in this intervening distance, but usually the roof was firm enough to stand up till the regular timbering force working behind the excavation made it secure.

The very effective type of haulage successfully used for the first time in these slopes is of special importance to the steel industry of Cape Breton inasmuch as it points to a solution of the haulage problems arising from the moving of submarine deposits of coal at increasing distances as the working faces recede from the shore.



Thew Electric Shovel, Loading Iron-ore into Mine-car in the Scotia No. 3 Mine at Wabana, Newfoundland.

MR. RICHARD BROWN, M. E.—1805-1882.

MR. RICHARD HENRY BROWN, M.E. — 1838-1920.

An Appreciation by THOS. J. BROWN, Sydney Mines, Nova Scotia.

On the 9th day of February in this year, at his home in Halifax, after a few hours illness, died Mr. Richard Henry Brown, at the age of 82 years. The names of Mr. Brown and his father, Mr. Richard Brown, have been so long and so creditably associated with coal mining and its kindred interests in this province, it is appropriate that your paper should record these few appreciatory remarks. It is a very remarkable fact that these two gentlemen, father and son, should have had control of the affairs of the principal, and at one time, the only company engaged in the mining of coal in this province, for the extraordinary span of 74 years, and it is also a remarkable coincidence that each gentleman served exactly the same length of time, 37 years.

The father, Mr. Richard Brown, F.G.S., F.R.G.S., was born at Lowther, Cumberlandshire, England, on May 2, 1805, and came to Cape Breton as the agent of the General Mining Association of London in the year 1827. In June of the year 1864 he resigned the position of agent and manager in favor of his son Richard Henry, and returned to London, England, where he died on the 30th of October 1882. He married Sibella daughter of Captain Barrington, of the 60th Rifles. Their children were two daughters, Margaret and Sibella, and four sons, Richard, Charles, David and Henry.

Mr. Brown, aside from being a practical mining engineer and expert, was a great student of geology and history and was closely identified with such noted authorities as Sir Charles Lyell and Sir William Dawson, the two famous geologists of those days. He added many valuable papers to the engineering and geological literature of his time and some rare geological specimens and fossil remains were through his efforts supplied, and added to the English and Canadian collections. As the result of his geological research work in Cape Breton, he wrote a "History of the Coal Trade of the Island of Cape Breton," a book filled with the most accurate information which is still used as a reference book on the subject, and those who have occasion to refer to the book are amazed at the amount and the accuracy of the information it contains, particularly when it is remembered that the information about the outcrops, thickness and quality of the various coal seams was collected when the country was a wilderness and the means of travel very limited. The attention he gave to a study of the Island's history, the attachment he had for the place of his adoption, the interest he manifested in the youth of Cape Breton, caused him to write a "History of the Island of Cape Breton." This he did after his retirement to England, and the work which he dedicated to the youth of Cape Breton is an interesting and invaluable one.

He was the first man in Cape Breton to see and appreciate the value of the Island's under-sea coal measures. His faith was manifested in a decision to sink a shaft at the water's edge for the purpose of winning the coal underlying the sea. This was pioneer work, and the engineer who undertook to advise the company to sink this mine through strata filled with sea water for the purpose of mining coal under the sea, must have been an engineer of remarkable foresight and courage, and such undoubtedly was Mr. Brown. The undertaking was proceeded with, and after eight years of many difficulties and dangers, the work was completed. The Winning is what is now known as the Princess shaft of the Nova Scotia Steel and Coal Company, and has produced coal uninterruptedly from the year of its opening to the present time. To his son was left the task of completing the work. It became necessary owing to the sea breaking into it, to line the shaft with metal to keep the water back and the successful completion of this work was considered an engineering feat of considerable consequence in those days. The son was also called upon to face the problems of the extraction of coal under sea. They were many and serious, but the plans and intentions of the one were ably executed by the other, and mining engineers engaged in this field of work today willingly pay tribute to the courage and foresight of the Browns, both father and son.

Richard Henry Brown, M.E., was born in London in the year 1838. His early education was received at the Collegiate School, Windsor, N. S., and subsequently he attended the engineering department in the St. Lawrence Scientific School at Harvard University. He spent some years as a student of mining in the Seaton collieries in the north of England and served under the celebrated mining engineer, Mr. Thomas E. Forster, of Newcastle-on-Tyne. On the first of July, 1864, he succeeded his father as the agent manager of the General Mining Association in Cape Breton. In addition to the management of Sydney Mines, Mr. Brown has also the management of the Lingan and Victoria collieries, which were then operated by the Association. He continued in the management of Sydney Mines for the Association until they sold out to the Nova Scotia Steel & Coal Company, in the year 1900, and continued as manager for the new company until they got nicely underway, when he decided to retire to Halifax to spend his declining years.

Mr. Brown was the first mayor of the town of Sydney Mines, and unopposed held the position until his duties began to interfere with his duties as manager, when he retired in favor of others.

He married Barbara Davidson of Pictou, and their family are one son, Richard now engaged in business at Sydney Mines, and four daughters, Annie the late wife of Dr. Lewis W. Johnstone of Sydney Mines, Margaret, Elizabeth and Lilian, living at their home. Kent street, Halifax.

The names of the Browns, both father and son, will always be associated with the coal industry of Nova Scotia. They were both remarkable men of untiring industry and unfailing integrity. Their word was their bond and they built up for the English interests they so long and ably represented in this country, a wide reputation for honesty and fair dealing.

Consistently throughout his whole lifetime, Mr. R. H. Brown was an exceptionally good living man. He had very high ideals and was scrupulously honest and upright in all his dealings. He never failed to be solicitous for, interested in and thoughtful of the sick and needy. He was notably open and honest in all his dealings and absolutely incapable of deception.

At Sydney Mines a few days ago when the many old friends of the late Mr. Brown gathered around his remains to pay him their last tribute of respect all felt they were parting with an old friend, who in his particular sphere of life had industriously striven

to do his duty, and had gone to his reward leaving after him the proud record of having been a good Christian citizen, a loving, thoughtful husband and parent and an honest straight-living, God-fearing man.

Note:—The Editor is very glad to publish the foregoing account of the life of the Browns of Sydney Mines, prepared by Mr. T. J. Brown, General Superintendent of the Nova Scotia Steel and Coal Company at Sydney Mines. Mr. T. J. Brown, it may be mentioned, is not a relative of the two gentleman whose life he has detailed, although by a curious coincidence his name has continued the long tradition in the management of the Sydney Mines collieries.

THE GOWGANDA RAILWAY PROJECT

Editor,
Canadian Mining Journal.
Sir:—

Mr. F. B. Macaulay, in your issue for February 25th, forgot to tell us, that Uncle Samuel is a member of, what I believe, is termed the Pan American Union, composed of the South and Central American countries. These countries are known to possess partly developed and undeveloped mining, agriculture and range land as well as timber. May not Uncle Samuel insist in getting paid in gold, from John Bull & Sons, and devote his trade, money and gambling spirit, towards developing the South American countries?

Canada today needs every man and every dollar she can secure for the purpose of developing her natural resources and it is safe to say, that had it not been for the American gambler, Canada would have had no nickel from Sudbury, no coal from the Crow's Nest, no gold and copper from Rossland and Boundary, in fact mighty little of anything, but an unexplored wilderness in possession of the Hudson Bay trapper.

The history of Canadian development shows that John Bull & Sons is more apt to invest in a hole in the ground, from which Uncle Samuel has shipped ore, than to risk irrational development. There is to be admitted, that now and then, there is an exceptional case in which John Bull & Sons shows pluck. One of these instances referred to is the history of development of the Miller-Lake O'Brien at Gowganda. To offset that, however, we have the faint heartedness of the Province of Ontario, which during the last ten years has failed to muster sufficient courage to build twenty-seven miles of railway into what undoubtedly will prove a second Cobalt, namely Gowganda.

During the last five years, newspapers, periodicals and patriots, have carried on a useless and today, it is beginning to be realized, an unprofitable agitation and demonstration against the Aliens in Canada.

Prohibition of trade, wholly or in part, with the country to the South of us, is likely to prove equally unprofitable.

Without the men, who are willing to risk their capital, and the men to carry on the work, the minerals contained in the Canadian rocks are of no service.

L. O. HEDLUND.

Gowganda, March 5th 1920.

We think that Mr. Hedlund has misunderstood Mr. Macaulay, who did not desire to discourage the United States capitalist from bringing his money into Canada. What he wished to discourage was sending Canadian gold out of Canada. When Uncle Sam's sons invest money in Canada, as so many of them have done and are still doing, they become members of the firm of John Bull & Sons, and the trading is all done within the family. As to the "exceptional cases in which John Bull and Sons shows pluck" we leave that to our readers. During the past six years the firm has incurred heavy liabilities, yet when we read in one issue of the daily paper that the old man has occupied Constantinople and has sent warships to the United States with $40,000,000 in gold, we surmise there's life in the old dog yet.—Ed.

PORT ARTHUR NOTES.

Robert Wachman, President of the Wachman Mining and Milling Co., Ltd, Dryden, Ontario, is in Port Arthur superintending the shipment of six cars of machinery, from Kawene, on the Canadian National Railway, to the Company's property, situated seven miles south of Dryden. On arrival at the mine, this machinery will be installed in their new 20 Stamp Mill, now nearing completion. It was originally intended to have the Stamp Mill in operation on May 1st. It is found that this will be impossible, and it is now the intention to begin dropping the stamps on June 1st.

Fifty men have been employed during the winter. Camps are all completed, and a wharf is now under construction.

No. 1 shaft is down 53 feet. The vein has widened to 8 feet of solid quartz, carrying average values of $20.60 per ton. No. 2 shaft is down 27 feet, bottomed in rich spectacular ore, a quantity of which is now on exhibition at Dryden.

J. I. Carmichael, M.E. of Winnipeg, has recently reported on the property for the shareholders. Prof. Kay, of the University of Iowa, has just completed an examination, and has made a highly satisfactory report, remarking that it has a great future.

The main vein has been uncovered for seventy feet, south from shaft No. 1 visible gold shows for practically the whole distance.

The Contact Bay Mining Co. (formerly Rognon) are opening up three properties adjoining the Wachman. They are down 110 feet. At the 100 foot level a drift is being pushed north in the direction of the Wachman, in which they have encountered an ore chimney, averaging $70. per ton. This is a continuation of the Wachman vein, and crosses both properties.

The Iowa-Canadian Mining Co. are opening up three properties about four miles from Contact Bay. At present they are employing 12 miners, this force will be largely increased in the near future. There are four parallel veins on their lands, with a dip that indicates they will come together at a reasonable depth. Carefully taken channel samples taken from the surface show an average of $55.60 per ton, over the four. Test pits put down at the top of a hill show the vein to be 4 feet in width. Pits sunk at the bottom of the hill show the vein to be 8 feet in width.

Visible gold is found in all of these veins.

All the necessary sinking and hoisting plant has been purchased at Gold Rock, and will be immediately installed.

NORTHERN MANITOBA MINES.

By R. E. HORE.

Activity at Flin Flon This Year.

It was announced last week that the copper deposit at Flin Flon Lake, Manitoba, would be developed this summer by Col. W. B. Thompson and associates. Additional information is given in the Mar. 13 number of "Engineering and Mining Journal", to the effect that W. J. Judson, C. F. Ayers and a certain mining company are associated with Col. Thompson in the deal. The price is said to be $1,500,000, payable in cash at the end of one year. It is understood that the prospective purchasers have agreed to spend $200,000 on the property. The plant at the Mandy mine has been purchased and $60,000 worth of equipment and supplies is being taken to the property.

The Flin Flon is situated in the Pas district Northern Manitoba. The Manitoba-Saskatchewan boundary line crosses the ore deposit; the greater part of the known ore is in Manitoba, but Saskatchewan will become a copper producer when the Flin Flon is in operation. It is not unlikely that the work done this year will result in big undertakings later. A railway 80 miles long will give the necessary transportation facilities. Water-power can be developed at Birch Rapids on the Sturgeon river or at Island falls on the Churchill river. The size of the ore deposit is such that large scale operations will be possible, and a smelter that will treat 2,000 tons daily is spoken of.

That a project of this nature will mean much for Manitoba is obvious. By encouraging such projects our governments will help to bring about a better balance of industrial activities in the Prairie Provinces. The announcement that the Flin Flon project is finally well under way, should prove encouraging to other enterprising persons, for Northern Manitoba is a very promising field and there is now firmer ground for believing that the governments concerned will not be unappreciative of the desirability of establishing mining industries in the province which do not own the minerals within their borders.

Discovery of the Mandy Mine.

The Mandy mine in the Pas district Northern Manitoba has been an important factor in drawing attention to the mineral possibilities of the Prairie Provinces. From this property there has been mined about 25,000 tons of high grade, 19 per cent. copper, ore during the past few years. Operations have been discontinued but are likely to be resumed when the transportation facilities are available. It is estimated that there is 200,000 tons of mixed copper-zinc-iron ore blocked out in the mine. If the Flin Flon property is developed and a smelter built, the Mandy mine will be heard from again.

As this is Manitoba's first producing copper mine, the story of its discovery and development is of special interest. This story is told by Mr. J. E. Spurr in the March 13th number of "Engineering and Mining Journal". Mr. Spurr has been identified with the enterprise from its birth and he gives an intimate account of the events leading up to the discovery.

Appreciation of Government Assistance.

The need of continually calling on governments to take action that will help to bring about more rapidly the development of our mineral resources is well recognized. It may not be out of place, however, to state that public commendation of what our governments do for the industry is also desirable. It is therefore with pleasure that I read Mr. J. E. Spurr's statement that in the development of the Mandy mine, the Manitoba Government "was very liberal and helpful". This statement is both courteous and well deserved and would be less noteworthy if it were less exceptional.

Criticism of our governments policies effecting mining is intended to be constructive, and it is commonly taken for granted that the good features of mining laws in Canada need no publicity. A little commendation is nevertheless desirable.

INTERNATIONAL MINING CONVENTION

Seattle, Washington, U.S.A., April 7th to 10th 1920.

When the very successful International Mining Convention was held in Vancouver in March 1919, the Seattle delegates anticipated a return visit to the Convention of 1920 in that City reciprocating by British Columbia mining men the large attendance of visitors from across the line at Vancouver, and indications are that this hope will be fulfilled.

The Official Call is now issued, and the object of the Convention is stated to be to bring together from around the "Rim of the Pacific" those interested in mining and its allied interests. Among subjects to be ventilated are the following:

GOLD.—The American Mining Congress is sponsor for a bill which is to be placed before the U. S. Congress immediately asking for a bonus of ten dollars per oz. on all gold mined. An address will be given by Mr. John Clawson, formerly with the Chemical National Bank in New York, and now with the Union National Bank at Seattle. Another banker, Mr. Crawford of Portland, Or., will address the Convention. Mr. Crawford originated the resolution asking for a bonus on gold that was passed by the American Bankers' Association at Chicago in 1919. It is hoped that a talk on gold from the miner's standpoint will be given by Governor Emmet D. Boyle, of Nevada, who fathered the Pittman Act regulating the price of American silver. There is no subject more discussed in mining conventions today, and less understood, than the status of gold and gold-mining, and a lively discussion may be anticipated.

IRON AND STEEL.—Many facts regarding the manufacture of iron and steel on the Pacific Coast will be presented, and discussion is also likely to be animated on this question, which greatly interests the North-West at this time.

Addresses are expected from C. P. Bowie, of the U. S. Bureau of Mines, on Petroleum, by Dorsey A. Lynn, also of the Bureau of Mines, on the needs of the mining industry; on electro-metallurgy, by O. C Ralston, and by Mr. T. A. Rickards with regard to mining investments. The Minister of Mines for British Columbia is expected to speak with regard to British Columbia iron resources. Prof. Joseph Daniels will speak regarding the Coal Resources of the North-West, as to which he is very well informed. Mr. J. G. Ralston, hydraulic engineer, of Spokane, will speak on the water powers of the North-West, and will explain the effect upon the public of the recent legislation of the Congress of the United States on water-powers.

It is announced by several Seattle hotels that Canadian money will be received at par.

An exhibition of minerals will be feature of the Convention, and arrangements are being made for suitable entertainment of the visitors. The address of the Convention Headquarters is 1316, L. C. Smith Building, Seattle.

Our Northern Ontario Letter

THE SILVER MINES

In the midst of world amazement at the lightning-like social and political upheaval throughout the German Empire, interest in silver during the past week or so showed a slight decline, and resulted in a considerable recessions in quotations for the metal. The slump in the opinion of Canadian silver mine operators, is but temporary, and when the concrete results of the present new wave of added destruction in old Europe emerge, the demand for silver is believed likely to be renewed afresh and to be intensified.

Mindful, also, of among other things of the official statement made by Chang Kung-chuen, Vice-Governor of the Bank of China, that the appetite for silver in the Far East is indeed proving to be insatiable, and that hoarding is now more general than ever, the silver producers of the Cobalt district do not regard with any undue alarm the fluctuating quotations. To the contrary, there appears to be a more deeply rooted belief that with the world literally flooded with paper currency, the demand for the precious metals may not yet have reached the peak, and that another sustained upward swing in quotations is not at all improbable.

During the past week or so practically no bullion has been shipped from the big silver producers of Northern Ontario. In the meantime, production is proceeding at full blast, and the vaults which but yesterday, so to speak, were looted clean of their precious contents on account of the high quotations for silver bullion, are being rapidly refilled during the present period of but only a slight decline in prices.

Added evidence of the general prosperity in the Cobalt field is this week's official statement by the McKinley-Darragh Mines, as well as by the La Rose Consolidated, covering operation during the year 1919.

For the twelve months ended December 31st, last, the La Rose produced 289,317 ounces of silver, the value of which was $356,124, or an average of $1.17 an ounce, as compared with an average of 99.83 cents an ounce in 1918. The surplus at the end of the year amounted to $514,424, compared with $456,046 in the previous year. Of its entire surplus, the La Rose holds $372,834 in cash, call loans and Victory Bonds. Also, since the report was issued, development work on the Company's University property has been quite favorable, and the general outlook for 1920 is good.

The Mc-Kinley-Darragh in 1919, in spite of last summer's labor strike, added upwards of 200,00 ounces of silver to ore reserves. Production for the year amounted to 767,798 ounces, against which 970,021 ounces in new ore was developed. Ore reserves at the beginning of 1920 are estimated at 1,077,411 ounces, as compared with 852,754 ounces at the beginning of 1919. Current assets are $579,100.30, while the net surplus, after providing for a dividend of $67,430.76 at the beginning of this year, amounts to $365,601.92. The average cost amounted to a little under 72 cents an ounce, while the average price received amounted to close to $1.11 an ounce.

Following is a summary of production and costs since the company first commenced operations:—

Ounces Recovered toDate

Year.	Ozs.
1906-7	749,216
1908	718,068
1909	1,297,326
1910	2,356,006
1911	2,654,177
1912	2,717,383
1913	2,214,036
1914	1,396,540
1915	1,107,815
1916	925,779
1917	908,756
1918	904,543
1919	767,798
Tot. to Jan. 1, 1920	18,995,443

Costs and Profits Compared

		Ave. Price Received	Total Costs.	NetProfits Per Ounce
Years	1906-7	0.59	$0.2614	$0.3286
Year	1908	0,52	0.2341	0.2859
„	1909	0.5131	0.2263	0.2868
„	1910	0.5405	0.1705	0.3700
„	1911	0.5416	019479	0.34681
„	1912	0.6166	0.1859	0.4307
„	1913	0.5919	0.2233	0.3686
„	1914	0.54385	0.31325	0.2306
„	1915	0.50785	0.28710	0.22075
„	1916	0.67364	0.40730	0.26634
„	1917	0.8320	0.5709	0.2611
„	1918	0.99724	0.6842	0.31304
„	1919	1,1065	0.7113	0.3872

During 1919 the Right-of-Way Mine was not operated profitably. The directors have advanced personally to date $21,000. The profit and loss account shows a balance atdebit of $12,661 at the end of 1919, as compared with the balance at credit of $514 at the beginning of the year. Current assets total $9,049, while the current liabilities amount to $16,443.

Negotiations in connection with the proposed merging of the Adanac and the Victory Silver Mines have taken a more favorable turn and now offer fair promise of being concluded successfully within a reasonably short time. It is stated that operations on the Hylands property of the Victory Company is now practically assured, either as a result of completing the merger or with the support of Buffalo capital. The basis of the proposed new merger is to organize a new company with an authorized capital of $3,000,000, made up of 3,000,000 shares of the par value of $1. each. Of this, 1,000,00 shares would go to the present Adanac shareholders, 1,000,000 to the owners of the Victory Silver Mines, and leave 1,000,000 shares in the treasury, to be sold at some subsequent date for the purpose of financing operations.

The Oxford-Cobalt Company, with property in Gillies Limit about one mile south from the Kerr Lake Mine is arranging to commence sinking at an early date. A small circular letter has just been sent out, dealing with the promising out look at the property and offering shares for sale. It is stated that a five-inch vein on the property has been found to contain 25 ounces of silver to the ton.

In the Gowganda district, attention is centering with renewed interest on the Castle property of the Trethewey-Cobalt Company, from which it is intimated that a carload of ore may be sent out within the next few weeks. While various reports in circulation greatly exaggerate the true physical condition of the mine, it is learned that the result of work has been extremely satisfactory, and that a considerable tonnage of high grade ore is already assembled ready for shipment, and that it is quite reasonable to expect such a shipment to be made before the spring break-up. The proceeds from such a car could then be used in connection with work of developing additional ore and assembling further high-grade for shipment at such time as transportation facilities appear to warrant it .

During the week ended March 19th, the Coniagas was the only company to ship ore from Cobalt. Three cars were sent out by the company, consigned to the Coniagas Reduction works at Thorold.

The total ore contained in the three cars amounted to 194,458 tons.

THE GOLD MINES

Now that the mining companies of Porcupine have made a similar announcement to that of the Kirkland Lake Companies in connection with increased wages, the general belief is that mine workers will be attracted to the gold mining districts in increasing numbers. The new wage scale adopted, place the mine worker on a similar basis as at Cobalt when the price of silver averages between $1.20 and $1.30 an ounce. At Cobalt the muckers, etc., are paid $3.25 a day plus a bonus of 25 cents a day for each ten points to which silver advances above 80 cents an ounce, so that with silver at $1,20 an ounce the bonus amounts to $1 extra, making a total of $4.25 for each eight-hour day worked. The scale to machine runners is $3.75 a day plus a similar bonus as to the muckers, making a total of $4.75 a day. Compared with this, the announcement is made, both at Porcupine and Kirkland Lake that muckers, etc., will be paid $4.25 a day and machine runners $4.75.

The changed policy of the Porcupine companies in regard to their wage schedules is commented on favorably by mining men in general. The departure from the former flat rate of $4 a day to all underground workers is regarded favorably. The system of classification of labor is generally believed to be preferable, and the present return to such a policy is welcomed. Early difficulties have arisen, however, but they promise to be adjusted satisfactorily. For instance, without former classification, it was inevitable that in making the change the more skilled labor would receive a greater increase than the unskilled and that some dissatisfaction would be expressed by the latter.

The mill at the Porcupine Crown Mine has been set in operation and with half a year's broken ore available no difficulty is expected in getting up to full capacity.

Last week's statement in the "Journal" showing official figures in conection with the tonnage treated and the gold produced by the Dome Mines has aroused considerable favorable comment in mining circles.While it is recognized that in recovering $6.87 a ton, a higher grade ore than the mine's average was being treated, yet it is thought that when mill capacity is increased another 1,000 tons a month, the lower average mill-heads may still leave a total net profit almost equal to that being realized while operating on high heads but on about two-thirds of mill equipment. It would perhaps be only fair to suggest that shareholders would do well to take into account the fact that the average gold content in the Dome's ore as estimated in latest reports is $5.10 per ton, and that it may be possible that costs will rule high for some time. Should this be true, it might not be well to figure on more than $1.50 profit on each ton treated, should this prove to be the case, the mill running at full capacity of from 40,000 to 45,000 tons a month would result in producing from $200,000 to $225,000 gross monthly, or a monthly net profit of between $60,000 and $70,000. In order to pay dividends at the rate of 20 per cent annually, it is only necessary to realize net profits of $66,666 monthly. Thus in dealing with the Dome on this ultra-conservative basis, the shareholders of the company would appear to have reasons for being exceedingly confident.

At Kirkland Lake, April 15th is the probable date on which the Wright-Hargreaves Company will commence the construction of its big cyanide mill. James Grant has been in the service of the Company for the past several months, having designed the mill the chief parts of which have already been transported to the mine. The reduction plant is to have a capacity for treating at least 200 tons daily, and will be similar to that of the Lake Shore. Continuous counter-current decantation will be the process. The mine itself is highly developed, there being upwards of a dozen faces from which ore may be drawn.

The Ontario-Kirkland will continue its main shaft from the present depth of 300 feet to about 500 feet at which point it is proposed to establish another development level. The ore body developed at the 300-feet level will be developed to as great a depth as possible, during the course of which it is planned to erect a new mill. The aggressive and business-like way in which the Ontario-Kirkland (formerly the Hurd claims) has been developed has been one of the outstanding favorable features in connection with the Kirkland Lake Camp.

It is estimated that the combined current output from the Lake Shore, Teck-Hughes and the Kirkland Lake is at the rate of between $90,000 and $100,000 a month. Following the completion of the Wright-work with the Tough-Oaks mill, it is believed that this Hargreaves mill together with the resumption of production may be doubled.

The Miller Independence Mines will probably turn on electric energy this week, following a number of unfavorable delays, and from now on the work of developing the mine will be speeded up considerably. A contract for some 300 feet of lateral work at the 500-feet level has been let, and rapid progress is expected, both at the depth and on development work that is also to be carried through an incline shaft from surface(and following the ore body in which gold tellurides occur.

The Peerless Company is making good headway in continuing its shaft to the 250-feet level. The recent report that a five-foot vein had been encountered at a depth of about 160 feet has been officially confirmed, but it is learned that the mineralization was not as heavy as that at first reported.

The Better 'Ole Mining Syndicate has been formed with object in view of developing a group of claims in the Sesekinika Lake district, in the township of Maisonvelle, adjoining the Murray-Mogridge property. The syndicate is capitalized at $100,000, made up of 2,000 share of the par value of $50 each. It owns 320 acres of territory, and includes the two Ashly claims which were staked six or seven years ago. Nothing was done on the property during recent years owing to the owner being overseas, but it is to be proposed to carry out sinking operations. A feature in connection with the new syndicate is that Captain Bruce Bairnsfather, the clever cartoonist who turned the grim tragedies of war to fun, and whose work became famous in many countries, is a member of the Better 'Ole Mining Syndicate.

MINING PERSONALS

Ernest C. Johnson, president of the Marathon Mill and Machinery Works, Chicago, as well as the Johnson Engineering Works is spending a few days in the mining districts of Cobalt, Boston Creek, Kirkland Lake and Porcupine. Mr. Johnson is the inventor of the Marathon Grinding Mill.

Mr. Hubbell, representing the American Cyanimid Company, Niagara Falls, Ont., was a business visitor in Cobalt this week, and returned south last night.

Wm. Gowans, of the staff of the Eastern Mining and Milling Company, at Eastman, Que., some 25 miles from Sherbrooke, is visiting at his home in Haileybury. Mr. Gowans declares that excellent progress is being made on the copper property of the Eastern Mining and Milling Company and that the mill is treating about 140 tons of ore daily.

T. J. Flynn, of the Port Matchewan Gold Mine is in Haileybury on business.

OFFICERS AND OBJECTS OF THE ONTARIO MINING ASSOCIATION.

An organization to be known as "The Ontario Mining Association" was effected in Toronto on March 9th, 1920.

The object of the association will be to foster the development of the industry and to co-operate with the Mines Department of the Ontario and Dominion Governments.

By collecting and consolidating data and statistics relating to the industry the Association will be in a position to supply authoritative information hitherto unavailable in the hope that the people of Ontario may gain a more reasonable and keener appreciation of the importance and problems of the industry.

The following is a list of the Officers and Directors:

President: A. D. Miles, Toronto; 1st Vice-President: A. F. Brigham, Porcupine; 2nd Vice-President: Col. R. W. Leonard, St. Catharines; Directors: C. W. Corless, Sudbury; C. D. Kaeding, Porcupine; H. H. Kee, Cobalt; H. Park, Cobalt; F. L. Culver, Kirkland Lake; Mr. Cowie, Sault Ste. Marie; W. A. Carlyle, Ottawa; G. H. Gillespie, Madoc; A. J. Young, Toronto; G. C. Bateman, Toronto; J. P. Bickell, Toronto, Alex. Fasken, Toronto; Secretary-Treasurer: B. Neilly, Toronto.

These Directors represent the following branches of the Mining Industry:

(1) Porcupine, Kirkland Lake and Boston Creek gold districts.

(2) Cobalt and Gowganda silver district.

(3) Nickel, Copper Mining, Smelting and Refining Industry.

(4) Iron and Sulphur Ore Mining..

(5) Silver smelting industry.

(6) Non-metallic production from Eastern Ontario.

Practically all producing mines, as well as a large proportion of the more important properties under development in the Province, are already members of the Association, making it apparent that the Ontario Mining Association will represent the Mining Industry as a whole.

A permanent office is being established in Toronto.

THE MINING SOCIETY OF NOVA SCOTIA.

Glace Bay Meeting, May 4th and 5th 1920.

The Council has made such arrangements that, with the co-operation of the Members in the matter of papers and attendance, will insure a very successful Meeting.

A smoker will be held on Tuesday evening, for which a very attractive program has been arranged.

The Dominion Coal Company has invited the Members to be their guests at a luncheon, at the Glace Bay Hotel on Wednesday.

The Committee desire, that all who intend to submit papers should send a copy to the Secretary before April 15th., so that they may be printed.

Full program will be forwarded prior to date of Meeting.

We feel assured that all Members will be amply repaid for any effort which may be made to be present.

PROVINCIAL GOVERNMENT OF MANITOBA TO EXAMINE DAUPHIN OIL DISTRICT.

Investigation of the Dauphin oil fields by the provincial government may be undertaken in the immediate future, according to an announcement made today by Hon. George A. Grierson, minister of public works.

Representatives have been received by the government from the Dauphin board of trade asking for an investigation of the oil shale in the district, in order to find out if it is present in commercial quantities. Mr. Grierson said that he had communicated with Commissioner R. C. Wallace, of Northern Manitoba, and Hugh McNair, of the Public Utilities Commission, asking them to report on the possibilities of oil in this district.

Should the report from these experts be favorable the government, he said, will dispatch a drill to the district to test for oil. The drill will be capable of boring to a depth of 1,000 feet. The report will be based on a geological survey of the Dauphin district.

JAPAN IS POSSIBLE MARKET FOR BRITISH COLUMBIA COAL.

The Japanese Consul at Vancouver, Mr. H. Ukita, states that British Columbia coal, even under high freight charges now current, could be sold in Japan and realize a substantial profit. During 1919, says Mr. Ukita, Japan consumed 27,000,000 tons of coal, at a price equivalent to $22,00 a ton.

THE HEDLEY GOLD MINE RESUMES OPERATIONS.

The Hedley Gold Mining Co. has resumed operations after several months inactivity. G. P. Jones, General Superintendent, states that the intention is to work the property to the capacity of the plant henceforth. The mine is situated on the Nickel Plate Mountain at an elevation of 5,800 feet and has been in operation for over 20 years.

BRITISH COLUMBIA LETTER.

The Metal Mine.

H. J. Bush, at one time owner of what now is the Premier Mine, and a prominent mine operator of British Columbia, recently returned from England and is authority for the statement that the Selukwe Gold Mining and Finance Company has taken a third interest in three properties controlled by Messrs O. B. and H. J. Bush and associates. These properties now are administered by the Bush Mines, Ltd., the B. C. Silver Mines, Ltd., and the Salmon-Bear River Mining Co., Ltd. It is understood that a single company to be known as the British Canadian Silver Corporation will be formed to take over the three first mentioned and that the Selukwe Gold Mining & Finance Company, which will subscribe the working capital, will take shares in the new Company. These three holdings are said to embrace about fifty claims from which some high grade ore has been taken but which have yet to be developed.

Roy Price, formerly in the employ of the Granby Consolidated Mining and Smelting Co., is behind a project which is to be given a trial in the development of the Salmon River District of Portland Canal, B. C. and which, although unique in Canadian mining operations, is pronounced by those most competent to judge, to be eminently practicable. It is the use of one or more hydroplanes from Hyder, Alaska, or Stewart, B. C. for the transport of light supplies to the properties now under development in that locality. There is nothing, it is pointed out by those who have been over the ground, impossible, or even formidable, in the undertaking. From either Hyder or Stewart there is straight flight up the broad Salmon River Valley to Long Lake, the distance by air line being probably little more than eighteen miles. There are no mountains of extremely high altitude to cross along this route so that the press reports of the character of the task are not warranted. From Long Lake there is a trail to the Mineral Hill and other properties which at present, is rather rough for about a mile but from that point is in fairly good condition, so that the distribution of freight from Long Lake to the different operating properties would be a comparatively simple proposition. On return trips it would be possible to the hydroplanes are a success in this field, to bring to tidewater such high grade ore as might be available for shipment. Lieut. Ernest O. Hall, of Vancouver, B. C., a Canadian aviator with overseas experience, is one of those interested and with him is associated Test Pilot E. Hubbard, of Seattle, Wn. The former states that a Seattle firm has contracted to deliver by April 15th one specially designed flying boat and two more of the same model by May 15th next, and if these are satisfactory three more will be built for delivery on or about June 15th. Each plane will have a carrying capacity of approximately forty cubic feet. Owing to the shortness of the summer season in the north the aviators are not figuring on more than 100 days suitable for their work but by making frequent trips they, and the mine operators, are said to be confident of their ability to transport by air, not only all light freight needed in the camp, but a large proportion of the year's output from the mines. Lieut. Hall and Pilot Hubbard have announced that they will take off from the Sound City in the first hydroplane completed about April 15th and that the 600-mile trip up the Coast will be made with only one stop, the place selected being Ketchikan. The planes will have a cruising radium of 450 miles.

The strike which has been interfering with operations at the Premier Mine is reported to be settled, an advance of 50 cents a day being granted the workmen, together with other concessions among them the undertaking to employ a competent cook.

In the Marmot River section of the Portland Canal Mining Division there has been little mining during the past several years outside of assessment work but, with the intense activity, along Salmon River and with high silver prices and a market promising to maintain its stability, an improvement is looked for this season. The Montana Group of Claims, situated in this locality, having been acquired by the Stirling Mining Co., which concern also has taken over the Grand View Group of four claims. The ores of both carry silver lead values. The Kay-Bee-Bird Group, also of Marmot River, is reported to be bonded to a Vancouver syndicate.

Alice Arm, B. C.

A. J. T. Taylor, president of the Taylor Mining Company, accompanied by C. M. Rolston, the Company's vice-president, and G. Nutter, representing the Mineral Separation Company of London, England, is visiting the Alice Arm District. The party propose making a survey of the scene of this year's operations in connection with the Dolly Varden Mine. Plans no doubt will be considered with reference to the additions to mine plant, railroad equipment, etc., which the company intends to install at an early date.

Travel to northwest British Columbia and southwest Alaska, which includes the camps of Salmon Arm and Alice Arm, has reached the proportion of a rush in the last few weeks. The Grand Trunk Pacific northbound vessels from Victoria, Vancouver, and Seattle have been crowded. Sleeping accommodation is at a premium for some weeks ahead. Residents of Vancouver who witnessed the departure of the last G. T. P. boats were reminded of the Klondyke rush, miners and prospectors, with little more than blankets, and asking only for deck space, are hurrying to the new fields in order to be ready to get into the hills as soon as the winter breaks.

Barkerville, B. C.

The Lightning Creek Gold Gravels and Drainage Co., operating near Wingdam on Lightning Creek, Cariboo District, has been unsuccessful in its last attempt to reach bed rock according to reports from that section. The timbers of a fine new shaft have been carried away, which would appear to mean that the Company's elaborate preparations, heavy expenditures in special equipment, etc., have gone for nought. In 1918 J. D. Galloway, mining engineer, told of the undoubted possibilities should the efforts being made to reach and operate at bed rock be successful. He explained that portions of the channel had been broken into by means of bed-rock drifts from the shafts which were sunk in the rim-rock," but in each case the great pressure of water and gravel encountered when the drift broke into gravel has been more than could be handled."

A Vancouver Syndicate is reported to have succeeded in development operations on the leases of the Antler Creek Gold Mines, Ltd., bed-rock having been reached and good pay found.

Trail, B. C.

Ore receipts at the Trail Smelter of the Consolidated Mining and Smelting Co. for the week extending from the 22nd to the 29th of February incl. were 6.004 tons.

For the first week in March they were 3,538 tons, bringing the total for the year up to 57,384 tons. Shipments from the Rossland Mines of the Consolidated Company ceased with the opening of March, which was to be expected in view of the announcement that for a time these properties were to be subjected to development.

A dividend of $261,936 has been declared by the Consolidated Mining and Smelting Co., payments to be made on April 1st to shareholders of record on March 10th. The pending payment will increase the total dividend disbursements to $6,567,211.

Simultaneously with the dividend announcement comes the statement that the Company has broken ground at Trail, B. C., for a large new concentrating mill, and has considered the construction of another at Kimberley, B. C. for the treatment of the ores of the Sullivan mines. The Trail Mill will dress the ores of the Rossland Mines. If the report regarding the latter is authentic it means that the management has decided definitely in favor of Trail as against Rossland as a site for the new installation.

Kimberley, B. C.

The action of the Consolidated Mining and Smelting Co. is advancing the wages of employees 50 cents a day has brought the strike at Kimberley to a close, the miners' union having, as a result, declared hostilities at an end.

Nelson, B. C.

Representations were made some weeks ago by the Associated Boards of Trade of Eastern British Columbia to the British authorities regarding the granting of an imperial preference to Canadian metals. A reply has been received through J. Henry, secretary to the Canadian Mission in London. He states that there undoubtedly is a large market in the United Kingdom for zinc and lead, there having been imported in 1918 a total of 217,610 tons of lead of a total value of over £7,000,000. Zinc imports aggregated 94,226 tons of a total value of £4,000,000. "The only question" Mr. Henry observes "is whether British Columbia can send lead and zinc to this and European markets at competitive prices." It is added that J. J. Warren, president of the Canadian Consolidated Mining and Smelting Company, spent some weeks in England last summer studying this question. Mr. Henry close as follows: "I should perhaps add that in the case of zinc the British government has entered into an agreement with the Australian government by which the available surplus of zinc in Australia for the next ten years has to be placed at the disposal of this country. I pointed out the fact to Mr. Warren and he was endeavouring to find out how far this would affect the supply of zinc from other parts of the Empire."

L. A. Biggar, a Montreal metallurgist, is visiting the Kootenay District. He is acquiring information as to mining conditions, having in mind the establishment of an ore testing and sampling plant.

Kamloops, B. C.

A company has been formed, known as the B. C. Silica and Talc Company, Ltd., for the development of a group of claim situated seven miles northeast of North Bend. The silica of this property, judging from a sample presented for assay, is exceptionally high grade. The assay return was 99.4. The Company was incorporated last December with a capital of $250,000, divided into 25,000 shares.

Slocan, B. C.

Operations on the Evening Star Mine, Dayton Creek, have been suspended pending the arrival of weather conditions that will permit the pumping of water. The underground workings have been flooded.

Cowichan, B. C.

The "Hill 60" Manganese Mine of the Cowichan District, Vancouver Island, B. C., is being placed on a basis that will permit uninterrupted production. An aerial tramway, designed by Major A. W. Davis, Vancouver, B. C., is being installed. It is a two-bucket balance tram, having a capacity of thirty tons in eight hours, and is costing about $10,000. About six towers carry the cable to the mountain face, whence the wire runs for a span of 3,600 feet to the Esquimalt and Nanaimo Ry., the total length of the cable being 4,750 feet. Bunkers are being constructed both at the workings and at the railway. Since last Spring about 500 tons of manganese ore have been shipped to the Willrowe Alloys Co. of Tacoma, Wn. As to development the open cut now discloses a twenty-five foot face of fifty per cent manganese ore. While the ore body has not been extensively explored what already has been shown, together with the exceptional indications, are considered very satisfactory by those interested.

Vancouver, B. C.

The International Mining Convention to be held at Seattle, Wn. from April 7th to 10th is attracting much attention among Canadian mining men and there is no doubt that there will be a large attendance from British Columbia. It is assured that Eastern British Columbia will send both delegates and an exhibit of the ores of the Kootenays.

Victoria, B. C.

Paul Billingsley, of Seattle, Wn., representing the Anaconda Copper Mining Co., and H. H. Townsend, an American mining engineer, passed through Victoria recently, paying their respects to Hon. Wm. Sloan, Minister of Mines, en route to examine some of the provincial mining prospects.

The Collieries.

If reports received from Alberta are correct it is likely that the coal operators of British Columbia will have competition on the local market shortly. Alberta interests are said to have arranged for the shipment of coal from that Province to the Pacific Coast, it being proposed to undersell the product of British Columbia by a considerable margin.

Judgment has been handed down in British Columbia in favor of thirty-four coal miners and general employees who sued the Merritt Collieries, Ltd., Diamond Vale Collieries Co., Ltd., et al for wages said to be owing them. The plaintiffs, whose claims amount to approximately $3,000, sought to enforce mechanics' lien against the defendants under tthe Mechanics' Lien Act and the Mechanics' Lien Amendment Act of 1917. The judge explained that, as a result of the amendment, the men were able to obtain their lien to the extent of 25 days wages and that this charge would be laid against the property precedent to any mortgage on record. Plaintiffs also were awarded the costs of trial. The Diamond Vale Collieries, Ltd., which is chiefly concerned, has not been in operation for some time.

That a seam of high grade coal, twelve feet in thickness, has been discovered on the property of the Harvard Coal Co., East Princeton, B. C, is the effect of a report from that district. Preparations for de-

velopment to the point that shipping will be possible already are in progress. Coal bunkers with a capacity of 200 tons are being constructed and it is expected that production will be commenced early next month, between 30 and 40 men being employed. H. G. Duerfeldt, the president of the Company, and Dr. Wymond Miller, one of the heavy stock holders, both are residents of Spokane, Wn.

The Telkwa Collieries, situated on the Grand Trunk Pacific Ry. near Prince Rupert, B. C., have been shipping all winter but it is not expected that much coal will be hauled after the snow leaves the ground. Probably work during the summer months will be confined to development.

The Vancouver Island coal trade has fallen off to some extent recently. Such, of course, is to be expected during the "between season" period when the winter domestic demand is on the decline and before the bunker trade has become brisk. In the Pacific Northwest the warmth of Spring is beginning to be felt and people are not so particular about keeping full the home bins, there being no danger of further cold snaps. What the forthcoming season is going to bring to the coal dealers in bunker business remains to be seen but it is feared that the exchange situation is likely to have so serious an effort on mercantile trade of the Pacific that the collieries of this Province will experience its influence in an unpleasantly lethargic market. However, conditions are not yet bad although the mines are not as active as was the case throughout the winter months. Last month (Feb.) the Canadian Collieries (D) kept their men at work at the three Comox Mines for 17 days, at Extension for 22½ days, and at South Wellington for 23 days. The Canadian Western Fuel Co. operated its properties at Nanaimo, Harewood, Reserve and Wakesiah for 24 days. This also applies to the collieries of the Granby Consolidated Mining and Smelting Co., at Cassidy's, the Pacific Coast Coal Mines, the Nanoose-Wellington Collieries, as well as to the Coalmont Collieries in the Nicola-Princeton Field.

The production of the Companies named during the month of February was as follows:

	Tons.
Canadian Collieries (D) Ltd. (Comox)	28,515
Canadian Collieries (Extension)	18,377
Canadian Collieries (S. Wellington)	6,450
	53,342
Canadian Western Fuel Co (Nanaimo)	23,615
Canadian Western Fuel Co. (Harewood)	18,756
Canadian Reserve Fuel Co. (Reserve)	9,379
Canadian Western Fuel Co. (Wakesiah)	5,063
	56,813
Granby Consolidated Mining and Smelting Co.	14,419
Pacific Coast Coal Mines	8,752
Nanoose-Wellington Collieries	2,488
Vancouver Nanaimo Coal Co	1,441
Coalmont Collieries	280
Telkwa Collieries	325

THE LATE HENNEN JENNINGS.

By Alexander Gray, Montreal.

The death of Mr. Hennen Jennings on March 5th., at Washington, D. C., where he had resided since his return to America from South Africa, is more than a loss to mineral industries and mining scientists; it is a misfortune of world-wide effect, in that he no longer can speak for whatever will dignify and exalt mining.

Other noted mining engineers may have been more in the limelight. None, however, wielded more widespread influence and commanded more confidence and capital. Economically perfect; uninfluenced by other than the soundest bases of valuation; gifted with a rare judgment reinforced with experience acquired on two continents; implicitly trusted by financiers of Great Britain, Europe, America and South Africa; he was the corner stone of the "Corner House", as Wernher, Beit, Eckstein, were known. Throughout the years, until his voluntary retirement, he was Consulting Engineer to the group of mining capitalists which even now controls a greater part of the world's gold production. No other group, company or firm, contributes as much gold as the Central Mining and Investment Company—which succeeded to certain Wernher, Beit, Eckstein interests—and that distinction is largely the result of Hennen Jennings's thoroughness in the mastery of facts and management. Wernher, Beit, Hermann Eckstein and now Hennan Jennings—have responded to the last roll call. The quartette represented the greatest degree of integrity in mining finance. More gold was produced under the aegis of Hennen Jennings than that of any of his contemporaries. Scattered along the Witwatersrand — exhausted outcrops, partly exhausted first row "deeps" second row "deeps"—and deeper "deeps" all the properties taken over and operated by the "Corner House" passed under the actuarial scrutiny of Mr. Jennings—a scrutiny that was implacable—unless the sampling, and structural conditions dictated affirmative decisions. There was no appeal to his principals from a Jennings adverse opinion. It was said of him that "he sampled his firm into everything worth having—and sampled them out of everything they ought not to be in"—and no finer eulogy need be bestowed upon him.

Nor did Mr. Jenings confine his distinguished abilities to mining affairs. Where mining was the paramount industry—as it was in the Transvaal—inevitably he was foremost in advocating whatever would conduce to the prosperity of the industry and the people it employed. At the time of the historic Raid when "Dr. Jim", made his Falstaffian attempt to capture the Kruger domain, Mr. Jennings was involved, along with Rhodes, John Hays Hammond, and others. He never shrank from a duty.

During the World War he rendered notable service at Washington, insisted that gold production must be increased; urged special inducements to that end. "One blast upon his trumpet" had more influence than what gets into the Congressional Record. At the moment when metal mining has to contend with grievous hindrances that legislators and leaders do not comprehend, the mineral industries can ill afford to lose him. Harvard, two years ago, honored itself by conferring upon him the degree of Master of Arts. Canada knew him better by reputation than by contact.

When the Secretary of State for the Colonies, the

Right Honorable Joseph Chamberlain, visited South Africa in 1902, Mr. Hennen Jennings was chairman of the committee of Consulting Engineers appointed by the Transvaal Chamber of Mines to prepare a descriptive and statistical statement of the gold mining industry of the Witwatersrand. Among his colleagues were Dr. Hatch, Fred. Hellmann, George Hoffmann, W. L. Honnold, Sidney J. Jennings, Sam. C. Thomson, H. H. Webb, George E. Webber, and Pope Yeatman. The document formulated was a masterpiece in graphic detail and textual lucidity. It was characteristically Jenningsesque, the social and economic aspects of the gold industry being reviewed as Mr. Jennings knew how to review them. Glacing over that document, I am prompted to cull the following in order to impress upon those who think capital invested in Canadian mines can await the pleasure of labor and politicians:—

"The vital importance to mining of the factor of time is easily demonstrated. In any ore deposit there is a certain unalterable amount of ore, and any profit obtained from explointing it is more valuable the quicker it is made available for further investment.

"If we could assume the output, its value, and cost of production to be constants, and that the deposit would yield, say, 10 millions tons of ore which would give a profit of 15 shillings a ton, if it were exhausted in equal yearly amounts, in

"100 years an owner would receive 100 annuities of £75,000 each.

"Or if in 50 years an owner would receive 50 annuities of $150,000 each.

"With so speculative an investment as mining, 5 per cent. compound interest would certainly be demanded. The 'present value' of the investment on

"The 100 years basis would be £75,000 x 19,8479095 =£1,488,590.

"The 50 years basis would be £150,000 x 18,2559246 =£2,738,380.

"If, by lowering working costs, and bringing under exploitation, say, double the foregoing assumed tonnage (or 20 million tons) of ore, which would yield a profit of, say, only 10 shillings a ton, the calculation would work out at

"For 100 years 100 annuities of £100,000 each, or

"For 50 years 50 annuities of £200,000 each.

"The present value of which, taking the previously assumed factors, would be in the former instance, £1,904,790, and in the latter instance, £3,651,185. **The necessity for activity to attract more capital is thus very clear.**

Mr. Jennings had the true perspective—and always adhered to the truest practice.

ECHOES OF THE TORONTO MEETING.

The new Minister of Mines of Ontario made a good impression when he addressed the Institute at the opening session and at the banquet. He has capable men on the staff of the Mines Department and he seems disposed to consult them. It was news to many that he had as a young man worked for some time in a coal mine. He has as a resident of Port Arthur a proper appreciation of the desirability of encouraging capital to develop mineral resources of Northern Ontario. If he uses his opportunities to good advantage, he may prove an important factor in improving relations between labor and capital.

Mr. H. E. T. Haultain has found someone whom he can agree with fully in matters relative to the Canadian Mining Institute's future. He says that Mr. Mathewson presented his ideas admirably in his speech at the banquet.

Mr. J. W. Evans made a big step up in the estimation of members at the smoker on Tuesday evening. He is in danger, however, of being referred to hereafter simply as the father of his talented daughter.

The moving pictures of scenes at the Nipissing mine were remarkably good and should help to give those who see in them some intelligent idea of the mining, handling and treating of ore at Canada's greatest silver mine. The underground views, in view of the difficulties of mine photography, do great credit to those who made them.

Col .Penhale was his old self as chairman of the smoker. His running mate G. G. S. Lindsay would have contributed largely to the fun if he had been able to be present.

Mr. E. P. Mathewson carried off the individual championship in the college yell contest. The superiority of McGill, Toronto or Queens remains undecided and there is some doubt as to whether the individual champion did not outpoint the class entries.

The excursion to the International Nickel Company's refinery proved a very popular one and Mr. Miles and his aides received many congratulations. Members of the Institute have always been courteously received at Copper Cliff and Creighton and have been shown everything of interest there. The extension of this courtesy to include the new refinery was quite in keeping with the old policy of Copper Cliff, but owing to the secrecy which has shrouded the Orford works the refinery proved unusually magnetic.

Mayor Church made a hit with the visitors from Montreal and New York and received invitations to run those cities if he ever gets tired of his present job.

Mr. Bradley Stonghton is more than ever popular with the members. His talks always do a great deal towards improving the happy relations between American and Canadian mining engineers.

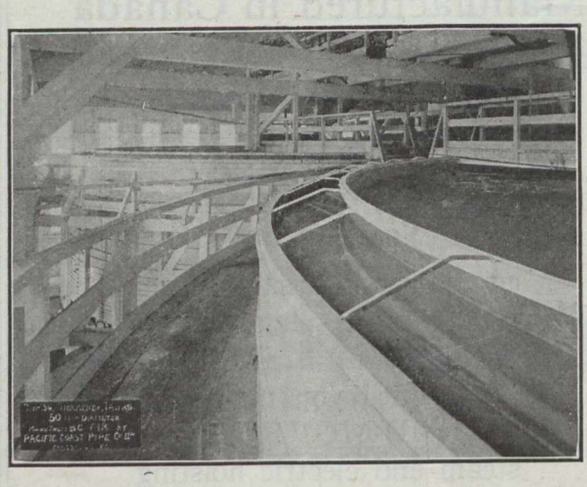
The Institutes owes his thanks to the acting secretary, Cyril W. Knight, who took over the duties on short notice and under unusually difficult conditions. He was ably assisted by his fellow workers,—the technical staff of the Ontario Bureau of Mines,—and succeeded so well that comparatively few of the members were aware of the fact that he had had so little time to familiarize himself with the work ordinarily done by the Institute officers and staff.

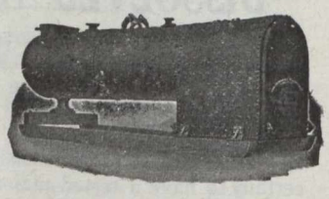
The "status of the engineer" discussion, although well introduced by Mr. McEvoy, did not bring out expression of opinions. Apparently most of the members are content to leave things as they are. If a serious attempt is made by others to bring about a close corporation control of engineers, there will doubtless be no uncertain negative vote by mining engineers. The meeting expressed its approval of the steps taken by Council to prevent status legislation that does not meet with the Institute's approval.—R.E.H.

MINING ENGINEER wishes position with mining machinery or supply firm. Eleven years' experience in mine, mill and smelter. Personal interview. Apply, Box 10, Canadian Mining Journal.

ENGINEERS OF THE NORTHWEST TO HOLD CONFERENCE IN SEATTLE, APRIL 6-7, 1920.

Of great interest to all technical men is the conference of engineers of the Pacific Northwest, which will be held in Seattle on April 6th and 7th of this year. The purposes of this conference are to bring the engineers of the Northwest together to discuss all problems pertaining to engineering interests and to organize a permanent annual conference, the conferences to rotate as to place of holding same. It is suggested that Portland be the next one, the Spokane etc. At this coming conference it is also planned to arrange for a propaganda in suport of the Jones Reavis bill, which is coming from congress to create a National Board of Works Department in the United States government. This department to take over all the engineering and construction departments of the different departments of the government as they now exist, and place them under the one head. This conference coming just before the Mining Convention will no doubt bring many engineers to Seattle who will attend both of the events.





The Canadian Miners' Buying Directory.

Acetylene Gas:
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.

A.C. Units:
MacGovern & Co.

Agitators:
The Dorr Co.

Air Hoists:
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.

Alloy and Carbon Tool Steel:
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway, N.J.

Alternators:
MacGovern & Co.

Spielman Agencies, Regd.
Aluminium:

Amalgamators:
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.

Antimony:
Canada Metal Co.

Antimonial Lead:
Pennsylvania Smelting Co.

Arrester, Locomotive Spark:
Hendrick Manufacturing Co.

Arsenic White Lead:
Coniagas Reduction Co.

Assayers' and Chemists' Supplies:
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.

Ashes Handling Machinery:
Canadian Mead-Morrison Co., Limited

Assayers and Chemists:
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.

Asbestos:
Everitt & Co.

Balls:
Canadian Foundries and Forgings, Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.

Ball Mills:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works.

Balances—Heusser:
Canadian Fairbanks-Morse Co., Ltd.
Mine and Smelter Supply Co.

Babbit Metals:
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd.
Hoyt Metal Co.

Ball Mill Feeders:
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.

Ball Mill Linings:
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.

Belting—Leather, Rubber and Cotton:
Canadian Fairbanks-Morse Co., Ltd.
Link Belt Co.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.

Belting:
R. T. Gilman & Co.

Belting (Transmission):
Goodyear Tire & Rubber Co.

Belting (Elevator):
Goodyear Tire & Rubber Co.

Belting (Conveyor):

Goodyear Tire & Rubber Co.

Blasting Batteries and Supplies:

Canadian Ingersoll-Rand Co., Ltd
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.

Bluestone:

The Consolidated Mining & Smelting Co.

Blowers:
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.

Boilers:
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.

Blue Vitriol (Coniagas Red):
Canadian Fairbanks-Morse Co., Ltd.

Bortz and Carbons:
Diamond Drill Carbon Co.

Boxes, Cable Junction:
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Brazilian Rough Diamonds:
Diamond Drill Carbon Co.

Brazilian Mica:
Diamond Drill Carbon Co.

Buggies, Mine Car (Steel)
Hendrick Manufacturing Co.

Brazilian Ballas:
Diamond Drill Carbon Co.

Brazilian Rock Crystal:
Diamond Drill Carbon Co.

Brazilian Tourmalines:
Diamond Drill Carbon Co.

Brazilian Aquamarines:
Diamond Drill Carbon Co.

Bridges—Man Trolley and Rope Operated—Material Handling:
Canadian Mead-Morrison Co., Limited

Bronze, Manganese, Perforated and Plain:
Hendrick Manufacturing Co.

Buckets:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Link-Belt Co.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Buckets, Elevator:
Hendrick Mfg. Co.

Cable—Aerial and Underground:
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.

Cableways:
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.

Cages:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Cables—Wire:
Standard Underground Cable Co. of Canada, Ltd.
Canada Wire & Cable Co.
Fraser & Chalmers of Canada, Ltd.
Northern Electric Co., Ltd.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.

Cable Railway Systems:
Canadian Mead-Morrison Co., Limited.

Cam Shafts:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Car Dumps:
Sullivan Machinery Co.
R. T Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.

Carbide of Calcium:
Canada Carbide Company, Ltd.

Cars:
Canadian Foundries and Forgings, Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
John J. Gartshore
MacKinnon Steel Co., Ltd.
The Electric Steel & Metals Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
Marsh Engineering Works
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Car Wheels and Axles:
Canadian Car Foundry Co., Ltd.
Burnett & Crampton
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
Marsh Engineering Works, Ltd.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works

Carriers (Gravity):
Jones & Glassco

Castings—Brass
The Canada Metal Co., Ltd.

Castings (Iron and Steel)
Burnett & Crampton
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works

Cement and Concrete Waterproofing:
Spielman Agencies, Regd.

Cement Machinery:
Northern Canada Supply Co.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Fraser & Chalmers of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
R. T Gilman & Co.
Burnett & Crampton

Chains:
Jones & Gltssco
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Link-Belt Co.
Greening, B., Wire Co., Ltd.

Chain Drives:
Jones & Glassco

Chemical Apparatus:
Mine and Smelter Supply Co.

Chemists:
Canadian Laboratories
Campbell & Deyell
Thos. Heyes & Sons
Milton Hersey Co.
Ledoux & Co.
Constant, C. L. Company

Chrome Ore:
The Electric Steel & Metals Co.
Everett & Co.

Classifiers:
Mine and Smelter Supply Co.
Mussens, Limited
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.
The Dorr Company

Coal:
Dominoion Coal Co.
Nova Scotia Steel & Coal Co.

Coal Cutters:
Osborn, Sam'l (Canada) Limited.
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.

Coal Crushers:
Canadian Mead-Morrison Co., Limited

Coal Mining Explosives:
Canadian Explosives, Ltd.

Coal Mining Machinery:
Osborn, Sam'l (Canada) Limited.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Sullivan Machinery Co.
Marsh Engineering Works
Hadfields, Ltd.
Hendrick Mfg. Co.
Fraser & Chalmers of Canada, Limitec
Mussens, Limited
R. T. Gilman & Co.

Coal and Coke Handling Machinery
Canadian Mead-Morrison Co., Limited.
Link-Belt Co.

Coal Pockets:
Canadian Mead-Morrison Co., Limited.

Coal Pick Machines:
Sullivan Machinery Co.

Coal Screening Plants:
Canadian Mead-Morrison Co., Limited.

Cobalt Oxide:
Coniagas Reduction Co.
Everitt & Co.

Compressors—Air:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd
Mussens, Limited
The Mine & Smelter Supply Co.

Concrete Mixers:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc
Mussens, Limited
R. T. Gilman & Co.

Condensers:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Northern Canada Supply Co.
MacGovern & Co., Inc.

Concentrating Tables:.
The Mine & Smelter Supply Co.
Deister Concentrator Co.
The Wabi Iron Works

Converters:
Northern Canada Supply Co.
MacGovern & Co,, Inc.

Conveyors—McCaslin Gravity Bucket:
Canadian Mead-Morrison Co., Limited.

Contractors' Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Consulters and Engineers:
Hersey Milton Co., Ltd.

Conveyors:
The Mine & Smelter Supply Co.

Conveyor Flights:
Hendrick Mfg. Co., Ltd.

Conveyor—Trough—Belt:
Canadian Fairbanks-Morse Co., Ltd.
Link-Belt Co.
Hendrick Mfg. Co.
Mussens, Limited
Jones & Glassco (Roller, Belt and Chain)
Hendrick Mfg. Co.
The Wabi Iron Works

Conical Mills:
Hardinge Conical Mill Co.

Copper:
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Cranes:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
Link-Belt Co.
R. T. Gilman & Co.
Smart-Turner Machine Co.

Crane Ropes:
Allan Whyte & Co.
Greening, B., Wire Co., Ltd.

Crucibles:
Canadian Fairbanks-Morse Co., L d.
The Mine & Smelter Supply Co.

Crusher Balls:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Limited, Hull, Que.
Osborn, Sam'l (Canada) Limited.

Crude Oil Engines:
Swedish Steel & Importing Co., Ltd.

Crushers:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co., Ltd
R. T. Gilman & Co.
Lymans, Ltd.
Mussens, Limited
The Mine & Smelter Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Lt
The Wabi Iron Works

Surplus Machinery and Equipment Property of U.S. Government

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AIR COMPRESSORS

Can. Ingersoll Rand, Class P.L.B.-2, power driven, two stage, cross compound, low-pressure cylinder 16″, high pressure cylinder 10″, stroke 12″, displacement 624 cu. ft. per min., 225 R.P.M., H.P. recommended to drive 110. Fly wheel 5′ x 18″, weight 1900 lbs., with vertical air receiver 42″ x 10′. Capacity,700 cu. ft. at 110 lbs. Location, Montreal, Que.

No. 8301.

Can. Ingersoll Rand, Class R.L.-3, Duplex type, steam driven, with cross-compound steam and cross-compound air cylinders. Cylinder sizes. H.P. steam 13″. L.P. steam 22″. H.P. air 12″, L.P. air 20″. stroke 16″, displacement 1160. R.P.M. 200. Indicated H.P. in steam cylinders, 200 Boiler H.P. recommended. non-condensing 162-146 condensing 132-116. Fly wheel 8′ dia., weight 4500 lbs. No. 6 Ingersoll Rand Air receiver, 48″ x 12″, and No. 1706 Ingersoll Rand aftercooler. Location, Leaside, Ont.

No. 2171

Sullivan Machinery Co., Class W.G.-3 horizontal single stage, power driven. Cylinder 12″ dia., 12″ stroke, displacement 345 ft.. R.P.M. 220, H.P. recommended, 75; terminal air pressure, 120 lbs.. Fly wheel, 60″ x 14½′. With unloader. Location, Leaside, Ont.

No. 17897.

Can. Ingersoll Rand, Class B-3, cross compound steam driven, steam cylinders 14″ x 24″, air cylinders 14″ x 22″, high pressure 22″ x 22″, low pressure, displacement 1160 cu. ft., at 120 R.P.M., indicated H.P. in steam cylinders 200, steam pressure recommended 125, with water-tube inter-cooler. Location, Montreal, Que.

Two machines numbered as follows:

No. 4040.

No. 4041.

Bury Compressor Co., Class L., horizontal single stage power driven, cylinder 12″ dia. by 12″ stroke, displacement 310 cu. ft., R.P.M. 200, terminal air pressure 100 lbs., belt wheel 12″ x 54″, H.P. recommended 75. Location, Brantford, Ont.

Two machines numbered as follows:

No. 2594.

No. 2595.

(With standard Air Receivers, 42″ x 10′.)

No. 2596.

No. 2597.

We issue a weekly Bulletin, which shows the materials available for sale at date of issue. If you are not on our Mailing List, we request your name and address.

Toronto District Salvage Board, Ordnance Dept., U.S. Army

39 Adelaide St., E., TORONTO, Ontario

Canadian Miners' Buying Directory.—(Continued)

Cyanide:
American Cyanamid Company.

Cyanide Plant Equipment:
The Dorr Co.
The Mine & Smelter Supply Co.

D. C. Units:
MacGovern Co.

Derricks:
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited

Diamond Drill Contractors:
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.

Diamond Tools:
Diamond Drill Carbon Co

Diamond Importers:
Diamond Drill Carbon Co

Digesters:
Canadian Chicago Bridge and Iron Works

Dies:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Dredger Pins:
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited

Dredging Machinery:
Canadian Steel Foundries, Ltd.
Canadian Mead-Morrison Co., Limited.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.

Dredging Ropes:
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.

Drills, Air and Hammer:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
The Mine & Smelter Supply Co.
Mussens, Limited

Drills—Core:
Canadian Ingersoll-Rand Co., Ltd
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.

Drills—Diamond:
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company

Drill Steel—Mining:
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockawaw, N.J
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.

Drill Steel Sharpeners:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Northern Canada Supply Co.
Sullivan Machinery Co.
Osborn, Sam'l (Canada) Limited.
The Wabi Iron Works

Drills—Electric:
Canadian Fairbanks-Morse Co., Ltd
Sullivan Machinery Co.
Northern Electric Co., Ltd.

Drills—High Speed and Carbon:
Canadian Fairbanks-Morse Co., Ltd
Osborn, Sam'l (Canada) Limited.
H. A. Drury Co., Ltd.
Hadfields, Limited

Dynamite:
Canadian Explosives
Northern Canada Supply Co.

Dynamos:
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Company

Ejectors:
Canadian Fairbanks-Morse Co. Ltd
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.

Elevators:
Canadian Mead-Morrison Co., Limited.
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
The Wabi Iron Works

Engineering Instruments:
C. L. Berger & Sons

Engines—Automatic:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
Fraser & Chalmers of Canada, Ltd.

Engines—Gas and Gasoline:
Canadian Fairbanks-Morse Co., Ltd.
Alex. Fleck
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Sullivan Machinery Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
The Mine & Smelter Supply Co

Engines—Haulage:
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.

Engines—Marine:
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Swedish Steel & Importing Co., Ltd.

Engines—Steam:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.

Engines—Stationery:
Swedish Steel & Importing Co., Ltd.

Engineers:
The Dorr Co.

Ferro-Alloys (all Classes):
Everitt & Co.

Feed Water Heaters:
MacGovern & Co.

Flashlights—Electric:
Spielman Agencies, Regd.

Flood Lamps:
Northern Electric Co., Ltd.

Flourspar:
The Consolidated Mining & Smelting Co.
Everitt & Co.

Forges:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Forging:
Canadian Mead-Morrison Co., Limited.
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.

Frogs:
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore

Frequency Changers:
MacGovern & Co., Inc.

Furnaces—Assay:
Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.

Fuse:
Canalian Explosives
Northern Canada Supply Co.

Gears (Cast):
Hull Iron & Steel Foundries, Ltd.
The Link-Belt Co.

Gears, Machine Cut:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Hamilton Gear & Machine Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Granulators:
Hardinge Conical Mill Co.

Grinding Wheels:
Canadian Fairbanks-Morse Co., Ltd

Gold Refiners
Goldsmith Bros

Canadian Miners' Buying Directory.—(Continued)

Gold Trays:
Canada Chicago Bridge & Iron Works

Hose (Air Drill):
Goodyear Tire & Rubber Co.

Hose (Fire):
Goodyear Tire & Rubber Co.

Hose (Packings)
Goodyear Tire & Rubber Co.

Hose (Suction):
Goodyear Tire & Rubber Co.

Hose (Steam):
Goodyear Tire & Rubber Co.

Hose (Water):
Goodyear Tire & Rubber Co.

Hammer Rock Drills:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
The Mine & Smelter Supply Co.

Hangers and Cable:
Standard Underground Cable Co. of Canada, Ltd.

High Speed Steel:
Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.

High Speed Steel Twist Drills:
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.

Hoists—Air, Electric and Steam:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Jones & Glassco
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Link-Belt Co.

Hoisting Engines:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Mine & Smelter Supply Co.

Hoisting Towers:
Canadian Mead-Morrison Co., Limited.

Hose:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co

Hydraulic Machinery:
Canadian Fairbanks-Morse Co., Ltd.
Hadfields, Limited
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Industrial Chemists:
Hersey, M. & Co., Ltd.

Ingot Copper:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Insulating Compounds:
Standard Underground Cable Co. of Canada. Ltd.

Inspection and Testing:
Dominion Engineering & Inspection Co

Inspectors:
Hersey. M. & Co., Ltd.

Jacks:
Canadian Fairbanks-Morse Co., Ltd
Can. Brakeshoe Co., Ltd.
Northern Canada Supply Co
R. T. Gilman & Co.
Mussens, Limited

Jack Screws:
Canadian Foundries and Forgings, Ltd

Laboratory Machinery:
Mine & Smelter Supply Co.

Lamps—Acetylene:
Dewar Manufacturing Co., Inc.

Lamps—Carbide:
Dewar Manufacturing Co., Inc.

Lamps—Miners:
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd.
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited

Lamps:
Dewar Manufacturing Co., Inc.

Lanterns—Electric:
Spielman Agencies, Regd.

Lead (Pig):
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.

Levels:
C. L. Berger & Sons

Locomotives (Steam, Compressed Air and Storage Steam:
Canadian Fairbanks-Morse Co., Ltd.
H. K. Porter Company
R T. Gilman & Co
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited

Link Belt
Canadian Fairbanks-Morse Co. Ltd.
Northern Canada Supply Co.
Jones & Glassco

Machinists:
Burnett & Crampton

Machinery—Repair Shop:
Canadian Fairbanks-Morse Co., Ltd.

Machine Shop Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Magnesium Metal:
Everitt & Co.
Hull Iron & Steel Foundries, Ltd.

Manganese Steel:
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Metal Marking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Metal Merchants:
Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Coniagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co

Metallurgical Engineers:
The Dorr Co.

Metallurgical Machinery:
The Dorr Co.
The Mine & Smelter Supply Co.

Metal Work, Heavy Plates:
Canada Chicago Bridge & Iron Works

Mica:
Everitt & Co.
Diamond Drill Carbon Co.

Mining Engineers:
Hersey, M. Co., Ltd.

Mining Drill Steel:
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited.
International High Speed Steel Co., Rockaway, N.J.

Mining Requisites:
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields. Limited
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Mining Ropes:
Dominion Wire Rope Co., Ltd.

Mine Surveying Instruments:
C. L. Berger & Sons

Molybdenite:
Everitt & Co

Monel Metal (Wire, Rod, Sheet and Foundry Metal):
International Nickel Co.

Motors:
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & Co.
The Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Motor Generator Sets—A.C. and D.C.
MacGovern & Co.

Nails:
Canada Metal Co.

Nickel:
International Nickel Co.
Coniagas Reduction Co.
The Mond Nickel Co., Ltd.

Nickel Anodes:
The Mond Nickel Co., Ltd.

Nickel Salts:
The Mond Nickel Co., Ltd.

Nickel Sheets:
The International Nickel Co. of Canada
The Mond Nickel Co., Ltd.

Nickel Wire:
The Mond Nickel Co., Ltd.
The International Nickel Co. of Canada

Oil Analysts:
Constant, C. L. Co.

Ore Handling Equipment:
Canadian Mead-Morrison Co., Limited.

Ore Sacks:
Northern Canada Supply Co.

Ore Testing Works:
Ledoux & Co.
Can. Laboratories
Milton Hersey Co.
Campbell & Deyell
Hoyt Metal Co.

Ores and Metals—Buyers and Sellers of:
C. L. Constant Co.
Geo. G. Blackwell
Consolidated Mining and Smelting Co. of Canada
Oxford Copper Co.
Canada Metal Co.
Hoyt Metal Co.
Everitt & Co.
Pennsylvania Smelting Co.

Packing:
Canadian Fairbanks-Morse Co., Ltd.

Paints—Special:
Spielman Agencies, Regd.

Perforated Metals:
Northern Canada Supply Co.
Hendrick Mfg. Co.
Canada Wire and Iron Goods Company.
Greening, B., Wire Co.

Pig Tin:
Canada Metal Co., Ltd.
Hoyt Metal Co.

Pig Lead:
Canada Metal Co., Ltd.
Hoyt Metal Co.
Pennsylvania Manufacturing Co.

Pipes:
Canadian Fairbanks-Morse Co., Ltd.
Canada Metal Co., Ltd.
Consolidated M. & S. Co.
Northern Canada Supply Co.
R. T. Gilman & Co.

Pipe Fittings:
Canadian Fairbanks-Morse Co., Ltd.

Pipe—Wood Stave:
Pacific Coast Pipe Co.
Mine & Smelter Supply Co.

Piston Rock Drills:
Mussens, Limited
Mine & Smelter Supply Co.

Plate Works:
John Inglis Co., Ltd.
Hendrick Mfg. Co.
The Wabi Iron Works
MacKinnon Steel Co., Ltd.

Platinum Refiners:
Goldsmith Bros.

Pneumatic Tools:
Canadian Ingersoll-Rand Co., Ltd
Jones & Glassco
R. T. Gilman & Co.

Prospecting Mills and Machinery:
The Electric Steel & Metals Co
E. J Longyear Company
Standard Diamond Drill Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, L
The Wabi Iron Works

Pumps—Pneumatic:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Sullivan Machinery Co.

Pumps—Steam:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Limited
Northern Canada Supply Co.
Smart-Turner Machine Co.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Turbine:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Canadian Ingersoll-Rand Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Vacuum:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
The Wabi Iron Works

Pumps—Valves:
Canadian Fairbanks-Morse Co., Ltd.

Pulleys, Shaftings and Hangings:
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
The Wabi Iron Works

Pulverizers—Laboratory:
Mine & Smelter Supply Co.
The Wabi Iron Works
Hardinge Conical Mill Co.

Pumps—Boiler Feed:
Smart-Turner Machine Co.
Northern Canada Supply Co.
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Mine & Smelter Supply Co.

Pumps—Centrifugal:
Canadian Fairbanks-Morse Co., Ltd.
The Electric Steel & Metals Co.
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Canadian Ingersoll-Rand Co., Ltd.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works

Pumps—Diaphragm
The Dorr Company

Pumps—Electric
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mussens, Limited
Smart-Turner Machine Co.

Pumps—Sand and Slime:
Canadian Fairbanks-Morse Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Electric Steel & Metals Co.
The Wabi Iron Works
Smart-Turner Machine Co.

Quarrying Machinery:
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Hadfields, Limited
Mussens, Limited
R. T. Gilman Co.

Rails:
Hadfields, Limited
John J. Gartshore
R. T. Gilman & Co.
Mussens, Limited

Railway Supplies:
Canadian Fairbanks-Morse Co., Ltd.

Refiners:
Goldsmith Bros.

Riddles:
Hendrick Mfg. Co.

Roofing:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Rope—Manilla:
Osborn, Sam'l (Canada) Limited.
Mussens, Limited

Rope—Manilla and Jute:
Jones & Glassco
Northern Canada Supply Co
Osborn, Sam'l (Canada) Limited.
Allan, Whyte & Co.

Canadian Miners' Buying Directory.—(Continued)

Rope—Wire:
Allan, Whyte & Co.
Dominion Wire Rope Co., Ltd.
Greening, B. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
The Electric Steel & Metals Co.
Mussens, Limited
The Wabi Iron Works

Samplers:
Fraser & Chalmers of Canada, Ltd.
C. L. Constant Co.
Ledoux & Co.
Milton Hersey Co.
Thos. Heyes & Son
Mine & Smelter Supply Co.
Mussens, Limited

Scales—(all kinds):
Canadian Fairbanks-Morse Co., Ltd.

Screens:
Greening, B. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Canada Wire and Iron Goods Company.
Link-Belt Co.

Screens—Cross Patent Flanged Lip:
Hendrick Mfg. Co.

Screens—Perforated Metal:
Hendrick Mfg. Co.

Screens—Shaking:
Hendrick Mfg. Co.

Screens—Revolving:
Hendrick Mfg. Co.

Scheelite:
Everitt & Co.

Separators:
Canadian Fairbanks-Morse Co., Ltd.
Smart-Turner Machine Co.
Mine & Smelter Supply Co.

Shaft Contractors:
Hendrick Mfg. Co.

Sheet Metal Work:
Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:
Hendrick Mfg. Co.

Shoes and Dies:
Canadian Foundries and Forgings, Ltd.
H. A. Drury Co., Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Shovels—Steam:
Canadian Foundries and Forgings, Ltd.
Canadian Mead-Morrison Co., Limited.
Osborn, Sam'l (Canada) Limited.
R. T. Gilman & Co.

Ship Bunkering Equipment:
Canadian Mead-Morrison Co., Limited.

Siline:
Coniagas Reduction Co.

Saline Refiners:
Goldsmith Bros.

Smelters:
Goldsmith Bros.

Sledges:
Canada Foundries & Forgings, Ltd.

Smoke Stacks:
Hendrick Mfg. Co.
MacKinnon Steel Co., Ltd.
Marsh Engineering Works
The Wabi Iron Works

Special Machinery:
John Inglis Co., Ltd.

Spelter:
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co

Sprockets:
Link-Belt Co.

Spring Coil and Clips Electrico:
Canadian Steel Foundries, Ltd

Steel Barrels:
Smart-Turner Machine Co.
Fraser & Chalmers of Canada, Ltd.

Stamp Forgings:
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.

Steel Castings:
Canadian Brakeshoe Co., Ltd.
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
The Wabi Iron Works

Steel Drills:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northen Canada Supply Co.
The Electric Steel & Metals Co.
Osborn, Sam'l (Canada) Limited.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.

Steel Drums:
Smart-Turner Machine Co.

Steel—Tool:
Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
N. S. Steel & Coal Co.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
Swedish Steel & Importing Co., Ltd.

Structural Steel Work (Light):
Hendrick Mfg. Co.

Stone Breakers:
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Sulphate of Copper:
The Mond Nickel Co., Ltd.
Coniagas Reduction Co.

Sulphate of Nickel:
The Mond Nickel Co., Ltd.

Surveying Instruments:
C. L. Berger

Switches and Switch Stand:
Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:
John J. Gartshore

Tables—Concentrating:
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.

Tanks:
R. T. Gilman & Co.

Tanks—Acid:
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks (Wooden):
Canadian Fairbanks-Morse Co., Ltd.
Gould, Shapley & Muir Co., Ltd.
Pacific Coast Pipe Co., Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Cyanide, Etc.:
Hendrick Mfg. Co.
Pacific Coast Pipe Co.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tanks—Steel:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Chicago Bridge & Iron Works
Marsh Engineering Works
Osborn, Sam'l (Canada) Limited.
MacKinnon Steel Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Hendrick Mfg. Co.
The Wabi Iron Works

Tanks—Oil Storage:
Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks (water) and Steel Towers:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Chicago Bdidge & Iron Works
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.
Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

Tramway Points and Crossings:
Canadian Steel Foundries, Ltd.
Hadfields, Limited

Transits:
C. L. Berger & Sons

Transformers:
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
Northern Electric Co., Ltd.

Transmission Appuiances:
Jones & Glassco

Troughs (Conveyor):
Hendrick Manufacturing Co.

Trucks—Electric:
Canadian Fairbanks-Morse Co., Ltd.

Trucks—Hand:
Canadian Fairbanks-Morse Co., Ltd.

TTruoks:
Canadian Fairbanks-Morse Co., Ltd.

Tubs:
Hadfields, Limited

Tube Mills:
The Electric Steel & Metals Co.
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.

Tube Mill Balls:
Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Tube Mill Liners:
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.

Turbines—Water Wheel:
MacGovern & Co.

Turbines—Steam:
Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

Weighing Larries:
Canadian Mead-Morrison Co., Limited.

Welding—Rod and Flux:
Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.

Welding and Cutting—Oxy-Acetylene:
Prest-O-Lite Co. of Canada, Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Imperial Brass Mfg. Co.

Wheels and Axles:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
The Electric Steel & Metals Co.
The Wabi Iron Works

Winches—Power Driven:
Canadian Mead-Morrison Co., Limited.

Winding Engines—Steam and Electric:
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
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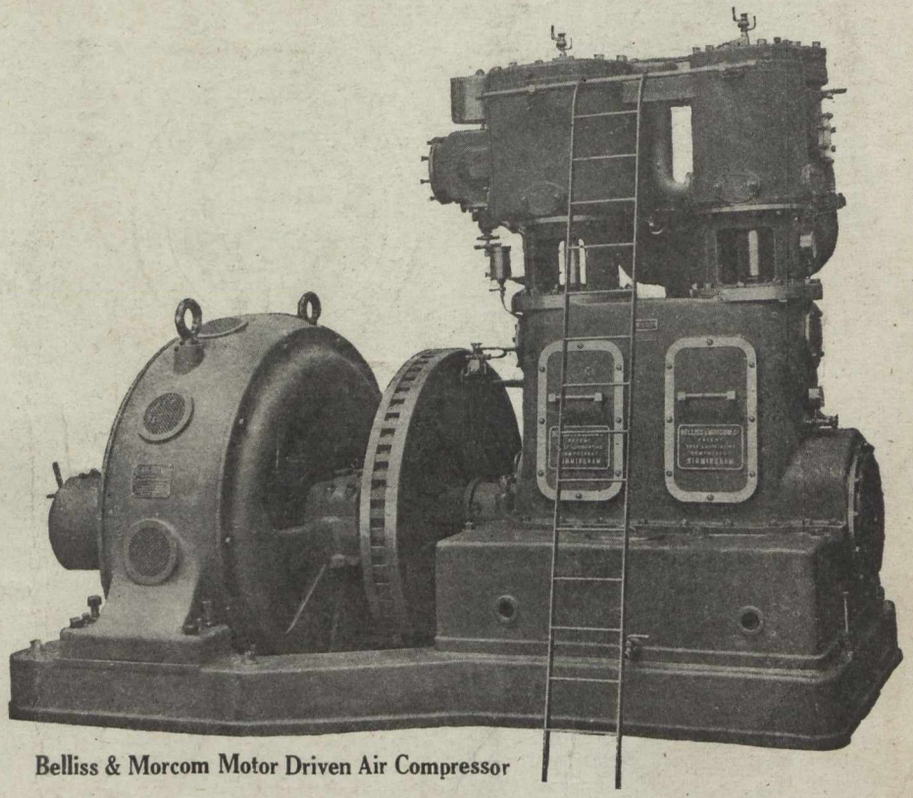

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