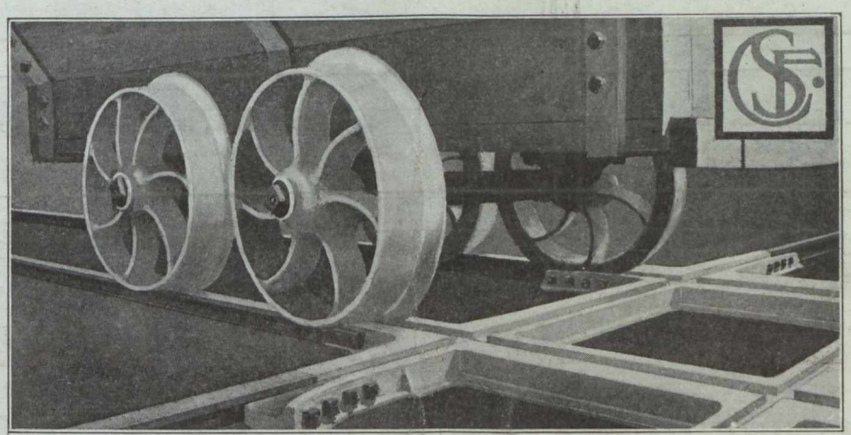
CANADIAN MINING JOURNAL

Vol. XL GARDEN CITY PRESS, Ste. Anne de Bellevue, NOVEMBER 5, 1919. No. 44.

MANGANESE-STEEL



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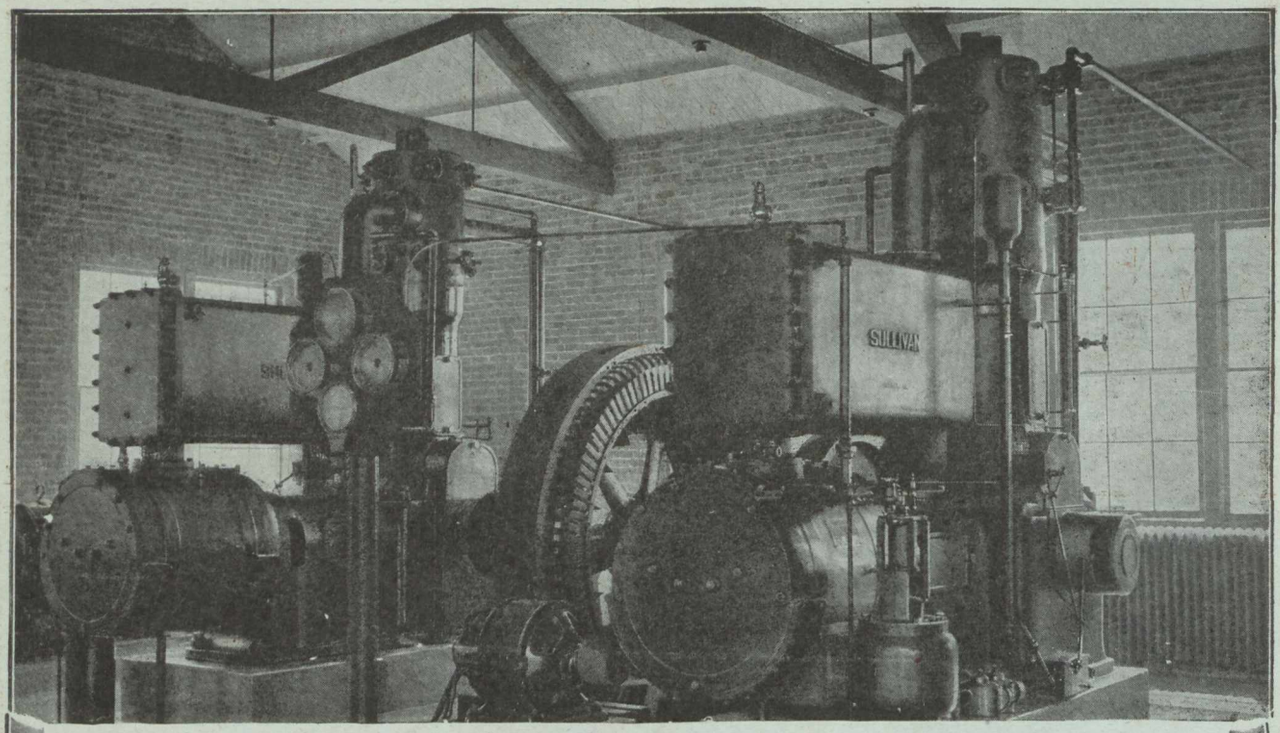

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Ontario's Mining Lands

Ontario, with its 407,262 square miles, contains many millions of acres in which the geological formations are favorable for the occurrence of minerals, 70 per cent of the area being underlain by rocks of pre-Cambrian age. The phenomenally rich silver mines of Cobalt occur in these rocks; so also do the far-famed nickel-copper deposits of Sudbury, the gold of Porcupine and Kirkland Lake, and the iron ore of Magpie and Moose Mountain Mines.

Practically all economic minerals (with the exception of coal and tin) are found in Ontario:—actinolite, apatite, arsenic, asbestos, cobalt, corundum, feldspar, fluorspar, graphite, gypsum, iron pyrites, mica, molybdenite, natural gas, palladium, petroleum, platinum, quartz, salt and tale. This Province has the largest deposits on the continent of talc, feldspar, mica and graphite.

Building materials, such as ornamental marble, limestone sandstone , granite, trap, sand and gravel, meet every demand. Lime, Portland cement, brick and tile are manufactured within the Province.

Ontario in 1918 produced 45 per cent. of the total mineral output of Canada. Returns made to the Ontario Bureau of Mines show the output of the mines and metallurgical works of the Province for the year 1918 to be worth $80,308,972 of which the metallic production was $66,178,059.

Dividends and bonuses paid to the end of 1918 amounted to $13,359,210 for gold mining companies, and $74,810,521 for silver mining companies, or a total of $88,169,733.

The prospector can go almost anywhere in the mineral regions in his canoe; the climate is invigorating and healthy, and there is plenty of wood and good water. Hydro-electric power is available in many parts of the Province, and many undeveloped water-powers remain to be harnessed. A miner's license costs $5.00 per annum, and entitles the holder to stake out in any or every mining division three claims of 40 acres each. After performing 240 day's assessment work on a claim, patent may be obtained from the Crown on payment of $2.50 or $3.00 per acre, depending on loca-tion in surveyed or unsurveyed territory.

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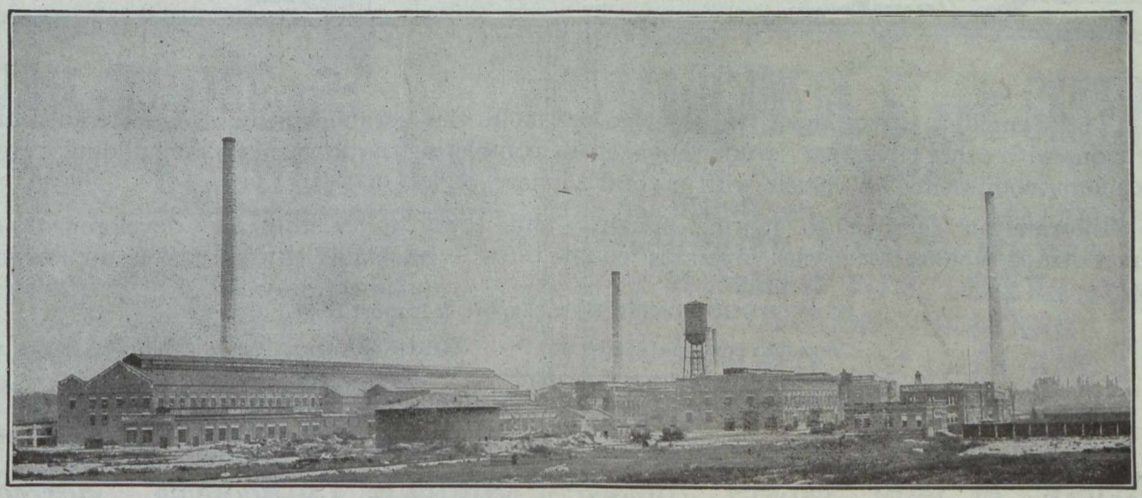

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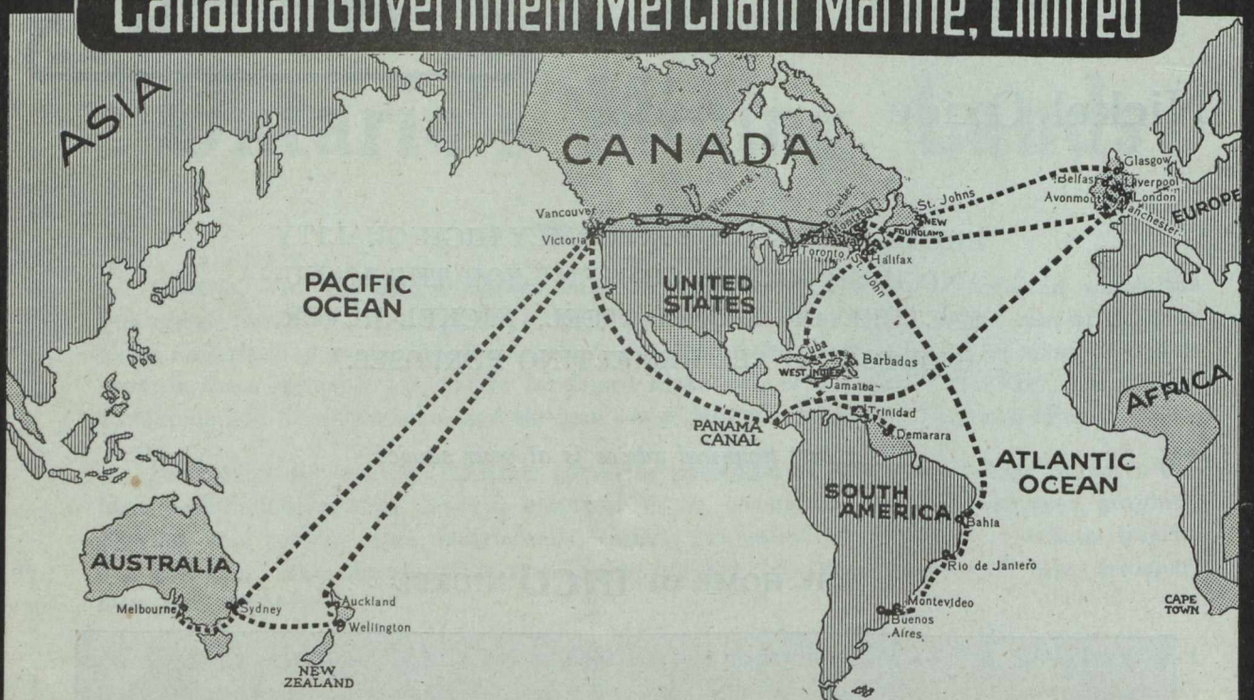

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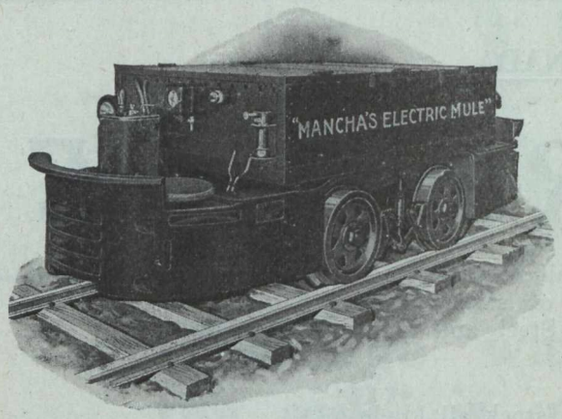

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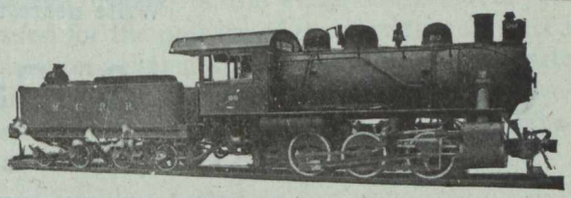

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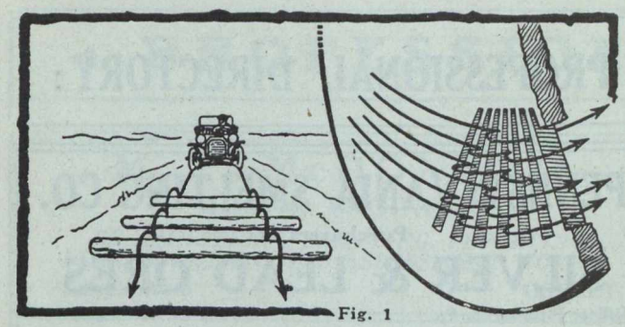
Fig. 1

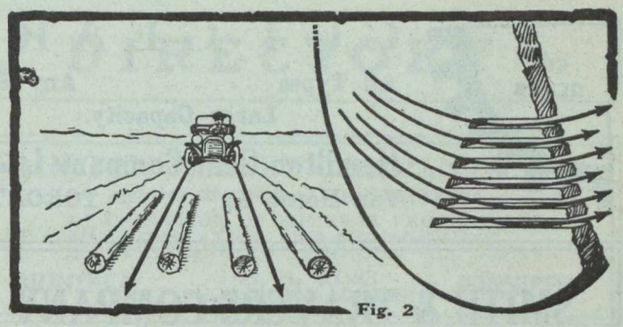
Fig. 2

Discharge "with the movement of the mill" is *unimpeded* discharge

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Study the above sketches. In figure 1, a mineral or gangue particle is being carried toward a line of vertical bars. Unless the particle hits an interstice squarely in the middle, its course is deflected.

In figure 2, a similar particle is being rolled toward horizontally aligned bars. The length of the slot instead of the width of the slot is presented for the passage of the particle. This is a condition existing in all Marcy Mills—the grate bars running circumferentially; "With the Movement of the Mill." Note the grate in the illustration below.

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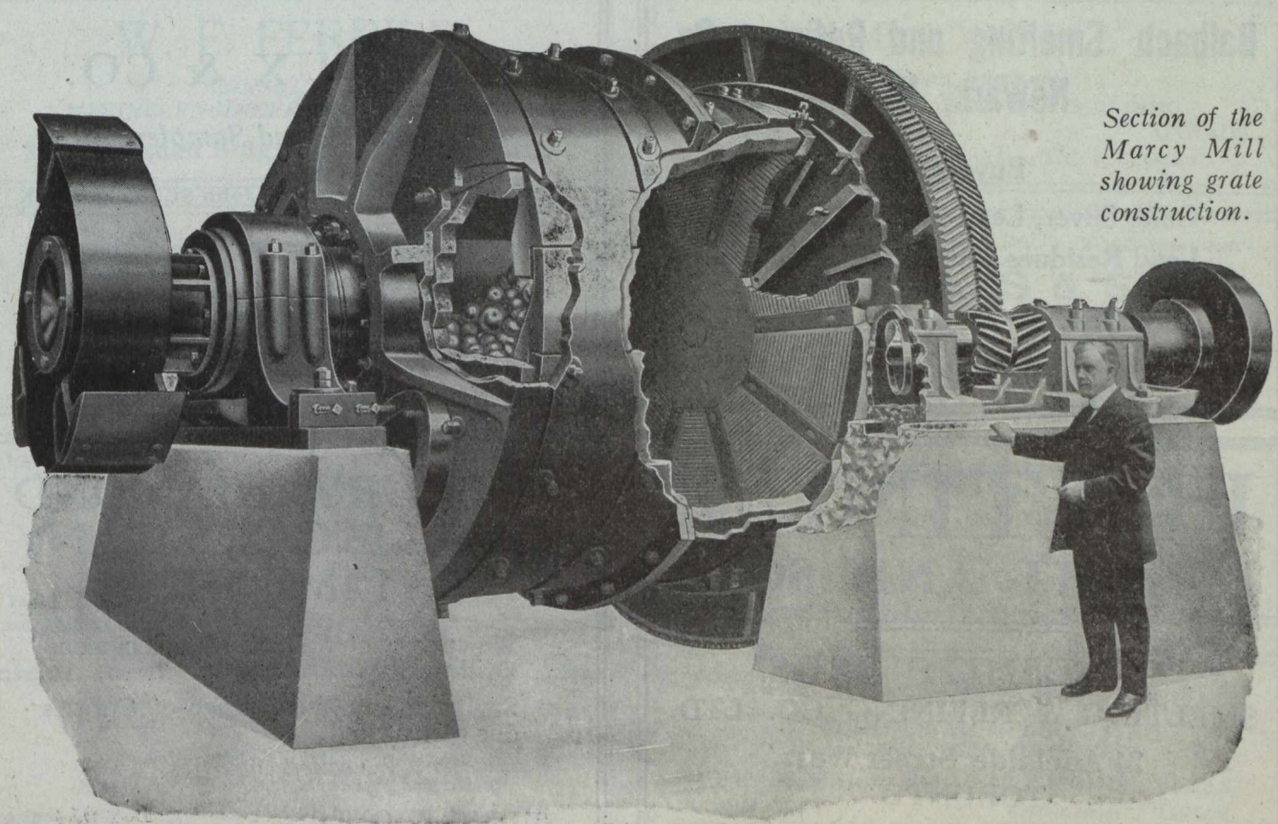

Section of the Marcy Mill showing grate construction.

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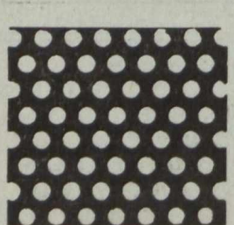

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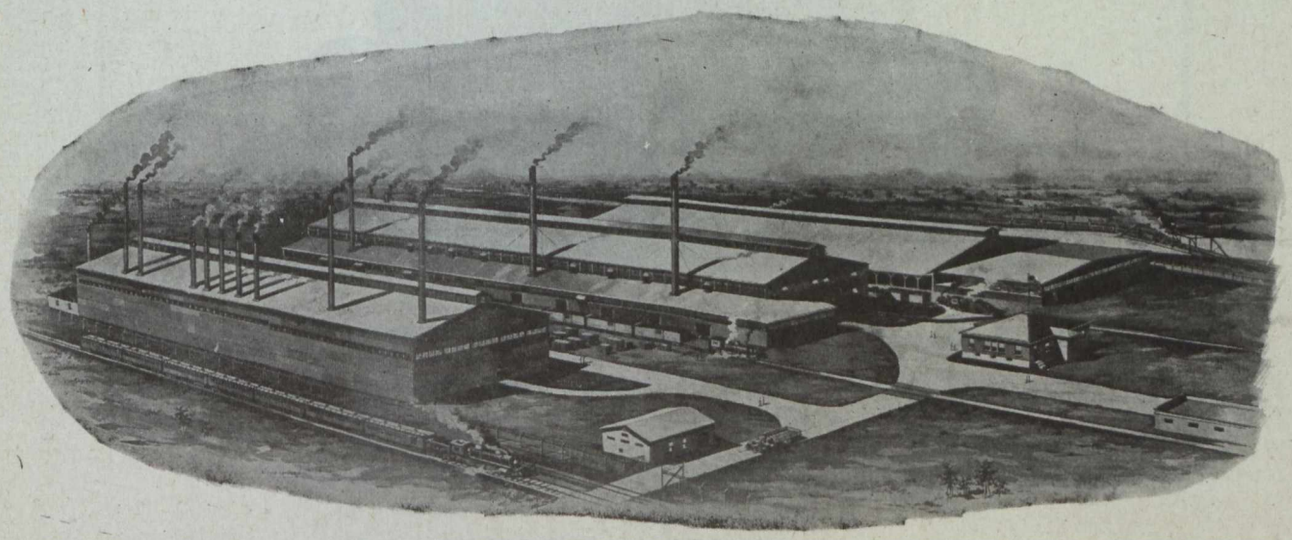

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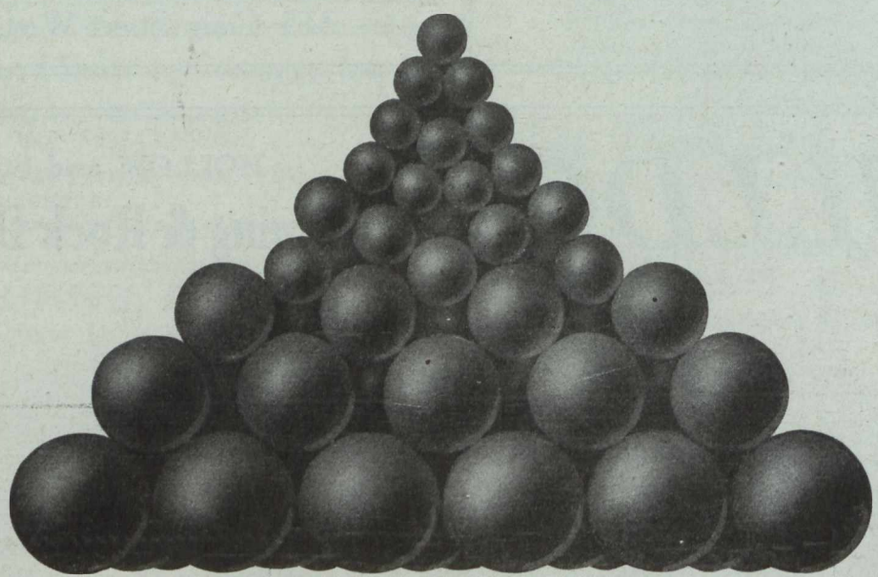

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VOL. XL. GARDEN CITY PRESS, 5th November, 1919 No. 44
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Pages 821 to 840.

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EDITORIAL

Electrification of the Canadian National Railway in Nova Scotia

The question of the electrification of a portion of the Canadian National Railway in Nova Scotia is raised in this issue by Mr. C. H. McL. Burns of the Maritime Coal, Railway & Power Co. The same question was rather fully discussed at the annual meeting of the Mining Society of Nova Scotia in 1917 and again in 1918, and while there was some hesitancy on the part of the coal men present, because of a possible diminuation of the quantity of coal required to operate the railway under electrification, there was very general agreement that not only was electric operation possible, but that it was desirable.

Mr. Burns's article points out that electric power may be generated from the slacks and inferior coals, which are, if not exactly a by-product of coal-mining, yet products that are not easily saleable and are unable to stand the cost of any long distance of rail haulage. This is in fact the method which the coal companies in Nova Scotia are using to supply the power required to operate the collieries. The Dominion Coal Company, in particular, has developed the application of electric drive to most of the operations at its collieries, distributed over a very wide radius, and is used dust-fired boilers with success. In fact, very little fuel of first-class commercial grade is now being used at Nova Scotian collieries, and the practice pursued at the collieries for a number of years has demonstrated not only the convenience and efficiency of electric power, but the economies arising from the generation of electricity in central power-stations with the use of low-grade fuels.

The question of grades is a serious one between Truro and Moncton. The adaptability of the electric locomotive to heavy grades is generally admitted and the President of one railway in the Western States has stated that the electric locomotive had enabled them to forget the continental divide.

As Mr. Burns mentions, the water-powers of the Maritime Provinces do not hold out much hope of generating large quantities of cheap electricity, and coal must always be the source of whatever motive power is used on the eastern railways, to a very large extent.

Those who favour electrification of the National Railways in Nova Scotia would electrify the whole of the road from Sydney to Monction at least.

It is pointed out that main generating stations could be placed along the line of railway to take advantage of the main coalfields of Sydney District, Inverness (by a station at the Strait of Canso), Pictou, and Cumberland County, including the extension of the Cumberland field into New Brunswick.

It is also thought that, by a system of light electric railways, feeding lines could be used to open up the districts of Nova Scotia which are today undeveloped, and must remain undeveloped until transportation is provided.

The question raised by Mr. Burns is one that we have by no means heard the last of in the Maritime Provinces. Nova Scotia's long sea frontage, her excellent harbours, and the natural position of the main centres of population on these harbours, has for a long time obscured the lack of proper transportation in the interior, a lack that extends both to highways and railways.

Considering that Nova Scotia has for a century been mining and exporting coal, that Cape Breton coal was used in the fireplaces of both Boston and New York before it was known that anthracite would burn, it is surprising how long the people of that province have endured the limited use that has been made of electricity and coal-gas. In the Sydney coalfield, the richest bituminous coal area in Canada east of Alberta, where hundreds of thousands of tons of coal are annually subjected to destructive distillation for the manufacture of coke, no such convenience as a gas stove is to be found. Not a single industry (beyond the basic industries of coal-mining and steel manufacture) is to be found in the Island of Cape Breton attracted there and having its manufacturing costs based on cheap power. This is something that can be said of no other coalfield of like length of development, and is certainly something to be thought over. Exactly the same may be said of the Pictou, Inverness and Cumberland coalfields—modified to a small extent in relation to the vicinity of New Glasgow.

The coal mined in Nova Scotia has for generations gone to provide the driving power for the industries of New England, Quebec and Ontario, and has, in large part, been followed by the youth and energy of the Province. Mr. Burns's proposal has a wider application that he has used, and it is probably unnecessary to excuse this amplification of a subject that must always bulk largely in the thought of those who have seriously considered the stationary, if not retrograde position of Nova Scotia, when compared with the other provinces of Canada.

Problems of the Maritime Provinces

At the recent meeting of the Maritime Board of Trade which was convened in Moncton a broader and more united spirit is stated to have prevailed than at any previous session. There was absolute unanimity of opinion on the advantages of Maritime Union, the necessity for the division of the Canadian National Railway into units, with a Maritime Province unit from Montreal or Quebec, and the necessity for a thorough geological re-survey of the Maritime Provinces.

The Province of Nova Scotia has been fairly well mapped geologically, but the maps badly need revision. New Brunswick is in large measure a terra incognito from a geological standpoint, largely of course because of the dense forest still covering a large part of that province. While more is known of the coal occurrences of Nova Scotia than is known of other mineral deposits of that Province, yet it cannot be said that any notable addition to our knowledge of the maritime coalfield has been made in the life of the present generation, or since the untimely death of Hugh Fletcher. The maritime coalfield includes the well-known seams of Sydney, Inverness, Pictou, Cumberland and Joggins, and the lesser known occurrences of New Brunswick and Newfoundland, with the possibility of concealed coalfields in Cumberland County and under the Permian cover of Prince Edward Island, and possibly also under the waters of the Bras d'Or Lake. The labours of many eminent geologists, from Sir J. W. Dawson and Abram Gesner down to the work done by Dr. A. O. Hayes and reported in the Summary Report of the Geological Survey for 1918, have been expended on the mapping and stratigraphical position of the maritime coalfield, but the problem has never been conceived as a whole, and no application of the newer developments of what may be termed "coal geology" has been made to the ascertained facts of this coalfield, which is essentially a single deposit covering roughly a parallelogram 200 by 300 miles in extent, having at its four corners the mouth of Chaleur Bay in the west; Fredericton, New Brunswick in the south, Arichat, Cape Breton, in the east; and the head of St. George's Bay, Newfoundland, in the north.

The configuration of the pre-Carboniferous rocks on which the Coal Measures were laid down, the subsequent earth movements, and the co-relation of the separated basins of the original coalfield, are matters worthy of the concentrated lifestudy of a competent geologist, but no geologist has as yet been able, or willing, to tackle this great and worthy task in the same way that Prof. Lapworth and Prof. Kendall worked at the problem of the concealed coalfields of England.

Even the lesser problem of co-relation of the seams within the known sub-divisions of the main coalfield has not been attempted, and, with all the added knowledge since his day, with all that we have learned through microscopic examination of coal sections, and of the persistence of maritime or fresh-water shell horizons associated with coal-seams, no one has made a better guess at the co-relation of the coal-seams in the several basins of the Sydney coalfield than did Richard Brown in 1865.

In Newfoundland, the situation is even more backward. Statements are made by responsible ministers of Newfoundland regarding the existence of large coal deposits in that country, but the exact geologic ascertainment of the basis for such statements is lacking, because Newfoundland has never been geologically surveyed as that term is understood today.

Whether political union of the Maritime Provinces should include Newfoundland is for Newfoundland alone to say. But from the standpoint of geological science, Newfoundland should be included in any systematic re-survey of the Maritime Provinces.

The Maritime Board of Trade is to be congratulated on its broader vision. It is on the right track. The undeveloped Maritime Provinces — for undeveloped they certainly are—cannot stand against the growing population and infinitely greater acreages and natural resources of the western provinces if they persist in disunity and unnecessary expenditures on administration.

We do not know whether the Maritime Board of Trade discussed another problem of the Maritime Provinces, namely, the need for a unified and enlarged measure of technical education. The dissipation of energy in educational problems in these provinces is not less marked, nor less detrimental, than the archaic and almost laughable spectacle of three full-fledged administrations, with upper and lower houses, speakers, lieutenant-governors and all the paraphenalia of government in a territory that nature and art and horse-sense indicate should be one and undivided.

LE PRINCE CONQUERANT.

The Prince of Wales was mentioned in despatches as having efficiently performed the duties of a liaison officer between French and British forces in the war. His ability has been demonstrated with no less distinction in the Province of Quebec, where he will be affectionately remembered as the liaison officer of racial concord and as **le prince conquérant.**

Should the Government Electrify the C.N.R. From Moncton to Halifax ?

By C. H. McL. BURNS.

The electrification of railways has been discussed so often by eminent electrical engineers and prominent railroad men during the past year, and the advantages and disadvantages compared with steam operation have been advanced so often in our leading trade journals and professional publications that it would be little short of presumption for me to attempt to arrive at any decision on the subject. Nevertheless, I wish to draw attention to the advantages which the electrification of the Canadian Government Railways from Moncton to Halifax might yield to the operators of the thin coal beds of the Cumberland district, and incidentally place before the public notice the opportunity which this step would present to conserve the coal resources of the Province.

The engineering phase of this question is an established possibility, beyond all doubt. It is no longer an experiment. The equipment is commercial. All that is required is the power and the money to develop it; the last annual report of the Norfolk and Western Railway testifies to this. The Commission of Conservation, in their ninth annual report, sums the situation up as follows:

"Balancing the pros and cons, it is found that electric traction materially reduces the operating expenses, but materially increases the fixed charges. "The saving in operating expenses is nearly directly in "proportion to the number of trains per day. The "greater the density of traffic the greater the saving. The cost of installation is in a great measure "independent of the density of the traffic, or the number of trains per day. On a road of a given standard, "the cost of many of the items which go to make up "the whole is the same whether the trains be few or "many. The problem thus always resolves itself into "this. With the number of trains per day on a given "section of a road, will the undoubted savings and "operating expenses be sufficient to offset the undoubted increase in fixed charges?

"Every division of the road is a separate and independent problem."

No doubt generalization is dangerous, especially in connection with the electrification of railways, where so many factors, such as the physical location, character of loads, the power situation, etc., come in to affect the decision if applied locally. But applying it locally the question is this—is the traffic on the Moncton-Halifax divisions sufficiently dense to justify the large expense necessary to the installation of electric traction? Probably under war conditions it was, and possibly facilities for handling might make it so under normal conditions. Halifax is one of the world's greatest ports. In fact it is rivalled by few in the shipping world. On this Continent it is the nearest port to Great Britain and France and should be the gateway to the whole Dominion. The average freighter can save eight days on a return trip across the Atlantic, sailing from Halifax, instead of from Portland, Boston or New York, and about four days over St. John. This fact was of the greatest importance during the war when bottoms were at such a premium, for it meant that a boat on the Halifax route could carry from one quarter to one third more men, food, ammunition and supplies, than can the same boat from any of the American ports. If Halifax can discharge and load that boat with greater efficiency and speed than any other port, it means a still greater saving over the others. But railway transportation and port facilities govern the degree to which this geographical advantage can be utilized, and it goes without saying that with equal facilities for handling and equal port charges, the port with the widest choice of transportation facilities to the interior will be the greatest. New York has grown by leaps and bounds beyond all other ports on this side of the Atlantic because of this universality of railway connection. It competes with Montreal and New Orleans for the freight that should come to them as the natural outlets for the country back of them. The fight for this trade started back in the days of inland water transportation when the Americans built the Erie Canal to divert the Western trade from the Montreal route. Canada tried to come back with the Trent Canal but was forestalled again by the advent of the American Railway. Are we still going to be satisfied with a second place? Why cannot Halifax and not New York handle the flow of grain from the West while Montreal is frozen up? The reason is quite evident. Railway congestion and lack of facilities for storing is driving this traffic into other channels. This is a very serious problem now, but even after this war is settled, when the struggle for the markets of the world will be fierce, any practical expense due to transportation will act as an increased cost of production on our goods. The port problem is important, but it is a railway problem even more than a shipping one. Halifax now has the terminal docks, which will doubtless be equipped with the best facilities for discharging and loading ships in port, but if it is not to be strangled, it must have adequate transportation facilities. The Intercolonial, the National Transcontinental and the C.P.R., all converge to pour the freight of Canada into Moncton, but from here to Halifax this freight must be hauled 186 miles over a single track railway. This 186 miles must be double tracked and some day electrified or electrified now as a more speedy remedy. As to double-tracking the "Canadian Engineer" in an editorial of April 18th, 1918, says:

> "The railways to the American ports are heavily congested. The whole shipping problem on the Atlantic coast would be materially relieved by widening the neck of the Halifax bottle. As to electrification as an alternative, Mr. E. W. Rice, the President of the American Institute of Electrical Engineers, in an address to that body in New York not long ago said: 'I think we can demonstrate that there is no other way known to us by which the railway problem facing the country can be as quickly and as cheaply solved as by electrification.'"

From the foregoing it seems at least reasonable to

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conclude that the electrification of this section of the Government Railways is justifiable in view of the energetic trade war and keen competition for a share in the world's markets, which will doubtless follow the Great War, as a permanent investment in the commercial life of our country purely from a transportation point of view. Further, and which I wish particularly to point out is the importance of such an undertaking in the conservation of the fuel resources of the Maritime Provinces, which are vital to the commercial and industrial life of the Dominion as a whole.

One of the great advantages claimed for electrification is the saving in coal, when burned in one large, central power plant in comparison with burning it in an inefficient locomotive. But electrification offers this and still greater advantages in the economy of coal through the medium of the central station. When this section of the Government Railways is to be electrified it must be by steam power. A glance at the map will illustrate this. The streams flowing through this part of New Brunswick and Nova Scotia are all short and their watersheds small. Hydro-electric development on a large scale cannot be undertaken between Moncton and Truro at any rate. But if the country has no water power great enough for an enterprise of this magnitude it has unlimited coal resources. The Cumberland Coal field, one of the largest in Nova Scotia, is situated at almost the centre of the Moncton-Truro division, and if the coal is properly conserved, it offers a supply of power more than sufficiently large for such an undertaking, for a great many years to come, probably hundreds of years. Here is another advantage for the central power station. Situated in the centre of the coal field, it will greatly reduce the cost of coal at the plant; power is now being generated by some of the coal companies for at least half a cent per kilowatt hour. This central power station could also distribute power to the industrial centers scattered along the railways, and contiguous thereto. This would eliminate the need for transporting coal to them and give them their necessary power with a much smaller coal consumption, a relief to the overburdened railway, and another step toward true conservation.

In the Cumberland Coal Field there are two areas of productive coal measures, separated by a large tract of newer rocks. One of these is the Springhill area, situated almost in the centre of the country and immediately north of the Cobequid range of mountains. It has an area of approximately 21 sq. miles and is connected with the port of Parrsboro and the main-line of the C.N.R., at Springhill Junction by rail.

The other productive area is the Joggins. It extends from the shores of Chignecto Bay inland some twenty miles to the old Economy Road. Between seventy and eighty seams of coal outcrop along the northern side of a cylindrical basin of carboniferous measures, the axis of which pass through Shulee, about twelve miles south of Joggins, on an east and west direction. The seams dip to the south under newer strata at angles varying from 17 degrees at Joggins to about 50 degrees on the eastern end of the area. The width of the area across the outcrops of the productive strata is about two miles, but as mentioned before, the seams all extend southerly under the newer rocks giving the basin a much greater width. The main line of the C.N.R., between Maccan Junction and Athol, crosses this area about midway between its extreme ends and taps the area on either side by the Joggins Railway on the west and the Chignecto and Fenwick lines on the east.

This Joggins field is unique in comparison with the other coal fields of the province. As they are noted for their thick seams this field is noted for the very large number of thin seams which it possesses. Of the eighty seams exposed only five or six are considered workable at a profit. These range from 2½ to 4 ft. in thickness. Nevertheless, a conservative estimate of the amount of coal in these six seams, as far as they have already been proved, is several billion tons.

Although this field was probably the first in America to be investigated, being mentioned in the "Relations of the Jesuits" as early as 1612, it has not grown in importance as have the other fields of the Province, due alone to the thinness of its seams. When pressed by the Government of Nova Scotia in the early fifties, to do more work on their areas in this district. the old General Mining Assocation complained that they had spent over a hundred thousand dollars and had not realized forty-five thousand. The mistake was that they were trying to apply the same methods of mining to these thin seams that had proved a success in much thicker seams. One company followed another with but indifferent success. None of the mining was deep, one slope after another being opened along the outcrop; long underground hauls with the equipment which they had made the cost of production prohibitive. The result is that this large field has only been scratched along the surface. But in late years the Maritime Coal, Railway & Power Company has come into this field and been pioneers in the profitable working of these thin seams. They now control large areas and by the introduction of machine longwall working, mechanical haulage, underground and universal electrical equipment throughout its mines and surface plants, has succeeded in bringing the cost of production appreciably below the market price of coal. They have proved that with proper methods of working and the economical handling of large outputs, the thin seam can compete favorably with the thick one. There is one drawback, which as yet has not been overcome. The coal has to be "mined" and since the mining is approximately the same for any seam, the percentage of fine coal is much higher in the thin seam than in the thick one, which of course is always harder to market than round coal.

In the early days of coal mining in Cape Breton and before the advent of the steel industry, the disposal of this fine coal became a serious problem, so much so, that at one time it was seriously advocated to use it on the sea beach to evaporate sea water in the production of salt. Now, however, their larger markets and the steel industry absorb it all.

Unfortunately the coal of the Joggins field is not a good coking coal and the fine coal cannot be used for metallurgical purposes. This however is a very strong argument for encouraging the working of these thin seams for steaming purposes now and conserve the large beds of good metallurgical coal to supply the demands of the future. The idea advanced heretofore has been to work the thick beds now at a profit and fall back on the thin ones as a matter of necessity when prices will be higher. This is human nature, but is it sound common sense? If the industrial life of Nova Scotia, which is part of the Dominion is to continue permanently, the coal industry must be maintained for as long a period as possible, and to accomplish this, the thin beds should be worked contemporaneously with the larger beds.

To profitably work these thin seams then, some market must be found for the fine coal, which in a great many cases runs as high as fifty per cent of the

output. Evidently, the only market accessible is for steam purposes. The most obvious method of utilizing a particularly small fuel is to burn it. Here again we strike a snag. Most of the individual steam plants, scattered over the country, and locomotives, are not equipped to economically use fine coal. To do so requires a study of the fuel and furnace designed for it. This, of course, could not be attempted by the plant using a few cars of coal a year. It must be done by the coal operator if he is to dispose of his coal. The only solution of the problem then, seems to be for him to erect and equip such a plant and turn this unmarketable fine coal into a marketable product in the form of electricity.

The Maritime Coal, Railway and Power Company, mentioned before, has taken the first step towards marketing their fine coal as electricity, in fact, they claim to be the first in America to supply power for commercial purposes, direct from the waste coal at the mouth of the pit. On the suggestion of Thomas A. Edison, they erected as an experiment a small power plant at their Chignecto Mine, six miles from the town of Amherst; the experiment has proved a success and the capacity of the plant has been increased gradually until now it supplies practically all the power used by the industries of that town, light for the town, light and power to the Company's mines throughout the district, as well as supplying the country situated along its power lines. But the extent to which the plant will relieve the situation is dependent on the market; that, at present, is not large enough to enable this one company to dispose of all its fine coal. True a power plant can, to some extent, create its own market by offering power at an attractive price and so induce industries to locate in the district, but, in order to make its price attractive it must be efficient, and therefore necessarily of large capacity. Further, to find money for such a venture, the market must be reasonably sure, or in other words market and plant must grow together.

Here is a coal field with an abundance of fuel, and the nucleus of a large power plant, already in operation, on the main line of the C.N.R., from Moncton to Halifax. Why cannot the Government kill two birds with one stone—solve its transportation problem by electrifying and offer the coal operator a market for his fine coal? Why increase mine production and overburden the railway carrying this coal around, depleting our coal fields more rapidly than necessary, when we can conserve the round coal by burning the fine?

IRON AND MANGANESE ORE DEPOSITS IN THE IDARWALD, GERMANY.

(From the British Military Governor, Cologne.)

For the last few months prospecting for iron and manganese has been taking place in the Idarwald, about 50 kilometres south of Coblentz. It was known before the war that there were deposits of iron ore in this region, but with the Lorraine Ironfields in their possession, the Germans did not consider the exploitation of the ore deposits in the Idarwald profitable enough.

The work of the last few months, however, has given very satisfactory results, and it appears that the whole of the Idarwald contains rich ore deposits. Deposits have already been discovered in the regions of Rhaunen-Sulzbach, Weitersbach, and Horbruch (about 20 kilometres W. by S. of Berncastel).

The ore has been discovered at a depth of from 6 to 10 ft., but in several places also just below the surface. Analysis shows that it contains from 55 to 60 per cent metal, and up to 30 per cent manganese. Its transport could be effected at a small cost by means of the Hunsbruck railway.

THE UNITED VERDE COPPER COMPANY, JEROME, ARIZONA.

From an article in the Tucson "Citizen," republished in "Iron Ore" of Ishpeming, Mich., the following particulars regarding the operations of the United Verde Copper Company are extracted.

For stripping the overburden a steam shovel weighing 300 tons is used. The dipper holds eight cubic yards, or rather more than ten tons, and the radius of the shovel's operation will permit of opening up a cut 140 feet wide. This shovel is shifting 175,000 yds. of rock monthly.

At the United Verde smelter at Clarkdale, a powdered coal plant is being finished. This plant will have a capacity of 500 tons of pulverized coal per day and will supply fuel to five reverbatory furnaces.

A coal storage and reclaiming plant has recently been completed. It will store 14,000 tons of coal, 12,000 tons of which can be stored under water. When the stored coal is required it is conveyed from the water-bunkers to the drying plant by a belt conveyor, and after drying, by a system of screw conveyors, the coal is taken to the pulverizers where it is ground to 200 mesh. It is expected that the use of powdered coal will show an economy over fuel oil now used.

A Cottrell smoke treater is approaching completion. The plans of the company contemplate an expenditure of a million dollars on treatment of the fumes, dust collection and recovery of copper which now goes to waste in the dust.

Large use is being made of concrete in the underground work. A stretch of tunnel reaching from the portal for 3,600 feet in the main tunnel has been treated with a concrete gun. Another tunnel section 950 feet in length is being entirely concreted because of the nature of the ground.

Especial attention is being devoted to the well-being and comfort of the employees.

PERSONALS.

Mr. Jas. McEvoy has returned to Toronto after examing iron deposits in the Belcher Islands, James Bay. He made the trip north in 15 days and the return trip in 20 days. He was accompanied by Mr. Sainsbury, one of the owners of the properties.

Mr. J. B. Tyrrell who has been examining gold properties in Rice Lake district, Manitoba, has been detained by the early freeze up.

Dr. W. G. Miller, Canada's representative on the board of the Imperial Mineral Resources Bureau, has returned to Toronto after several months' absence in connection with the work of the Bureau.

Mr. R. E. Hore has returned to Toronto after examining properties in the Shiningtree gold district and will leave shortly to make an examination in the Rice Lake gold district, Manitoba.

Some Elements of Economy in Air Compression

By WM. CARTER, A.M., A.S.M.E.

(Continued from page 809, issue of October 29th.)

But even under the best conditions water jacketing realizes only a part of the saving which its theory promises. Some beneficial effect in this respect it certainly has, particularly in slow speed, long-stroke machines. But probably its greatest value lies in its effect upon the lubrication and the resultant wearing qualities of the machine. Compression at sea level and ordinary atmospheric temperature to only 75 lbs. gage produces a temperature of about 400 degrees Fahr. If some means were not employed to reduce this temperature, the inevitable result would be destruction of all ordinary lubricants and packings, and the rapid wear of piston rings, cylinders, rods and valves, with extravagant leakage, loss of capacity, increased friction and excessive power consumption. But the water jacket keeps all parts reasonably cool and results in tight joints, free lubrication, little wear, reduced friction, easy running, and sustained capacity and efficiency.

It is perhaps unnecessary to say that it is almost as important that air should be admitted into the cylinder cool as that it should be kept cool during compression. If a water jacket were not used the entering air would be heated while passing through the hot valves and ports and by contact with the heated interior of the cylinder. This would mean the rarification of the intake air, reduced cylinder capacity, lower efficiency of compression and excessive terminal temperature. Since jacketing is at the best only partially effective, this latter argument suggests the advantage of those constructions which admit air through one or at least only a few large openings where only the outer film of the air is heated rather than through a number of smaller openings through which the air is finely sub-divided and heated.

The second process of cooling—compression in stages—is analagous to an arrangement in which the compressing piston of a single cylinder is stopped at intervals through its stroke and the partially compressed and heated air is withdrawn and cooled by some external means to its initial temperature or even lower; then returned to the cylinder to be further compressed, heated and cooled until the desired pressure is reached. It is evident that such an arrangement would maintain a fairly uniform low temperature in the air volume throughout the stroke, giving very close to isothermal compression.

Such a proceeding is evidently not practical. But the same results may be obtained by compressing in several cylinders, in the first of which moderate pressure and temperature are reached and the air in this condition discharged through a cooling device which restores its initial temperature; then admitted to another cylinder for further compression and heating; again withdrawn and cooled and again compressed. This is a stage or compound compression. An average of the practice of the leading builders permits single stage compression for pressures up to 70 pounds or under some conditions to 100 pounds; two stage compression for pressures of 75 to 500 lbs., three or four stage (preferably in duplex compressors) for pressures of 500 to 1,500 lbs., and four stage compression for pressures from 1,500 lbs. up.

A three stage straight line machine should only be used for small or moderate capacities. Above this, the duplex type should be preferred because of its balanced construction and of the readiness with which it is compounded.

The primary object of compound compression is a saving of the power required by what may be called the heat element in compression. The degree to which this is accomplished depends entirely upon the efficiency of the intercooler. The ideal intercooler would be one which would reduce the temperature of the air to the temperature of the cooling water. This probably cannot be realized, but a good practical standard demands that the intercooler shall deliver air at a temperature not more than ten degrees above that of the cooling water.

The successful intercooler involves six fundamental requirements. It must provide for a complete and minute subdivision of the air passing through it, that the heat may be dissipated without any dependence upon the best-conducting qualities of the air itself. The air should be split up into thin sheets or streams so as to dissipate its internal heat. There must be an ample cooling surface presented to this subdivided air stream. The circulation of the cooling water must be properly directed in relation to the flow of the air, and its velocity must be such that the maximum amount of heat will be carried away without waste of water. All air passages must have ample cross section, that the velocity of air may be such as to give a length of contact with the cooling surfaces sufficient for the complete removal of the heat. Expansion and contraction must be provided for that there will not be a leakage of air or of water. Suitable means must be provided for removing from the intercooler the moisture condensed from the air in the cooling process.

Compound air compression has important bearings upon other features of compression economy. It reduces the average structural stresses, resulting in a higher factor of safety and a longer life for the machine with a given weight of metal. The maximum stresses encountered in compression in two stages are only 55 or 60 per cent of what they are in single stage compression to the same pressure. The reduction of stresses here referred to is felt not only in the machine structure but in the air valves, which show a notably easy operation under compound conditions. Another advantage of compound compression is an improved steam economy if the compressor is steam driven. The averaging of the stresses throughout the stroke, permits the work to be done with a lower M.E.P. in the steam cylinder, which means a shorter cut-off and a greater steam economy. The reduced terminal stresses permit a higher piston speed with safety, thus improving the steam economy by reducing condensation losses and leakage in the steam cylinder.

Higher volumetric efficiency results from compound compression, coming from three sources. The first of these is the fact that the clearance pressure in the intake cylinder is lower. The second is a lower maximum temperature in the cylinders so that the entering air is not so much heated. The third is a reduction of leakage consequent upon the reduced extremes of pressure in each cylinder. Compound compression results in more efficient lubrication of the machine be-

cause of the lower temperatures involved. This means easier running, improved mechanical efficiency, less wear, lower repair costs, reduced leakage losses, and longer life. Compression in stages results in the delivery of drier air—a feature of great importance where the air is used under conditions which may result in freezing up at the exhaust ports. This also largely obviates the accumulation of water in pipe lines.

The air valves of a compressor are probably the most vital parts of a machine. While the number of different types of air valves is greater than the number of compressor builders, yet they may be broadly classified into two groups. Mechanically actuated valves have a positive motion derived through some mechanical connection from the rotating or reciprocating parts of the compressor. Poppet or automatic valves are operated wholly by differences of pressure. There are some air valves in use today which cannot be exactly placed in either class. Notable among these is the "Hurricane-inlet" or "Piston-inlet" of one of the large builders which is operated by its own inertia. In other cases a valve may seem to combine the features of both classes, an automatic adjustability supplementing a primary mechanical control.

Without going into a detailed discussion of the many different types of air inlet valves, some general observations may be made as to their function and requirements. The function of an inlet valve is to admit the maximum volume of cool, clean air to the cylinder with the least expenditure of power; to keep this air in; and to continue to perform this duty indefinitely at the least total cost. Analysis of this function reveals the following requirements of the successful inlet valve.

It must admit a volume of air which will entirely fill the cylinder, this air being as nearly as possible at atmospheric pressure. This calls for an instantaneous and complete opening of the valve, so timed that there shall be no escape of the compressed air in the clearance space. This full opening should be held to the end of the stroke, and short, direct and unobstructed passages should be provided through ports and valves.

It must admit clean air, suggesting a design permitting ready connection to an intake passage or conduit leading to a place free from dust and grit. The air admitted must be as cool as possible—a condition partially met by the consideration just mentioned by which cool air as well as clean air should be supplied. But, more than this, the cool air supplied should nowhere be heated in its course into the cylinder, suggesting that valves, ports and passages shall be so placed as to be cooled by the cylinder jacket. Moreover the air should be admitted through one or a few large openings rather than sieved through many small ones.

All the air admitted must be kept in the cylinder, calling for instantaneous and complete closing of the valve at the end of the stroke, with a perfect seating and without any leakage. All the processes outlined here must be carried on with the least possible expenditure of power for the overcoming of friction and the manipulation of the valve gear—a requisite demanding nice adjustment, simplicity of mechanism, perfect lubrication and as few wearing surfaces as possible. This exacting performance must be continued indefinitely, twice each revolution and hundreds of times per minute without undue wear or loss of adjustment. This condition is fundamentally one of correct design, high class materials and workmanship, and generous lubrication.

The ideal inlet valve is here outlined. Probably no compressor valve on the market today exactly fulfills all of these conditions; but many types represent the experienced judgment of the builders applied in an excellent compromise.

The functions of an air discharge valve are to release the full volume of compressed air from the cylinder with the least friction and power expenditure; to keep it all out after discharge, and to continue indefinitely to maintain this duty without undue expense. The primary essentials of such a valve are as follows:

Its opening must be full and instantaneous, must occur just at the right point in the stroke and must be held until the piston comes to rest. The valve opening must be ample so that the velocity of discharge may not be excessive and the ports and discharge passages should be short and free from obstruction, to reduce friction.

As few parts as possible, and these correctly adjusted, should provide for the necessary valve movement with the minimum loss of power in mechanical friction.

The valve should close instantly and completely as soon as the piston stops, that there may be no return of the air discharged when the piston starts on its back stroke. Such a return of compressed air would have the effect of an increased clearance, reducing the capacity of the cylinder.

The continued maintenance of this performance (which is more arduous upon the discharge valves than upon the inlet valves because of the higher pressures) suggests the advisability of a simple construction with the fewest bearings, careful workmanship, the use of good materials, perfect lubrication and careful distribution of materials. It is always to be remembered that discharge valves and ports are continually exposed to a flow of heated air even where jacketing is most complete. On the other hand, an essential of inlet valves and ports is that they shall be kept cool. The latter should therefore be removed as far as possible from the former, nor should the same ports be used for both inlet and outlet.

It might at first glance, seem that the area of the discharge valves, ports and passages could be much less than the corresponding inlet area, since the former must pass the air at a higher pressure and in less volume than the latter. But it is to be remembered that while the inlet areas are open during the full stroke, the discharge areas are open for only a part of the stroke—about one-third. In order, therefore, to make the velocity of discharge about the same as that of intake or admission, it is usual to make the inlet and discharge areas approximately equal.

It is important that the velocity of flow through the valves, ports and passages shall be not excessive, and this depends upon the piston speed which is a widely variable quantity. The higher the piston speed, the larger should be the area. In actual practice, the inlet areas vary from 3 to 15 per cent of the cylinder areas, with an average probably around 9 to 10 per cent. The corresponding discharge areas from 7 to 15 per cent, with an average in the neighborhood of 10 to 12 per cent. The larger these areas, the better the economy.

Owing to the increased friction through a number of small passages as compared with that through a single

large one, the actual measured area in the former case should be 50 to 100 per cent larger than the latter. This explains why the measured inlet area of machines with Corliss or other large area inlet valves is often so much less than the measured discharge area of many small poppet discharge valves, while still giving good results.

It may we well to recall at this point that cylinder clearance is really made up of three elements: the inlet port clearance, which is all the space left between the closed inlet valves and the inner surface of the cylinder, the discharge port clearance, which is the corresponding space in the discharge passage, and the piston clearance, which is the space allowed for safety between piston and cylinder head at the end of the stroke. This latter element is an essential in compressors. But it is not unusual for the other two elements together to constitute by far the larger proportion of the total clearance. This suggests the superiority of those valve designs in which inlet and discharge port clearance are reduced to the lowest practical limit.

Coming now to consideration of the third element in air compression, the mechanical structure, we find that it has a very important bearing upon the economy and the endurance of the machine.

The mechanical efficiency of a compressor can be exactly determined by a comparison of the steam and air indicator cards (in a steam driven machine) or by a comparison of the measured power applied to the horse power of the air indicator card (in a power driven machine). The difference between these values represents the power consumed in the fricton of the compressor. Good mechanical efficiency, therefore, depends upon the extent to which friction is reduced. There is no time here to enter into the details of compressor design, it will be enough to enumerate some points having a vital bearing on this subject.

Power should be applied to resistance—steam pressure to air pressure—in as direct a manner as possible, so that bending or deflecting strains may be avoided as far as possible, with the resultant binding of bearings and loss of correct alignment.

Ample metal should be used, properly disposed to afford the rigidity necessary as a further precaution against the attendant binding stresses just mentioned. A light construction is always to be avoided.

Lest this correct proportioning of materials to meet stresses should result in an excessive weight and an extravagant cost, these materials should be of the best quality and intelligently selected for specific purposes, affording the maximum strength per unit of weight.

All bearings should be of ample area, so proportioned as to give a safe, moderate pressure per inch of bearing surface.

Wherever possible, bearings should be supplied with removable linings (preferably of anti-friction metal). In all cases, whether thus lined or otherwise, they should be scraped smooth and true, properly adjusted and arranged for the ready distribution of lubricant—all of this tending toward a lower coefficient of friction for these bearing surfaces.

Complete provision should be made for a plentiful supply of lubricant to all bearing surfaces, furnished preferably by an automatic system which will be efficient at all speeds.

The utmost simplicity should be sought throughout, reducing the number of parts, the number of joints, (each an element of weakness) and the number of bearings, with their attendent friction and their possible loss of economical adjustment.

The design should afford a ready accessibility at every point, inviting frequent and careful attention to the maintaining of a correct adjustment of all parts for most efficient operation.

Steam compounding and compound air compression have important effects upon the mechanical efficiency, which have already been discussed in the proper place.

Friction has been aptly defined as "that portion of the power consumed by a machine in wearing itself out." This definition throws on the question of compressor endurance a light in which the importance of a high mechanical efficiency appears in bold relief. True economy is a question, not of momentary results, but of results covering months and years of continuous service under all conditions: and a compressor in which the percentage of "wearing out power" is least promises not only the highest, but also the longest, record of sustained economy and satisfactory service.

While the regulating devices or governors used on air compressors vary in detail among the different builders, all may be divided so far as the principle of operation is concerned, into two classes.

The first class is that applied to compressors with plain or adjustable cut-off valves of flat or piston type. It operates by throttling the steam supply as load diminishes. Devices in this class consist fundamentally of a valve in the steam pipe, which is opened or closed by action of a piston in a cylinder, this piston being actuated by air pressure from the receiver. The movement of this piston is opposed by weights on a lever or by a spring, and the spring tension or the weights may be adjusted so that the governor valve is full open at any desired normal air pressure. But when pressure exceeds this limit, the tension of weight is overcome, and the valve in the steam supply is closed in a degree corresponding with the amount of excess pressure. This slows down the machine and reduces the volumne of air discharged until such time as the normal pressure is reached, when the weights or spring tension again open the governor valve, and full speed is restored.

The second class includes governors applied to machines with Corliss steam valves. The mechanism consists of a pressure cylinder and piston with opposing weights or springs as described in the preceding paragraph, but in this case the movement of the governor, instead of throttling the steam, changes the cut-off of the steam valves, reducing speed under partial load, and restoring it as load increases. The resistance per stroke being the same throughout a very slight change of cut-off hardly effecting the economy, produces all the speed change necessary.

Both of these classes of governors include also a speed-limiting device, the more common form being the familiar fly-ball arrangement, which throttles the steam supply or greatly shortens the cut-off when speed exceeds a certain limit, as it might in case an air pipe should break or other accident occur.

There are occasional instances in which governors of one or other of the above classes are used in connection with a unloader on the air end, so arranged that, as speed falls off, the load is partially taken from the air end. These are the specialities of individual builders, and as such cannot be elaborated upon here. The two general classes defined cover the general requirements of this paper.

Since the power driven compressor is almost always a constant speed machine, the methods of regulation and governing described for variable speed steam driven machines evidently cannot here be applied. Con-

stant speed means constant piston displacement, and the problem of delivering a variable volume of air with constant piston displacement, becomes one of making a portion of that displacement non-effective in the compression and delivery of air. Only the fundamental principles of several methods of accomplishing this will here be discussed.

The first method is really one of unloading, rather than of regulating. A pressure controlled mechanism is arranged so that when pressure exceeds normal, due to excess of delivered volume over demand, a communication is opened between the two sides of the compressing piston. Usually this is accomplished by opening and holding open one or several of the discharge valves at both ends of the cylinder, the air then simply sweeping back and forth from one side of the piston to the other through the open valves and the air discharge passage. When normal pressure is restored, the valves are automatically closed, and compression and delivery are resumed. Evidently this is practically a total unloading of the machine for a longer or shorter period—a sudden release from load and a sudden resumption of load. Moreover, the air which is swept back and forth by the piston in its travel is air under full pressure, so that when the discharge valves suddenly close, the piston at once encounters a full cylinder of air at maximum pressure. These facts limit regulators of this class to machines of comparatively small capacity.

Another method provides, by means of a pressure operated device, for the partial or total closing of the compressor intake under reduced load. To avoid the dangers attendant upon such an operation acting suddenly, these devices are provided with some damping mechanism so that they are compelled to operate slowly, making the release or resumption of the load gradual. The cutting down of the air intake results in a rarification of the air entering the cylinder, and a greater range between initial and discharge pressures, with a corresponding increase in the range of temperatures. This method of regulation, therefore, is not suitable for very great load variations; nor is it recommended for such conditions by the builders responsible for it.

The third method is very similar to the first, except that here the inlet valves, instead of the discharge valves, are held open when the machine is unloaded, the piston thus simply drawing in and forcing out air at atmospheric pressure. It is open to the same criticism (though in somewhat less degree) as the first method namely, undue shock and strain on release and resumption of load.

The fourth method uses a pressure-controlled valve on the compressor discharge of single stage machine, combining also the functions of a check valve to limit the escape of air from the receiver of air line. Excessive pressure blows the discharge to atmosphere, instead of into the line. This arrangement is also used on two stage machines by placing it on the low pressure discharge to the intercooler. Then, when the governor valve is opened by excess pressure, the low pressure cylinder discharges to atmosphere, and the high pressure cylinder acts simply as a low pressure cylinder with intake at atmospheric pressure. This device is more of a relief valve than an unloader, for the piston must continue to compress to a pressure which will open the discharge valves, and this volume of compressed air, with its power equivalent, is wasted.

Yet another method of regulation provides auxiliary clearance spaces, or pockets, at each end of the cylinder, which are successively "cut-in" as load diminishes. The excess air is simply compressed into these clearance spaces and expanded on the back stroke. The capacity of the cylinder is reduced without any appreciable waste of power, for the energy used in compressing the clearance air is given back by its expansion.

On power driven compressors with Corliss intake valves, several different methods of unloading or regulating are used.

By one method, the Corliss valve is held open for the full admission stroke, and also for a part of the compression stroke, this latter portion being determined by the unloading called for. Evidently this is practically equivalent to a shortening of the stroke of the compressor.

By another method the Corliss intake valve is opened full at beginning of admission, but closes later in the admission stroke. The air admitted to that point is expanded or rarefied for the remainder of the compression stroke, and then compressed, the volume of compressed air delivered being of course reduced. This arrangement is productive of an excessive temperature range in the cylinder. Still a third method opens and holds open the intake valves at the end of the cylinder, or at opposite ends in duplex machines. The effect of this is to make ineffective one out of every two strokes. If still further unloading is necessary, the intake valves at the other end of the cylinder or cylinders are opened and held open. The three arrangements just outlined all operate by a pressure controlled mechanism which actuates some form of trip on the Corliss air valve gear, somewhat similar to the release mechanism of the Corliss steam valve for varying the cut-off.

Three things are to be avoided in the successful unloader or regulator for power driven machines. first, a sudden release or resumption of load, throwing heavy strains on the machine; second, undue rarefaction of the intake air, resulting in a wide range of cylinder pressures and temperatures; third, the blowing-off of compressed air to the atmosphere with a waste of power.

In the regulation of the power driven compressor, less reliance must be placed upon the automatic regulation of the individual machine than upon the intelligent subdivision of the load between two or more machines and upon the careful management of the resulting plant. In designing a plant of these machines, maximum capacity must be cared for in the normal output of the machines, while partial loads are provided for by starting or stopping one or more machines, the remainder running at or very near full load. It is usually desirable to start a power driven compressor with no load, throwing on the load gradually after normal speed has been reached. This is in fact essential in machines driven by electric motors, for the heavy inrush of current in starting under load is dangerous, particularly where power is taken from a transmission circuit supplying other motors.

Evidently almost any of the unloading devices noted in the previous section can be used for this purpose if properly arranged for manipulation. The usual form, however, is simply a by-pass valve to atmosphere on the line close to the compressor protected by a check valve between it and the receiver to prevent the return of air from the line when the starting unloader valve

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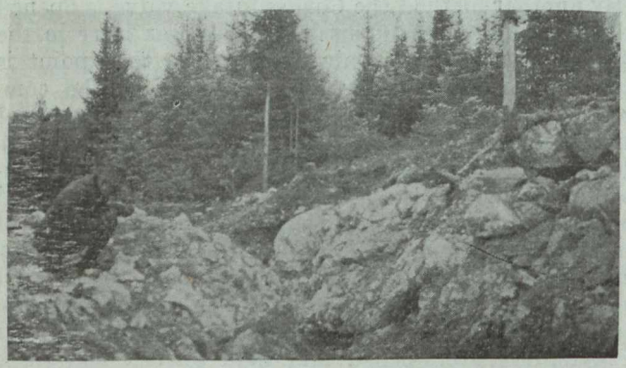
The Pitchblende Deposit in Butte Township, Nipissing District, Ontario

By REGINALD E. HORE.

During the past few weeks there has been much interest shown by prospectors in the radium ore discovery made by Wm. Elliott in Butt township. The accompanying photographs will give readers of The Journal some idea of the nature of the country in which the pitchblende has been found. Mr. C. W. Knight of the Ontario Bureau of Mines has briefly described the deposit in the Oct. 15 number of The Journal. The photographs will supplement his description.



The Elliott Pitchblende Deposit, Close View.

Since Mr. Knight visited the property there have been many claims staked in Butt township. There has been a search for pegmatite dykes that would astonish the resident of the Parry Sound and Muskoka districts, as it would those who have been prospecting for gold and silver. Pegmatite dykes are abundant in most areas of the old crystalline schists. Yet in Butt township where they are most in demand very few are exposed. The rocks in which the pegmatite occurs are ordinarily of little interest to the prospector in Ontario,

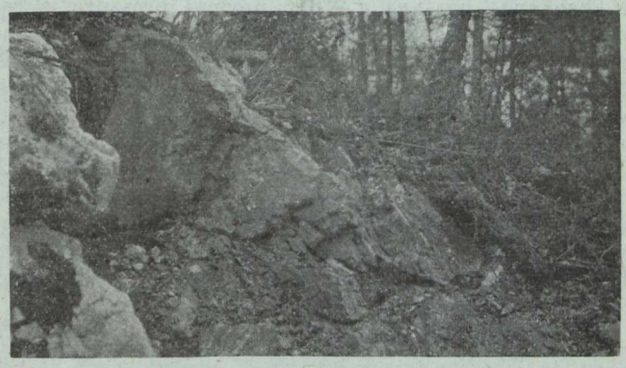
The Elliott Pitchblende Deposit, General View.

for they are granite and diorite gneisses. Mr. Elliott's discovery, therefore, will lend new interest to these formations and possibly result in further important discoveries being made in areas that have hitherto been considered as unpromising.

The Elliott discovery was made while developing a pegmatite dyke which contains an abundance of mica. The exposure is at the edge of a little peninsula in Mica Lake. The dyke is probably a big one, but very little of it can be seen. Only the footwall portion has been exposed and that only for about 40 ft. The photographs help to show why so little is yet known about the extent of the deposit.

In the dyke there are numerous muscovite mica crystals three or four inches in diameter. Thin leaves of this mica are nearly colorless and clearly transparent, but show numerous inclusions of green, red and black minerals. The crystals derive from the inclusions a brownish color.

In addition to the transparent muscovite mica there

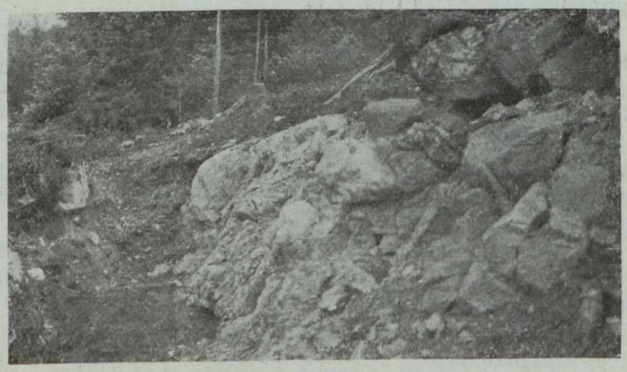


The Barber Mica Deposit, Butt Township.

are also present crystals of black opaque biotite.

The feldspar crystals that form a great part of the pegmatite are plagioclase feldspars of red, flesh, and greyish white color. Some of the nearly white feldspars at the edge of the dyke show very distinct plagioclase striations. The red feldspars have also these characteristic striations. Some of the large crystals are partly red and partly white.

The quartz in the pegmatite is in part nearly colorless, but some is very dark colored—smoky quartz.



Another View of the Elliott Deposit.

The pitchblende, which is a heavy mineral and should be readily recovered by ordinary concentration methods, occurs in shapeless grains. Its name suggests its appearance, for it is a black mineral with a lustre resembling that of asphaltum. It is fairly hard and of high specific gravity. It occurs chiefly in the red feldspar, but not in all cases. The grains I have seen are nearly all in the red feldspar. In one case I noticed the characteristic weathering product, a yellowish powder which is probably uranium oxide.

Pitchblende is an amorphous variety of uraninite which is a uranate containing lead and rare metals of the lanthanum and yttrium group. It is distinguishable from most of the common black minerals by its high specific gravity and lack of crystalline structure and by the pitchy lustre. According to Brush it is soluble in dilute sulphuric acid with slight evolution of a gas (helium).

The rock which forms the footwall of the Elliott pitchblende deposit is a dark grey crystalline rock in which the most notable mineral is biotite or black mica. There is also an abundance of quartz and a white feldspar. The crystals are about the size of ordinary granulated sugar. Weathered portions of the rock close to the dyke are very friable—easily broken in the fingers.

The method of separating radium from uranium is described in Bull. 104 of the U. S. Bureau of Mines. Radium is used chiefly by the medical profession, the emanations having been found to have the power of curing various diseases. The chief source of radium in America is the carnotite deposits at and near Placerville, Colorado.

PORT ARTHUR NOTES.

(By J. J. O'Connor.)

The romance of a Chicago wholesale merchant finds its settling in the gold regions of Northern Ontario.

Last year Mr. Robert Wachman of 4439 South Michigan Boulevard, Chicago, Ill., came to Dryden, Ontario, to spend his vacation in fishing, hunting and boating. Falling in with an old prospector named Gus Larssen, Mr. Wachman rapidly became inoculated with the mining fever. He lost no time, first in formulating a comprehensive plan of campaign, and second, in beginning intensive work.

Having acquired 2,100 acres of mineral lands at Contact Bay, Vermillion Lake, and formed the Wachman Mining Co., Ltd., with a paid up cash capital of $500,000. Mr. Wachman started to make things move.

The company's lands are reached over a government road, and lie six miles south of Dryden, on the Canadian Pacific Railway. The main vein shows spectacular specimens of native gold over 400 feet of its extent, whilst the vein has been traced for 2,640 feet on the Wachman land, and runs to the adjoining territory of the Rogon Mining Co. Several subsidiary veins, carrying native gold, have also been discovered. On the Rogon property, the vein enlarges from a few inches on the surface, to a width of 12 feet at the 100-foot level.

On the Wachman property, the vein widens from 6 inches at the surface, to 3 feet, at a depth of 15 feet. At this depth a 6-inch paystreak shows, and a series of stringers encountered in sinking, consolidated to form the vein. The gold is free milling, carrying a large percentage of silver. A mining representative of the "Winnipeg Tribune" affirms that average assay values of $700 per ton were obtained by him.

Sixty men are at present employed in building camps and sinking. It is proposed during the winter to sink three shafts, each to a depth of 300 feet. Diamond drilling will be consistently pushed.

A complete 20 stamp mill, with all necessary power, crushing and handling equipment has been purchased, and will soon be installed. The contractor in charge of erection of the mill will receive a bonus of $1,000 if he has steam up on May 1st, 1920.

All ore assays so far obtained indicate a present high average. Ore will be supplied to the mill from four contiguous claims.

One pleasant feature of the situation is that Mr. Wachman's Company has no stock, or securities of any kind for sale. The unique policy of setting aside a large amount of money ($20,000) for distribution amongst employees after three months' service, has been adopted.

The head office of the company is located at Dryden, Ontario, where Mr. Wachman will be pleased to answer all inquiries, or refer them to the "Winnipeg Tribune," Winnipeg, Manitoba.

Incidentally, Mr. Wachman is a native of Courland, and was educated in Dublin, Ireland, and has spent his business life in the United States and Canada.

The Nicholls Chemical Co. are about to commence the construction of an ore dock on the Mission River, just east of the Canadian National freight sheds at Fort William, for the purpose of handling their pyrites ore from the Northern Pyrites Mine, at North Pines, Ontario, and also from their pyrites property at Mokoman, about 30 miles west of Port Arthur. This dock will cost $100,000, and be ready for operation in the spring of 1920. It will afford facilities for the shipment of local iron ore.

Col. Milton Francis manager of the Port Arthur Fort William Development Association is in correspondence with Mr. Bradley Stoughton, Secretary of the American Institute of Mining Engineers, in regard to a proposed visit of the members of the Institute to Port Arthur, in September 1920.

He is also in correspondence with Mr. H. Mortimer Lamb, Secretary of the Canadian Mining Institute, regarding the selection of Port Arthur for the annual meeting of the Institute, to be held during the frst week of March 1920.

One of the syndicate that owns the Czone Siding, zinc ore property, situated about 70 miles east of Port Arthur, on the line of the Canadian Pacific Railway, has recently visited New York, conducting negotiations for the sale of their property. The ore body has been traced for more than a mile. It is essentially a rich pegmatitic segregation in granite. It consists of from 2 to 3 feet of very spectacular zinc blende, adjoining, and surrounding which, are from ten to twelve feet of lower grade ore.

The chief workings are on an exposure which shows strongly on both sides of a creek bed, the vein has been trenched at various points on its length for over a mile. The owners are Messrs. Lawrence and Rochon of Fort William, and Dr. R. J. Manion M.P. of Fort William.

Some Elements of Economy in Air Compression.

Concluded from page 829.

is open. This check valve is essential where several compressors serve one line, permitting cutting in or out any machine without unloading the others. This by-pass valve is opened on starting, when the compressor simply compresses to a pressure sufficient to open its discharge valves, this air escaping to atmosphere. When normal speed is reached the by-pass or unloading valve is gradually closed and load resumed. On two stage machines, an unloader valve should be provided on the low pressure discharge of the inter-cooler, as well as on the high pressure discharge to the line. In the latter case, both cylinders operate momentarily as low pressure cylinders.

Our Northern Ontario Letter

The Silver Mines.

Cobalt mining companies are selling silver at the highest figure in their history. Dispatches from London declare that quotations have reached a higher point than ever before. Metal authorities point out that the demand is without precedent. Producers have figures to show that the world output of silver is declining. As a natural consequence the situation is plainly beneficial to the producers.

While the silver currency of the British Isles is being threatened with the possibility of being relegated to the melting pot, and while small silver coins appear to have disappeared almost entirely in Old France, each constituting a source of anxiety among the financial experts of these two great nations, the silver mines of the world are reaping the benefit, and, in the case of Cobalt with its world-famed high grade silver deposits, are speeding up operations to the maximum capacity in an effort to take full advantage of this greatest opportunity so far in their history.

On October 31st the Coniagas Mines closed its fiscal year. It will probably be a month or so before the annual statement can be prepared. In the meantime it is learned that production exceeded three-quarters of a million ounces and that ore reserves are from two to three years ahead of mill requirements based on the present capacity as well as silver at a point above $1 an ounce.

The Mining Corporation is stated to be negotiating with a view to, if possible, acquiring the Thompson-Krist property at Porcupine. At the time of writing, no official statement has as yet been issued.

The Trethewey-Cobalt Company will hold its annual meeting Friday, Nov. 7, in Toronto at which time the question of acquiring additional prospective mining property in the Gowganda district will be brought up for consideration. It will be recalled that the Trethewey, when optioning the Castle a year or so ago, optioned only 51 per cent of the 1,500,000 shares. The annual meeting will deal with this matter and the cancellation of certain agreements pertaining to the minority interest will take place. Among the new properties mentioned as likely to come up for consideration is the Major claim as well as a lease of 112 acres lying under Miller Lake.

According to advice received from Texas, drilling on the oil lands of the Nipissing Mining Company has attained a depth of about 2,200 feet. As yet oil has not been encountered, but officials of the company appear to entertain hope of success. The zone in which oil has been encountered in the vicinity of the Nipissing holdings, ranges from a depth of from 1,700 to 4,000 feet.

Work being done on the Nipissing Extension property is meeting with satisfactory results. A second vein containing high grade ore has been opened up on surface. It has been found to measure about one inch in width and has been opened up for about 60 feet in length. Major Birkett is in charge of operations.

According to unofficial reports, the Buffalo Mines and the Temiskaming Mining Company have been negotiating with the object in view of the Temiskaming taking over the Buffalo. Officials of the latter company declined to make a statement this week regarding the matter.

High grade ore has been encountered on the old Silver Cliff Mine, being operated under lease by the Northern Customs Company. During the past month it is learned that considerable ore has been taken out of the Silver Cliff. The Northern Customs lease has to do only with that part of the property lying between surface and a depth of 500 feet. Below the latter point the Colonial Company is part owner.

In the outlying silver districts, the Gowganda field is easily the most active, especially in the vicinity of the Miller Lake-O'Brien. A good deal of activity is also taking place in the Leroy Lake section of the Gowganda field. The Camburn Silver Mines at the head of which is identified Messrs. Campbell and Fairburn, former leaseholders of the Foster Mine at Cobalt, is exploiting the old Leroy Lake property, and prospects are stated to be encouraging. Other properties on which exploration work is being done are the Collins and the McDonald. On the former a small steam plant is in operation and a shaft has been driven to a depth of about 170 feet.

The White Reserve Mine in the Maple Mountain section of the Elk Lake district continues to attract attention as a result of the high grade ore recently encountered there. Arrangements have been made to send out a shipment of ore during the coming winter.

In the South Lorrain area, activity has reached almost low ebb, the Keeley Mine having been closed down for the winter, and leaving the Pittsburg-Lorrain the sole operating property in that once active district. It would now appear that the anticipated revival of activity in South-Lorrain as a result of the high quotations for silver will at least not materialize until next summer.

The Gold Mining Area.

In the gold mining districts of Northern Ontario the shortage of unskilled labor continues to be a perplexing problem. The peculiar part of the situation is the fact that the shortage is greatest in the larger centres of activity. For instance, in Porcupine there is at present a shortage of close to 2,000 men, while at Kirkland Lake the mines are experiencing very little difficulty in securing large enough forces to fill all vacancies. When the time comes to fully man the mines in the Kirkland Lake field, it is feared more difficulty may be encountered. At present working forces are about one-quarter of the number before the strike was called in June. In the other mining districts, such as Boston Creek, Larder Lake, Bourke's and Fort Matachewan, no serious difficulty is felt in procuring the desired number of men, although in all districts the shortage is more or less felt.

In the Porcupine district mechanical muckers are being tried out, and good hopes are entertained that this may offset the unskilled labor scarcity to at least some extent. As to this, only the future will decide.

The Dome Mines is said to be treating around 1,000 tons of ore daily with about 300 men on the pay-roll, or an average of over three tons per day per man. Compared with this, the Hollinger and the McIntyre are able to handle only about fifty per cent of this tonnage, or between 1½ and 2 tons daily per man. Mining men are pointing to the Dome's achievement as an assurance that costs are being maintained well within bounds and that the president will probably be able to make good his promise to pay a dividend within the next two months.

The Clifton-Porcupine is being aggressively developed, and it is officially stated that a substantial amount of commercial ore has been put in sight.

The Gold Centre Mining Company has decided to explore their Boyce property by use of a diamond drill and arrangements are being made to do from 3,000 to 5,000 feet of core-drilling.

The McIntyre-Porcupine Company is reported to have acquired a working option on the property of the Martin Gold Mining Company, situated in the Harricana River district, near Amos, Que.

Among the mining companies subscribing in a big way to the Victory Loan, 1919, are the Hollinger and the Mining Corporation, the former taking $1,750,000 and the latter $1,000,000.

According to official advice to your correspondent, the Tough-Oakes Mines will remain closed until March, this decision having been reached at a recent meeting. It is believed by that time the economic situation will have improved, the problem of heating the large plant during the winter months will not have to be met.

The Lake Shore, Teck-Hughes and Kirkland Lake Gold Mines are all three making steady progress in their effort to get back to normal rate of operation. A number of the smaller properties are also getting under way, including the Canadian-Kirkland which property is under option to the Crown Reserve.

It is stated in usually well-informed circles that the firm of Hamilton S. Wills still entertains hope of being able to secure control of the property of the Orr Gold Mines. It will be recalled that the latter was for two years under option to the Kirkland-Porphyry, which company recently went into voluntary liquidation, and with which company was identified the Will's firm. Reports, therefore, are conflicting for the reason that only a few days ago it was intimated that the Teck-Hughes Mining Company appeared to have fair prospects of being able to secure the Orr.

At Boston Creek, the Miller Independence Mines announce that they will build a road from the station to the mine. The new highway is to be graded and be sixteen feet in width. It is an interesting fact that the retiring Ontario government promised to construct a road for the benefit of the mining properties in the Boston Creek district, but that such a promise will now rest with others. The neglect of the government to assist in past years in road-building in the Boston Creek district is pointed to as a glaring instance, and it is quite unfair that a private enterprise should be compelled to construct a highway which the general public makes use of.

According to an oficial statement just received, aggressive development work will be carried on at the Boston-Creek property. It is stated that eighteen men are at present employed, and that sinking operations are underway. The shaft which is down 40 feet will be continued to a depth of 100 feet. As to the diamond drill campaign, the official statement says:

"The north fractured zone is being core-drilled for the purpose of exploring the altered basalt at depth. At surface, this wide fractured zone is made up of characteristic altered basalt in which occurs numerous quartz stringers that contain calaverite as well as visible gold, the whole indicating a comparatively wide ore body."

The Sullivan and the Siscoe properties, in the Harricana River district in Northwestern Quebec, which are under option to the British Minerals Corporaton, are to be aggressively explored.

Payments have been made at regular intervals on the purchase price of the Murray-Mogridge property, and upwards of half of the total of $100,000 has now been paid. On the remainder, it is learned, an extension for one year has been secured. The company is stated to have undergone a reorganization, control having been either underwritten or purchased by New York interests. It is understood operations will be resumed this winter.

Ore and Bullion Shipments from Cobalt.

During the week ended Oct. 31st, four Cobalt companies shipped a total of nine cars containing 731,792 pounds of ore. The Buffalo, with three cars containing over a quarter of a million pounds, was the leader Following is a summary:

Shipper.	Cars.	Pounds.
Buffalo	3	263,945
Mining Corporation	3	217,156
McKinley-Darragh	2	189,309
Hudson Bay	1	61,382
Totals	9	731,792

During the corresponding period, the Nipissing was the only bullion shipper, a consignment made up of 75 bars containing 101,370.43 fine ounces having been sent out on the 29th.

The litigation in which the Bailey-Cobalt has been involved during recent years, and which appeared to have drawn to a close, took another turn a few days ago, and an appeal is being heard this week in Toronto. Provided the offer of A. J. Young is accepted, the property will merge with the Northern Customs Company, to be known as the Bailey-Northern Customs, Limited, with an authorized capital of 1,250,000 shares of the par value of $1 each, and with $50,000 working capital in the treasury. It was the intention of the new concern to commence operations this month, but the present delay may defer developments until some time in December.

Mr. Arthur Balfour, who was a member of the British Coal Commission, is now in Canada, visiting the Canadian office of the Arthur Balfour (Canada) Co., Limited. Mr. Balfour's firm is a large manufacturer of tool steel, and he is visiting Canada for the first time since the war.

Special Correspondence

BRITISH COLUMBIA.

The Metal Mines.

Cowichan, B.C.—A gold-copper prospect, located near the headwaters of the Nanaimo and Chemainus Rivers, has been inspected by Wm. M. Brewer, government mining engineer, an application has been for assistance in meeting expenditures involved in the construction of a trail to the property. Development up to the present consists chiefly in the driving of a fifty-foot tunnel. Samples have given encouraging returns, running as high as $105 a ton in values. It is understood that engineers representing the Canadian Consolidated Mining & Smelting Co. are making reports on this prospect.

There is every reason to believe that the copper deposits of Mount Sicker and Mount Brenton are to be exploited on a considerable scale. The work started by G. B. D. Turner, of Butte, Montana, who represents New York interests, is being carried out in a business like manner, a 50-foot shaft having been sunk adjacent to the old Lenora Mine. Behind Mount Brenton and north of the Chemainus river, a copper deposit has been located, which is reported to be large in extent and high in values. The company developing the latter, in connection with which are mentioned the names of A. J. Palmer, of the Victoria Lumber Company and some American capitalists, is applying for water porwer rights on the Chemainus River.

In addition to the Manganese Mine, known as Hill 60, which is being operated by the British Columbia Manganese Company, regular shipments being made to the Tacoma Smelter, Cowichan District, possesses another promising manganese deposit on Shaw Creek. It is situated at the northwestern end of Cowichan Lake and there are reports that its development is to be undertaken. The only reason that this has not been done is that it is not as accessible as Hill 60 but, with the completion of construction on the Canadian Northern Pacific Ry., Vancouver Island, this and other dormant mineral sections will be provided with transportation facilities which are expected to lead to considerable mining activity. Rails have been laid as far north as the Koksilah River, Cowichan, and grading has advanced beyond the northwestern boundary of the Cowichan District on the Nitinat River.

The Blue Grouse Mine, situated on Cowichan Lake, is a promising gold-copper proposition which, as yet, is in a state of development. Some first-class shipments have been made to the Trail Smelter of the Consolidated Mining & Smelting Company. Diamond drilling has been done with results that are said to be satisfactory although no official information is available, the work having been carried out under the Consolidated Company, which is in control.

Stump Lake District, B.C.

In the course of the last few months this section has been visited by Charles Camsell, of the Canadian Geological Survey; Mr. Weck, a mining engineer connected with the Bunker Hill and Sullivan Mining & Smelting Company, operating in the Coeur 'd Alenes, Idaho, and other mining men. Interest centered chiefly in the work of the Donohoe Mining Corporation in the unwatering of the Joshua Mine workings and the provision of the equipment necessary to place the property on a producing basis. The old Mary Reynolds Mine, on which development work has been in progress for some time under the supervision of R. R. Hedley, also was inspected. With reference to the Joshua Mine it is announced that the first mining operations will be on the 300-ft. level, water now having been cleared to a depth of 380 feet, and that shipments are expected to be made before long. As to the Mary Reynolds it is stated by Mr. Hedley that the showings are encouraging. He has made a shipment of 45 tons to the Trial Smelter and asserts that the new road to the property, in the construction of which financial assistance was tendered by the Provincial Government, has resulted in a considerable economy in the matter of transportation.

Stewart, B.C.

The survey of the proposed Government extension of the Premier Wagon Road to the Big Missouri Mine has been completed, according to James P. Suttie, who had charge of the work and has returned to Stewart. It is expected that the work will be started early next season and that it will be completed during the summer. This will facilitate the shipment of ore by such properties of the Salmon River district as the Big Missouri, Forty Nine, Unicorn and others. While there may be trial shipments from some of these properties this winter it is not thought that much ore will be sent out. The only regular shipper in the district this winter will be the Premier. It is understood that snow motors now are being built for the company and that they will arrive soon. Just how much ore it is planned to ship is not known but there is a considerable quantity on the dump. The Premier road is almost completed and when the snow comes it will be in first class condition compared with that of last year over which two shipments were made, the returns from which totalled $168,000.

A small shipment of highgrade ore has arrived at Hyder, Alaska, which is close to Stewart, from the Forty-Nine Mine. It is said to rank among the finest ore the district has produced and is expected to average $1,000 to the ton. H. Howson, who is in charge of the work, is very enthusiastic with the showing developed. The diamond drill work, now in progress, is reported to have demonstrated that the Forty-Nine is likely to become a producer of importance.

The mineral zone of the Salmon River is handicapped because of its situation. The rugged mountain range dividing Alaska from British Columbia forces the export of ore through American territory to Stewart, whence it is loaded for the smelters or concentrators. Representations have been made to the Canadian Government that a railroad be constructed to provide a ready outlet for the mineral riches of the country. The reply, it is understood, has been that it is impracticable to build such a road because, as matters stand, it would mean that a section would have to traverse American territory. Naturally, on the other hand, the American Government would be scarcely likely to undertake the work to take care of a Canadian output. Consequently the project, which is considered of first importance to prospectors and mine operators, has fallen back to the shoulders of the latter and everything possible is being done to

induce Sir Donald Mann, who is interested in the Big Missouri, and his associates to take up the task and to make a start next year. .

Alice Arm, B.C.

Shipments from the Dolly Varden Mine to the Anyox Smelter of the Granby Consolidated Mining & Smelting Company have been closely inspected by mining men at Anyox who are reported to be favorably impressed. It is felt that the Alice Arm District of British Columbia has an assured future as a mining centre. Important developments are looked for with the completion of the plans of the Taylor Mining Co. in regard to its railway which, it is understood, is to be extended to the Wolf Mine, another silver producer some distance further inland than the Dolly Varden. The railroad now is handling a limited quantity of ore daily but with additions to the rolling stock and general improvements its tonnage capacity will be materially increased.

Quesnelle, B.C.

The announcement that the Ward-Hoppe litigation at last is at an end, the Privy Council having, according to cable advices, upheld the judgment of the Supreme Court of Canada in awarding the Bullion Mine, of Cariboo, to Mr. R. T. Ward and associates has been received with interest generally and with much satisfaction throughout the Cariboo. The latter feel that this large property now perhaps will be operated and the revival of the activity of its plant, which for so long has been idle, would mean considerable to the district. This hydraulic property consists of 1,200 acres. It originally was taken up by a syndicate of C.P.R. officials, the date being 1895, among whom were Sir William Van Horne, Baron Shaughnessy, and Messrs. W. D. Matthews and E. B. Osler, of Toronto, Ont. The syndicate worked it from that date until 1916, sinking a total of $3,500,000 in opening it up and equipping it, $1,500,000 of this amount being taken out of the property itself. Apparently no dividends were declared. In 1906 the syndicate sold to the Guggenheim, who incorporated a company under the name of Cariboo Gold Mining Co. This company never worked it but spent over $500,000 in further equipment and in digging a canal for water supply. There are over 50 miles of canals on the property and a number of large dams and reservoirs. In 1913 the property was sold by the company to R. T. Ward, of California. Ten days after Ward took possession, the property was claimed by John Hopp, a local man, on the ground that under the Mineral Act it had been abandoned, as a miner's license had not been renewed.

Fernie, B.C.

That the Premier Mine, Salmon River, B.C., has been sold is the effect of a report originating in Fernie, B.C., the home of W. R. Wilson, general manager of the Crow's Nest Pass Coal Co.; Roland Wood and A. B. Trites, all of whom are interested in the property. It is stated that the control, as a result of the deal, has passed to the American Smelting Company. Messrs. Wood and Trites are in New York, where the negotiations are said to have been concluded.

The Premier is the best known mine of the Salmon River section. It was because of the exceptional returns given by a carload of ore shipped from this property last winter that the rush of this summer to Stewart, thence to the mineral region of the adjacent interior, took place. The success of the Premier led to the opening up of the Big Missouri and of other prospects which are developing favorably.

Nelson, B.C.

The Beatrice Mine, of Cambourne, B.C., is beginning to ship and it is the intention of the New Era Mines, Limited, to continue the shipment of ore while developing the property. E. Bodine, a mining engineer who has been engaged until recently in the Mount McKinley district with the United States Geological Survey, is in charge of operations. W. E. Morphy, managing director of the company, reports that on No. 2 level, from which considerable ore was taken in 1911, the face is in ore and mining work will be continued in this body all winter. Generally speaking values, as far as past experience is concerned, have run around $60 in silver, when quotations on silver were low, and approximately 34 per cent lead. Drifting is under way from the point at which No. 3 tunnel cuts the vein, with the object of coming under the ore body of No. 2, when a raise will connect the workings. Mr. Morphy says that the company is looking forward to the installation of a mill next year.

Trail, B. C.

No fewer than six new properties make their appearance in the last list of ore receipts at the Trail Smelter of the Consolidated Mining and Smelting Co. of Canada. With the exception of the Sovereign, which is one of the properties operated by Clarence Cunningham in connection with his big reduction plant at Alamo, B.C., all the new shippers are for the time being minor properties under development, and all qualify in the silver-lead-zinc category. The list includes the Freddie Lee, which is being developed by A. W. McCune, and the Ocean at Sandon, the Little Phil and the Tariff, at Ainsworth, and the Zincton in the silver-lead-zinc belt of the Sheep Creek district.

Ore receipts in gross tons for the week from October 15 to October 21, inclusive, at the Trail Smelter of the Consolidated Mining & Smelting Co. of Canada, totalled 4,157, making the aggregate for the year 270,700 tons. The black Bear, of Rossland, with 591 tons; Josie, Rossland, with 174 tons; the Mandy, Le Pas, Manitoba, with 394 tons; the Quilp, of Republic Wn., with 479 tons, were among the chief independent shippers. Of the properties owned by the company the largest contributor was the Centre Star, Rossland, which shipped 1,652 tons. The Sullivan Mine, Kimberley, B.C., the biggest shipper when in operation again was conspicuous by its absence, the strike, to which reference already has been made, being still in force and there being no signs of a settlement.

Grand Fork, B. C.

The Molly Gibson Mining Co., operating about four miles from Paulsen, have struck ore assaying from $48.50 to $125.00 a ton in the lower tunnel of their workings. There are 60 feet of stoping ground and the work of development is proceeding energetically. It is understood that steps are being taken to provide transportation facilities it being the intention to start regular shipments as soon as possible.

Ainsworth, B. C.

A number of Ainsworth miners are forming a syndicate to work a claim known as the 4th of July, situated on Coffee Creek, at a point above the Eden

and Crescent Group. Some ore is reported to be in sight and it is believed that several carloads can be shipped in a short time.

Phoenix, B. C.

O. B. Smith, general superintendent of the Granby Mines Company, has been in Phoenix with E. E. Campbell, mine superintendent at Anyox, B. C., local into the situation with a view to formulating some plan as to the future of operations in that locality. It is apparent that nothing will be done this year but it is considered likely in that district that a concentrator will be installed and mining on a limited scale re-commenced in the spring.

Republic, Wn.

All mines of Republic (Washington) Camp are reported to have closed down some days ago, as a result of a demand by the miners for an increase of $1.00 a day in wages. About 50 or 60 men are affected. Thus the same situation as prevails at Kimberley, B. C. would appear to be developing across the line.

Lightning Peak, B. C.

Favorable reports are received from the Rampolla Group of Claims which are among those which are being developed on Lightning Peak, B. C. Two tunnels have been run on the Rampolla. One is in 150 feet and at the face is in 30 inches of high class ore, which, it is estimated, will assay between 250 to 300 ounces silver. B. Cordiana, who has been in charge of this work, is said to have brought to Nelson, B. C. some of the most beautiful specimens of silver and gold seen in the district.

Camborne, B. C.

The Burniere and Nelson Mineral Claims, situated six miles from Camborne, have been taken over by what is known as the Burniere Gold Mining Company, Indianapolis. The company announces its intention to develop these properties extensively, the construction of a modern mill, which will be in operation by next mid-summer, being planned. The Burniere and Nelson Groups are on the westerly slope of Fish River, and are nine miles from the Beatrice Group, of the New Era Mining Co. It is claimed that the output of the Burniere will average $50 a ton.

THE COLLERIES.

The consumption of coal in the City of Calgary and that part of the adjacent district which has been largely dependent for its fuel and lighting on the natural gas of the area is expected to be largely increased during the coming winter. This is explained by the fact that the supply of gas appears to be failing. The pressure in the City is falling to such an extent that the City Commissioners have ordered that all buildings under their control shall be fitted to use coal with as little delay as possible for heating purposes. The reason for the recent somewhat alarming reduction of pressure is given as being the continued cold weather but the possibility of such a contingency has been foreseen by many, as more than a few of the larger buildings of the City have been changed in respect of their heating arrangements for several weeks.

What will be the effect of the general strike of bituminous coal miners in the United States on men similarly employed, and affiliated with the United Mine Works of America, in Canada? That is a question which is giving some concern to Canadian operators, as well as to the general public which is dependent to a large extent on the output of Canadian mines for their winter fuel. In District 18, U.M.W. of A., which comprises Eastern British Columbia and the Province of Alberta, the concensus at present seems to be that the United States strike will not extend to Canada. At the same time preliminary strike orders have been received by unions of District 18. Officials say that the Alberta miners are not in a mood to strike so soon after the long period of idleness resulting from the One Big Union fight and that, the majority, if ordered to leave work would be likely to refuse. In the event of matters coming to an issue it is considered possible that a movement to secede from the U.M.W. of A. would receive general support. The place of the latter, it is suggested, could be taken by a Canadian Mine Workers' Union.

There is no present indication of a coal shortage in British Columbia. Dealer of Victoria and Vancouver state that there is plenty of lump and nut coal available to meet the current domestic demands. The price of $11.50 per ton, it is thought, will stand. As to the possibility of a shortage later none will venture an opinion. The mines of Vancouver Island, however, are producing steadily and it would appear that the only problem is that of transportation.

B. C. SEPTEMBER COAL PRODUCTION.

The output of coal by British Columbia Colleries for the month of September was as follows:

Crow's Nest Pass Field.

	Tonnage
Crow's Nest Pass Coal Co., Coal Creek	32,192.
" Michel	17,400
Corbin Coal and Coke Co., Corbin	9,537
Total	59,129.

Nicola Field.

	Tonnage
Middlesboro Colleries Ltd., Middlesboro B. C. (short tons)	8383
Fleming Coal & Coke Co., Merritt B. C. (tons)	3155
Coalmont Colleries Ltd., Coalmont B. C. (tons)	1379
Total	12,917

Vancouver Island Field.

	Tonnage
Canadian Western Fuel Co., Nanaimo, B. C.	27,340
" Harewood Collieries	19,302
" Reserve "	5,453
Total	50,095
Pacific Coast Mines Ltd., Morden	5,501
British Columbia Coal Mfg. Co., Jingle Pot	3,344
Nanoose Colleries, Nanoose Bay	2,306

It will be noted that the production of the Canadion Colleries (D) Ltd. are not noted, they being unavailable at the time of writing.

Nova Scotia Notes

Production of Coal.

The output of the collieries is increasing owing to the stimulation of demand caused by the railway strike in England, the heavy demand for coal from Scandinavian countries, Holland, and all the Mediterranean ports as far as the Levant. The longshoremen's strike in New York, and now the strike of the bituminous coal-workers in the central competitive district of the United States, are added reasons for increased demand, with of course the likelihood that if the U. M. W. of A. strike is prolonged, as there seems every reason to suppose it will be, the demand for bituminous coal from Canadian sources will become very insistent. Unfortunately, the collieries in Nova Scotia are not in the best position to take advantage of the great demand for coal, as the output capacity of the collieries is much less than it was before the war. This condition exists irrespective of the still unsatisfactory condition of the working organizations, which are yet—and must continue for some time to be—unbalanced and inefficient.

The output of the Cape Breton collieries of the Dominion Coal Company during October was 280,068 tons. A comparison of October outputs over the past ten years is given below:

1910	330,494 tons	1915	408,247 tons
1911	348,062	1916	313,983
1912	422,343	1917	291,927
1913	438,272	1918	275,890
1914	368,016	1919	280,068

Compared with recent production, the October figures are encouraging, being the highest for one month since August 1918, when the output was 288,781 tons.

The Nova Scotia Steel Company's output during October was 56,507 tons. This is an increase of 4,000 tons over September production, and is the largest October output since 1915. The collieries produced severally as under:

Princess	15,320 tons
Florence	21,913
Scotia	8,184
Jubilee	11,507

Fatal Accidents.

The Mines Office at Halifax states that for the Government year ending Sept. 30th, 1919, there were 17 fatal accidents in the mines of the Dominion Coal Co. and the Scotia Co. at Sydney Mines, for a combined production of 3,542,280 tons of coal.

The Dominion Coal Co. mined during the period from Oct. 1st, 1918 to Sept. 30th, 1919, 3,037,435 tons of coal, and within that time they have had 15 fatal accidents. The Scotia Co., had mined 504,845 tons for two fatal accidents while in 1918 there was a production of 520,677 tons for seven fatal accidents.

All the fatalities in the Dominion Coal Co's mines, occurred in the Glace Bay district, Dominion and Reserve being excluded. There was not one fatal accident in Waterford. The number of mine accidents is being gradually reduced through the greater care and precaution exercised by the men and officials.

LABOR AND WAGES.

The representatives of the coal operators and the mineworkers met in Sydney on the 29th October to discuss the renewal of the wage agreement which has now expired. The men are asking for standard rates at the Nova Scotian collieries, in place of the rates which now exist. These have always varied in the several districts, owing to the differing condition of work, and to some extent because of the lesser cost of living in some localities. The U. M. W. asked that the existing minimum wage for common labour should be increased from $3.11 to $3.40 per day, and submitted the following schedule of the standard rates desired by them:—

Ordinary labor	$3.40
Lamp cabin men	3.90
Lamp cabin boys	2.86
Blacksmiths	5.02
Blacksmiths' helpers	3.34
Hoisting engineers (Coal and man engines)	4.60
Haulage engineers	4.24
Man engineers	3.76
Compressor oilers men	3.83
Compressor oilers boys	2.95
Screen engineers	3.77
Carpenters (Co. to furnish tools)	4.33
Tubmen	3.39
Electricians (left open)	4.21
Mechanics	5.07-4.79
Head firemen	4.21
Stokers and ash wheelers	3.62
Conveyor men	3.75
Pumpmen	4.64
Mason and Bricklayers	5.90-5.30
Teamsters	3.40
Box car loader operator	3.40
Boiler makers	5.07
Boiler makers' helpers	3.80
Locomotive fitters	5.07
Drill hands	3.81
Car shop men	3.54
Painters	4.11
Pipe fitters	4.50

Underground.

Ordinary labor	3.40
Shiftmen and timbermen	3.85
Drivers	3.40
Landing tender	3.87
Shaftmen (left open)	3.86
Trapper boys	2.18
Chain runners	3.87
Stablemen	3.60
Cage Bottomers (left open)	
Donkey drivers (left open)	3.34
Brake holders	3.40
Roadmakers 80 lb. rails	5.50
Roadmakers (left open)	
Mine examiners	4.50
Pick boys	3.40
Rope splicers (left open)	
Slope timbermen in pitching seams	6.00
Fan turner	3.40
Boys pushing down coal	3.40
Shot firers	4.50
Relightermen	3.40
Air Locomotive drivers	4.06
Shot firers' helpers	3.58
Boss drivers	4.00

The conference failed to reach a complete agreement, although it is stated it was marked by friendliness on either side. An official statement was issued by Mr. Charles Fergie, who acted as Chairman of the Conference, as follows:—

"At the joint conference held yesterday in the general offices of the Dominion Steel Corporation by representatives of the coal operators of the province, and the Executive of the U. M. W., the operators informed the representatives of the men that, after giving most careful consideration to the wage schedule presented by the Union, it was found that the business situation and the differences in operating conditions at the several mines in question made it impossible for them to bring the rates paid at the various mines to one common standard.

"The men were informed that the operators could not, at the present time, accept such a schedule as that presented by the Union, or pay the rates named therein. It was pointed out that many of the proposed rates are excessive, and in fact that some of them are not in existence at any of the collieries under the classification shown in the schedule as submitted to the operators.

"Mr. Fergie, in speaking for the companies, stated that they are desirous of meeting, to the extent possible, the requests of the men, and that they would consider paying a higher standard for one or two classes of the lower paid men, both on the surface and underground, provided the Union would enter into a contract agreeing that no further wage demands would be made by the men for a period of one year.

"The men's representatives informed the operators that such a condition would not be accepted by them and they stated they would not enter into an agreement covering any fixed period even after a joint consideration of their proposed schedule of rates.

"This statement, Mr. Fergie announces, compelled him to say that, in view of this unfortunate attitude on the part of the U. M. W. executive, the operators were regretfully forced to the opinion that no satisfactory aggreement appears to be possible at the moment. He added that it is hoped the men will reconsider their position on this point at an early date and so permit the continuance of efforts towards an amicable solution to this important question at an early date."

It is announced by the U. M. W. Executive that application will be made for a Board of Conciliation. Speaking to the Sydney "Post," the Secretary of the U. M. W. said:—

"I believe the fact that the United States miners are carrying on negotiations for wage increases is prolonging our case here to an indefinite length.

"We are no further ahead now than we were when the negotiations opened." The miners are now working on the old schedule of rates, the contract for which expired some weeks ago. Until some settlement is made we will of course continue working under those rates.

"One thing noticeable about our conference was the friendly spirit that existed between the representatives of the miners and the operators, but we didn't get much work done in the way of settling the dispute."

Fear has been expressed in some of the Montreal dailies that a sympathetic strike might be called in Nova Scotia by the United Mine Workers of America in aid of the strike in the central district, but there is little likelihood of this. In fact the report has been contradicted by the officials of the U. M. W. in Nova Scotia—as it has also been in Alberta— and the statement has been made that Nova Scotia will make its own decisions.

There is reason to believe that the demands now being made in the central district by the acting leaders of the U. M. W. there have been contemplated for some time, and that when the U. M. W. of America entered Nova Scotia recently, an understanding was arrived at which will prevent any sympathetic strike in Nova Scotia, as the central district does not desire to be burdened with strike payments from a district where the cessation of coal-mining could have but negligible effect on the main situation, and would at the same time be much resented in Canada.

Undersea Coal Areas in Cape Breton.

The Dominion Coal Company has announced its intention to open a mine at Bonar Head, a point lying approximately half way between Cranberry Head and the Little Bras d'Or Entrance. In choosing this site, the Dominion Company has elected to enter its undersea areas at a point where the workings of any projected colliery will abut upon and definitely limit the further extension of the workings of the Florence Colliery of the Nova Scotia Steel & Coal Company, which Company is now obtaining the greater part of the production of its Florence Colliery from a strip of coal, leased to the Dominion Coal Company, but now being mined upon by the Scotia Co., by virtue of permission granted under a provincial Order-in-Council. The bulk of the undersea leases of the Dominion Company lie between Bonar Head and Point Aconi, and the undersea territory which would be mined by a colliery located at Bonar Head is precisely the tract which is necessary to prolong the life of the Florence Colliery of the Scotia Company.

The Dominion Company has made the formal application required by the Coal Mines Regulation Act for permission to make a new undersea winning, and by doing so have raised the whole issue of the proper and workmanlike winning of the undersea leased area covered by the legislation of the Session of 1919.

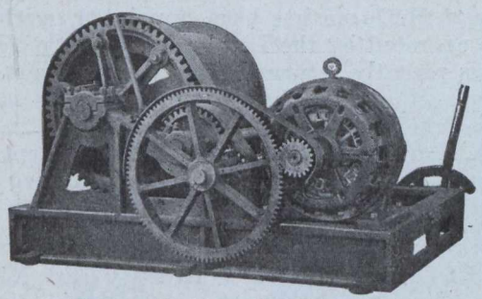
Under this legislation the Governor-in-Council is empowered to appoint a Commission to enquire "whether any worked or unworked submarine coal-mining "area now held under lease and subject to the provisions of the Mines Act, can be advantageously "worked in the best interests of the Province by some "other lessee."

The contention of the Nova Scotia Steel Company before the Legislatures at the last session was that it could work the Bonar Head territory more advantageously through the existing openings and workings of the Florence Colliery.

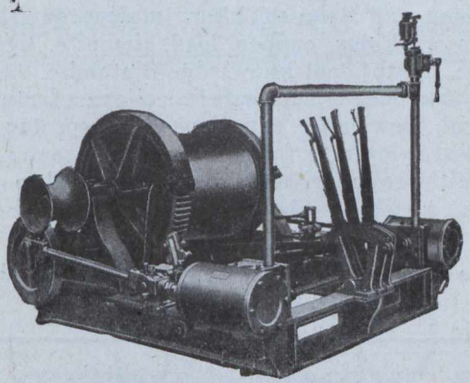
It may therefore be anticipated that before approving the plans of the Dominion Coal Company to operate from Bonar Head, the Nova Scotia Government will appoint the Commission enjoined by the legislation referred to,and will await its enquiry and report.

The legislation referred to does not affect any of the consolidated areas included in the Blanket Lease of the Dominion Coal Company, which all lie to the southwards of the Sydney Harbour entrance. The Dominion Coal Company's leases north of Sydney Harbour are not included in the Blanket Lease, having been acquired by purchase subsequent to the specification of the boundaries of the Blanket Lease under the Acts of 1893.

An exchange of anonymous correspondence is being given much prominence in the Nova Scotia newspapers, regarding the existence or non-existence of metallur-



Electrically Operated Mine Hoist.



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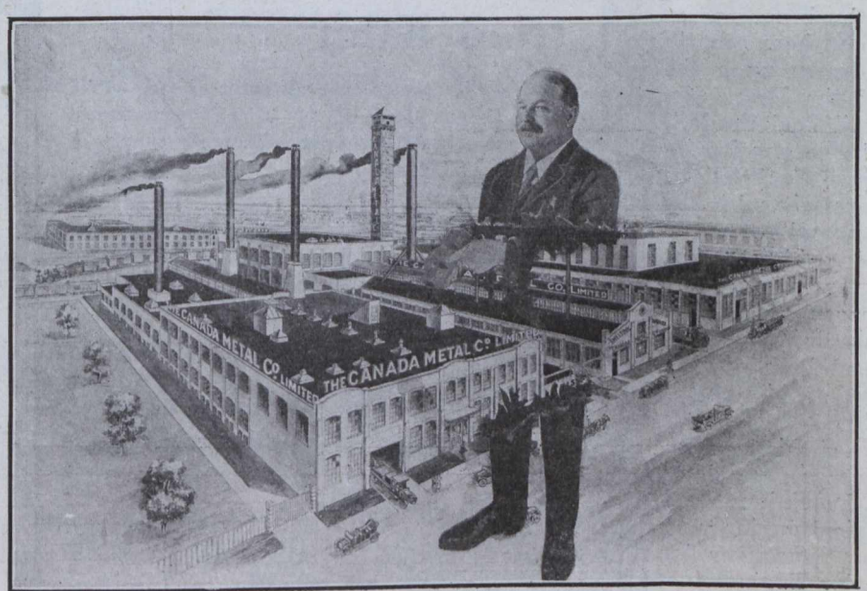

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gical coal and the thickness of the coal seams in the Bonar Head district, all of which miss the main point of the problem as it presents itself to the government of Nova Scotia. The question which the government must decide, as the owner of the coal seams, and as the guardian of the public interest therein, is not concerned with the private interests of any of the lessees of coal areas, but is solely to be determined by whether or not the existing arrangement of the undersea leases is such as will ensure the maximum extraction of coal, at the lowest cost, over the maximum period of time. These are questions that can only be decided by independent and impartial enquiry by competent engineers, and as the government is fully empowered to institute such an enquiry, the appointment of a commission seems the logical course.

The S. S. "Rosecastle" has been returned to the Dominion Coal Company by the Admiralty. This vessel made her maiden voyage to Canada in 1915, arriving at Louisburg on the day that the "Lusitania" was torpedoed. This day will be remembered by a number of the officials of the Dominion Coal Company, who indulged in an unusual holiday by going to Louisburg to meet this vessel, whose safe arrival at a time when the high seas were so unsafe, was a matter for congratulation, a feeling that was turned to something approaching consternation when on arriving back at Glace Bay they learnt of the wanton, but pregnant action of the Germans in sinking the "Lusitania" and murdering her passengers. The "Rosecastle" carries some 10,000 tons of coal. There are still two others of the Dominion Coal Company's freighters to be released.

CROSS-COUNTRY PERSONALS.

Nova Scotian, and more particularly Cape Breton readers of the 'Journal' may be interested in the following gleanings from the Western Canada Coal Review, a coal trade paper published in Winnipeg, which covers the four western provinces, and pays particular attention to the sales end of the coal business.

The contents of the latest issue show how greatly the coal industry of the West has drawn upon the men trained in the coal districts of the East. An article on "Figuring Costs in the Retail Coal Trade," promises a series of articles on coal sales accounting by Fraser Cameron, district sales manager of Coal Sellers, Ltd., Winnipeg. Mr. Cameron was formerly with the Dominion Coal Company at Glace Bay, and for many years filled the responsible position of cashier to that company. He was born in Glace Bay, and his brother was mayor of that town. Mr. Cameron must have realized that changes had taken place in his native town, when, on the occasion of a recent holiday visit to his home, a local newspaper referred to him as "a man who used to live in Glace Bay!"

Another article in the October issue of this western paper is by Mr. Frank Sawford, who was for a long time the electrical engineer of the Dominion Steel Company, and afterwards was mechanical engineer to the Canadian (D) Collieries, Ltd., of Vancouver Island. He is now a member of the Taylor Engineering Co. of Vancouver. Mr. Sawford's abilities have been generally recognized in the West.

The following items from the "Screenings" column will also appeal to Cape Breton readers.

Daniel MacCauley has been appointed mine manager with the Newcastle Coal Co., Drumheller, and Mr. Peter Murphy has been appointed overman.

Mr. Donald McAskill has been appointed overman with the Atlas Coal Co., Drumheller.

Mr. Andrew McQueen has been appointed overman at the mine operated by the Lethbridge Coal Co. Mr. McQueen has recently returned from overseas service.

Mr. Joseph MacIntyre has been appointed mine manager with the Sherness Coal Co., Sheerness.

Mr. H. A. Lovett, K.C., of Montreal, president of Coal Sellers, Ltd., recently visited the Winnipeg office.

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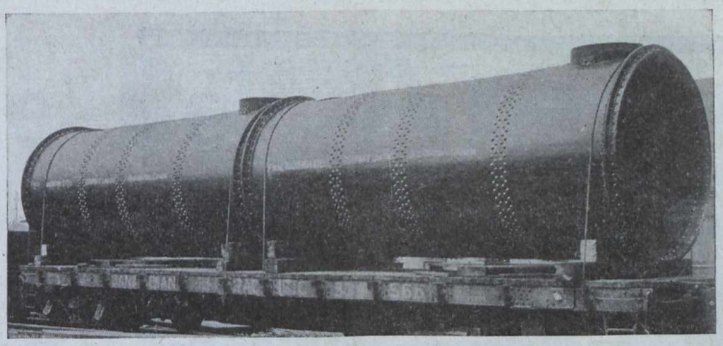

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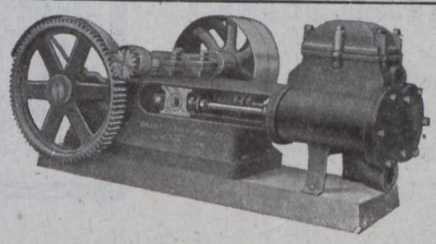

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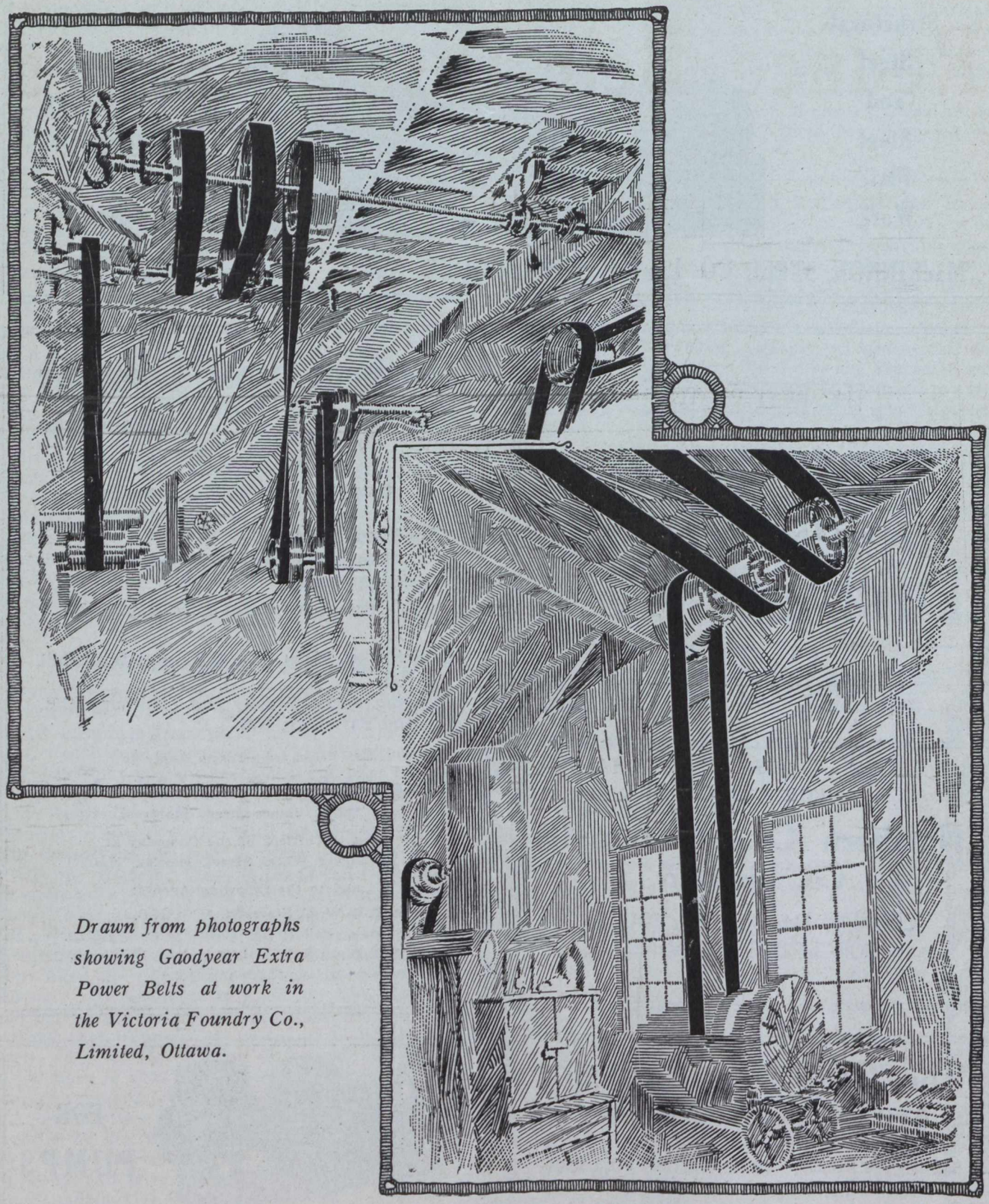

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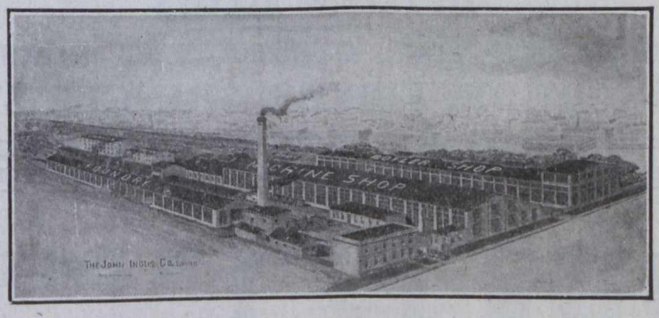

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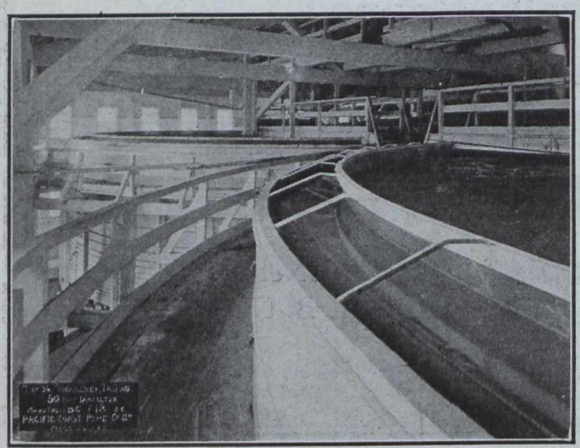

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Mussens, Limited.

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Wabi Iron Works.

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Canada Metal Co.

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Hendrick Manufacturing Co.

Arsenic White Lead:
Coniagas Reduction Co.

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Lymans, Limited
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Pennsylvania Smelting Co.
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The Wabi Iron Works.

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Babbit Metals:
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Hoyt Metal Co.

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Hardinge Conical Mill Co.

Ball Mill Linings:
Hardinge Conical Mill Co.

Belting—Leather, Rubber and Cotton:
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The Mine & Smelter Supply Co.
Northern Canada Supply Co.
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Bortz and Carbons:
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Boxes, Cable Junction:
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Brazilian Mica:
Diamond Drill Carbon Co.

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Hendrick Manufacturing Co.

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Brazilian Rock Crystal:
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Brazilian Tourmalines:
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Fraser & Chalmers of Canada, Ltd.
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Mussens, Ltd.
The Wabi Iron Works

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Canada Wire & Cable Co.
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Diamond Drill Carbon Co.

Diamond Importers:
Diamond Drill Carbon Co.

Digesters:
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Dies:
Canada Foundries & Forgings, Ltd.

Dredger Pins:
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The Electric Steel & Metals Co.
Hadfields, Limited

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Hadfields, Limited
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R. T. Gilman & Co.

Drills, Air and Hammer:
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International High Speed Steel Co., Rockawaw, N.J.
Mussens, Limited

Drill Steel Sharpeners:
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
Sullivan Machinery Co.
Canadian Rock Drill Co.
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.
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:
M. Beatty & Sons
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.
Fraser & Chalmers of Canada, Ltd.

Engines—Gas and Gasoline:
Canadian Fairbanks-Morse Co., Ltd.
Alex. Fleck
Fraser & Chalmers of Canada, Ltd.
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
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.

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

Engines—Steam:
Canadian Fairbanks-Morse Co., Ltd.
M. Beatty & Sons
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.

Engineers:
The Dorr Co.

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

Feed Water Heaters:
MacGovern & Co.

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:
M. Beatty & Sons
Canadian Foundries and Forgings, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.

Frogs:
Canadian 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:
Canadian Explosives
Northern Canada Supply Co.

Gears (Cast):
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:
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.
Hadfields, Limited
International High Speed Steel Co., Rockaway, N.J.

High Speed Steel Twist Drills:
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.

Hoists—Air, Electric and Steam:
Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Jones & Glassco
M. Beatty & Sons
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.
The Electric Steel & Metals Co.
Mussens, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
M. Beatty & Sons
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Mine & Smelter Supply Co.

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.

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.

Manganese Steel:
Canadian Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
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.

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:
International High Speed Steel Co., Rockaway, N.J.

Mining Requisites:
Canadian Steel Foundries, Ltd.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Mine Surveying Instruments:
C. L. Berger & Sons

Molybdenite:
Everitt & Co.

Monel Metal:
International Nickel Co.

Motors:
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & 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 Mond Nickel Co., Ltd.

Nickel Wire:
The Mond Nickel Co., Ltd.

Oil Analysts:
Constant, C. L. Co.

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.

Perforated Metals:
Northern Canada Supply Co.
Hendrick Mfg. Co.
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, Ltd.
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.
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.
M. Beatty & Sons
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:
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:
Mussens, Limited

Rope—Manilla and Jute:
Jones & Glassco
Northern Canada Supply Co.
Allan, Whyte & Co.

Canadian Miners' Buying Directory.—(Continued)

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

Rolls—Crushing
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
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.
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.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works

Shovels—Steam:
Canadian Foundries and Forgings, Ltd.
M. Beatty & Sons
R. T. Gilman & Co.

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:
Ltnk-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.

Steel Castings:
Canadian Brakeshoe Co., Ltd.
Canadian Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
The Wabi Iron Works

Steel Drills:
Canadian Fairbanks-Morse Co., Ltd.
Sullivan Machinery Co.
Northen Canada Supply Co.
The Electric Steel & Metals Co.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited

Steel Drums:
Smart-Turner Machine Co.

Steel—Tool:
Canadian Fairbanks-Morse Co., Ltd.
N. S. Steel & Coal Co.
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.
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

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
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

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.

TTrucks:
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.

Tube Mill Liners:
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.

Turbines—Water Wheel:
MacGovern & Co.

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

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

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

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.
Mussens, Limited
R. T. Gilman & Co.
The Wabi Iron Works

Wire:
Canada Wire & Cable Co., Ltd.
Greening, B. Wire Co.

Wire Rope:
R. T. Gilman & Co.

Wire Cloth:
Northern Canada Supply Co.
Greening, B. Wire Co.

Wire (Bars and Insulated):
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.

Wolfram Ore:
Everitt & Co.

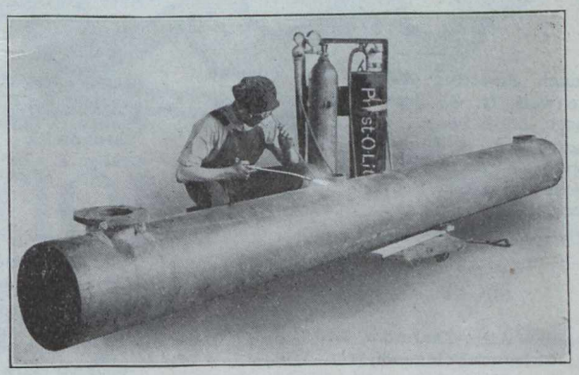
Woodworking Machinery:
Canadian Fairbanks-Morse Co., Ltd.

Zirconium:
Everitt & Co.

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

Zinc Spelter:
Canada Metal Co., Ltd.
Hoyt Metal Co., Ltd.

Oxy-Acetylene Welding and Cutting



Prest-O-Lite operator welding 6-inch nipples into steam header 14 inches in diameter

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In order to maintain the maximum production, with a corresponding high standard in the quality of the work, it is absolutely necessary that every working place should have a good working atmosphere, and that the ventilation should be so kept up with the progress of the work that the men may continue to perform their duties in health and comfort. Mechanical ventilating systems which have been designed with careful study and are now in operation have fully justified the cost of their installation, as evidenced by the increase in tons per man per shift and the decrease in cost. In mines where such a system has been carefully worked out and conditions have been standardized as much as possible, there has always been a great saving in the amount of compressed air used. In fact, in some cases the economy in this item alone has more than balanced the cost of installation.

The accompanying extract and chart are from **"Standardization of Mining Methods"** by Charles A. Mitke, Engineering and Mining Journal, Nov. 30, 1918, and answer most conclusively the question, does it pay?

He says, among other things, **"in some cases the economy in this item alone, (compressed air saving)** has more than balanced the cost of installation."

His charts of actual performances where mechanical ventilation has been installed show that after installation the output per man per shift was more than doubled; and the cost was cut to LESS THAN HALF.

Compressed air savings more than balance the cost of installation; your output is doubled; your costs cut in half. All these indicate there is something worth while investigating. SIROCCO fans are extra efficient in forcing large volumes of air through the tortuous and restricted passage-ways of the average mine.

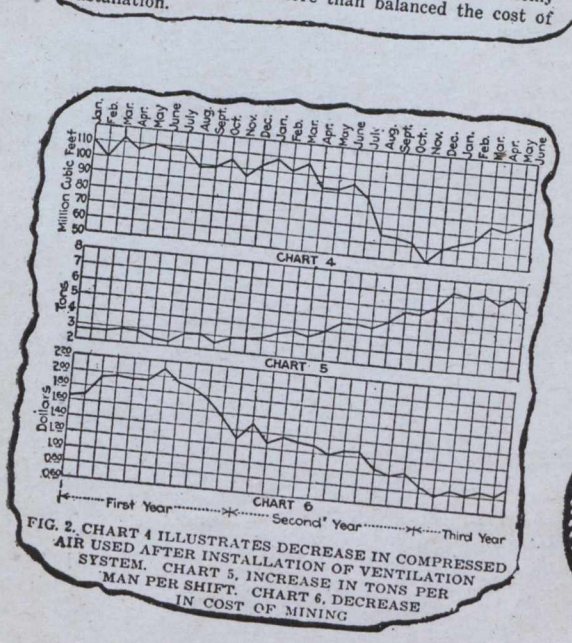
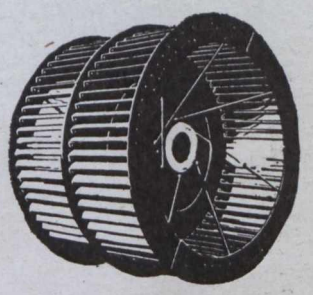


FIG. 2. CHART 4 ILLUSTRATES DECREASE IN COMPRESSED AIR USED AFTER INSTALLATION OF VENTILATION SYSTEM. CHART 5, INCREASE IN TONS PER MAN PER SHIFT. CHART 6, DECREASE IN COST OF MINING



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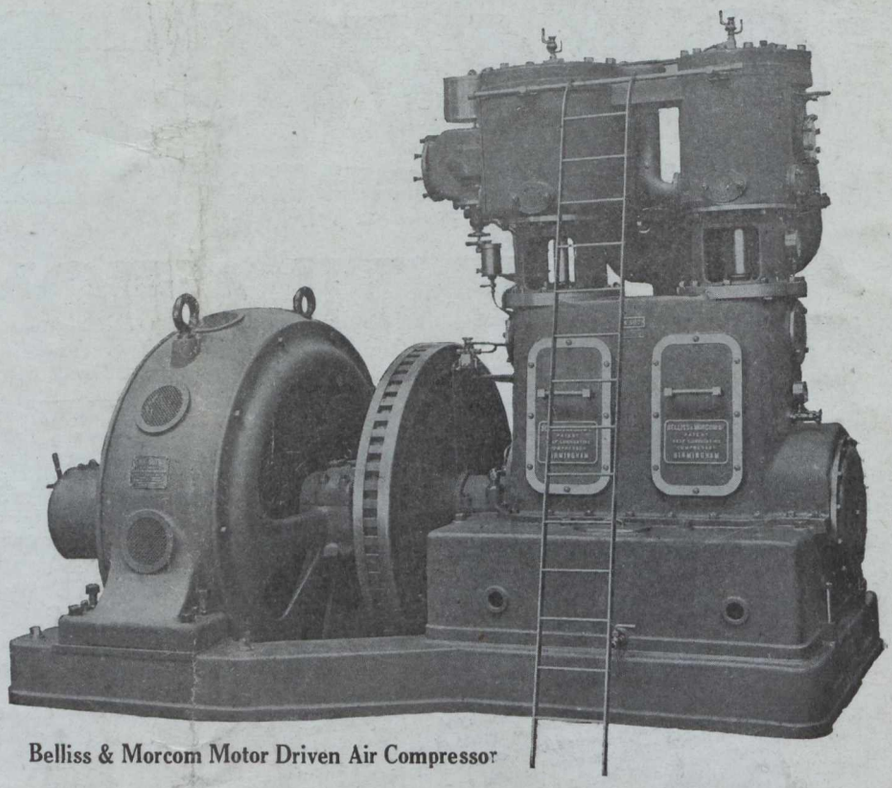
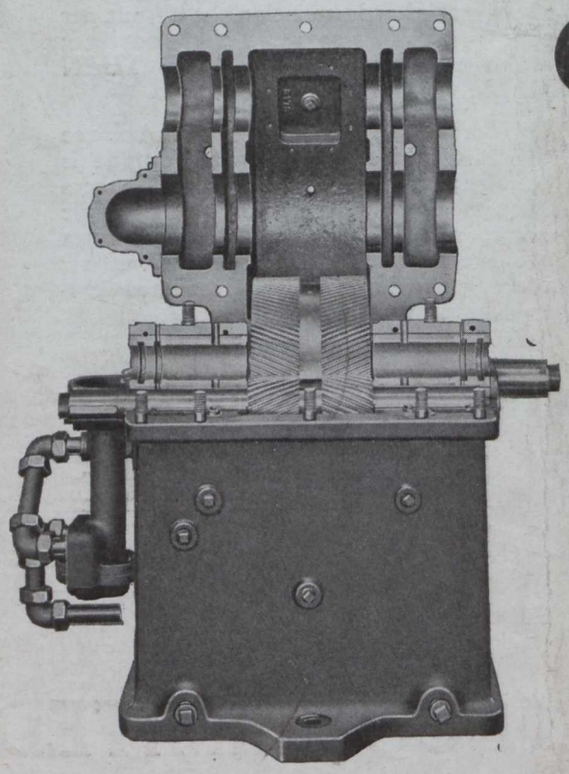


Belliss & Morcom Motor Driven Air Compressor



Horizontally Split Throughout

Cool Operation

Although determined somewhat by the efficiency of the gear, depends largely upon the design of the cooling system

THE TERRY GEAR

cooling system is very unique in that no troublesome water coils are used. There are two amply cored chambers running the entire width of the case beneath each pair of bearings. The walls of these chambers are so placed that warm oil draining from the gear teeth and bearings comes in contact with the cooled surfaces before it has the opportunity to heat the main body of oil in the reservoir. Each chamber is hydraulically tested to detect any possible water leak. Bulletin S—17 explains many other interesting features. Write for it. and

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