

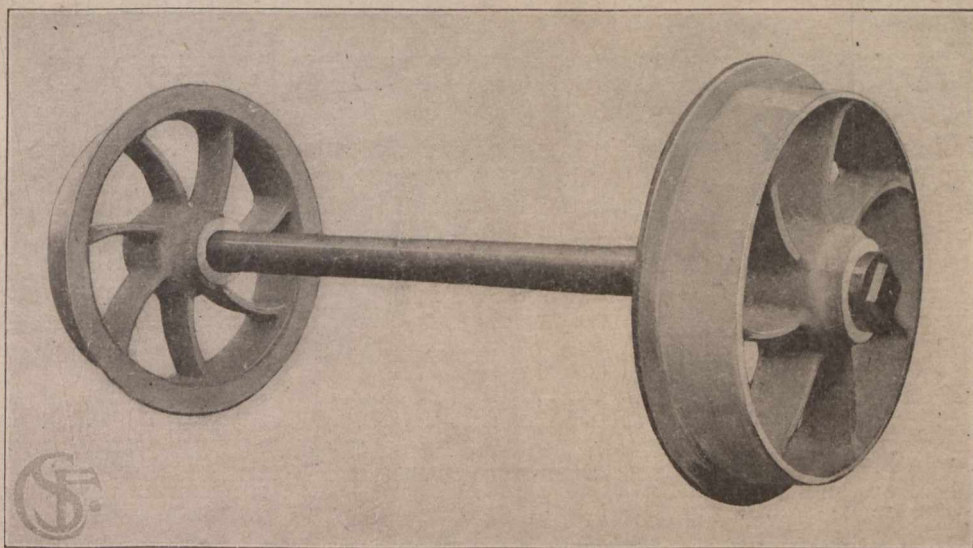
CANADIAN MINING JOURNAL

Vol. XLI.

Gardenvale, P. Q., December 31, 1920.

No. 52.

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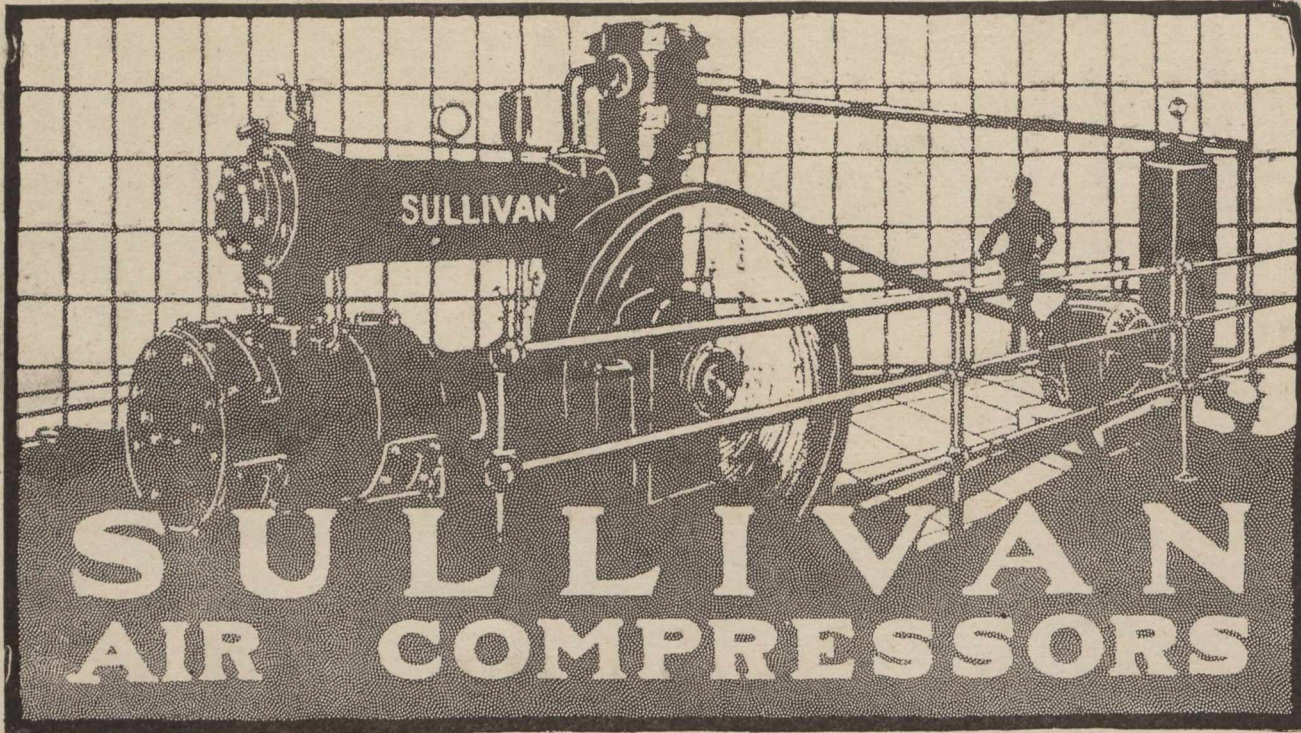


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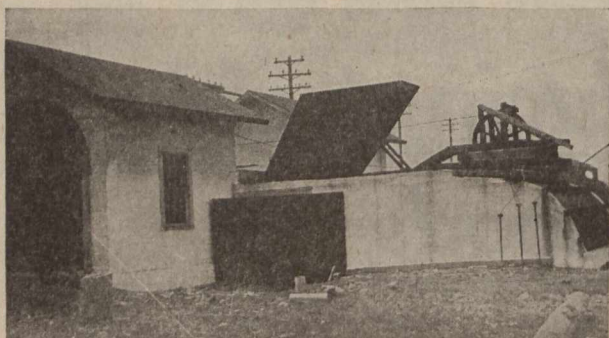
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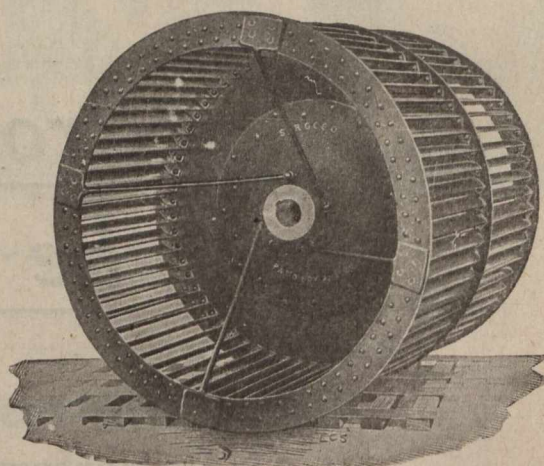
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HON. H. MILLS, Minister of Mines.

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Ontario in 1919 produced 38 per cent. of the total mineral output of Canada. Returns show the output of the mines and mineralogical works of the Province for the year 1919 to be worth \$58,583,916, of which the metallic production was \$41,590,759.

Dividends and bonuses paid to the end of 1919 amounted to \$15,545,238 for gold mining companies, and \$78,335,943 for silver mining companies, or a total of \$93,881,181.

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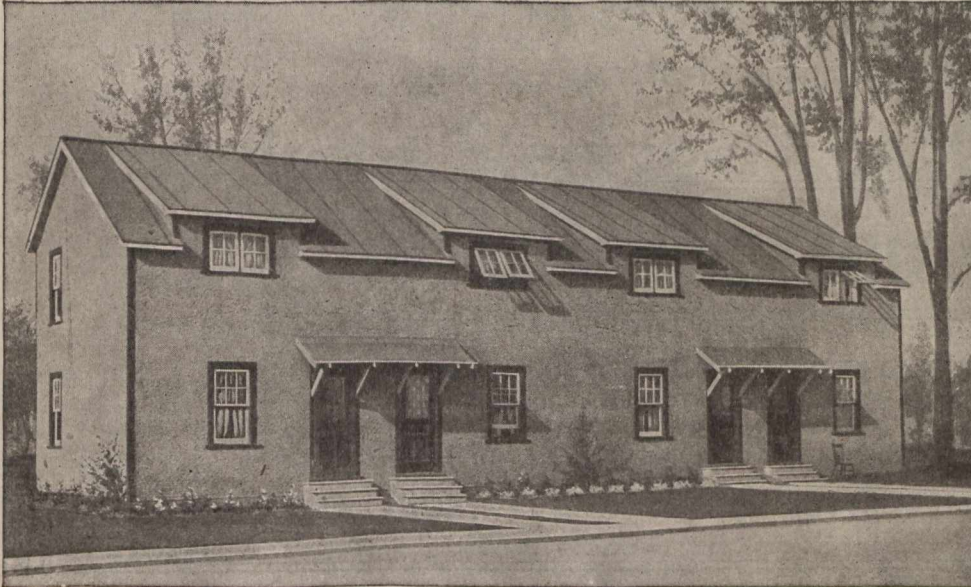
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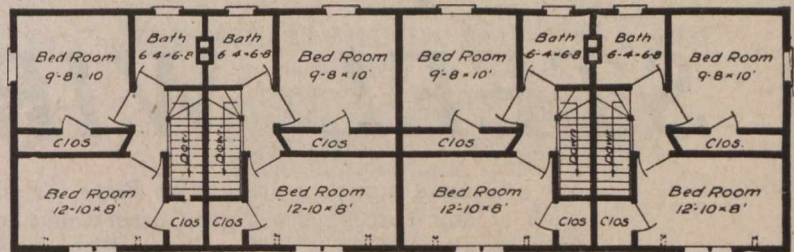


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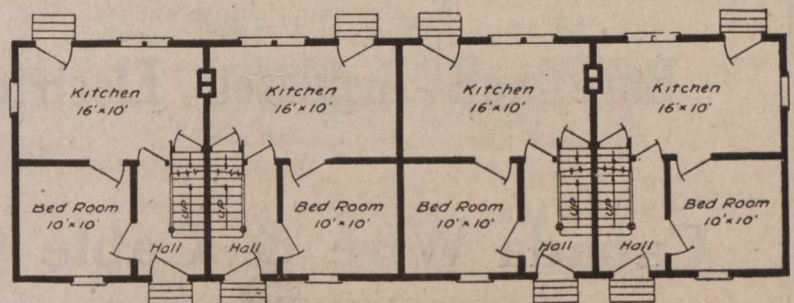
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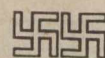
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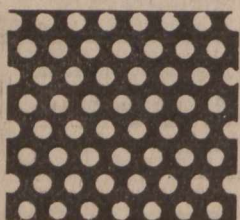
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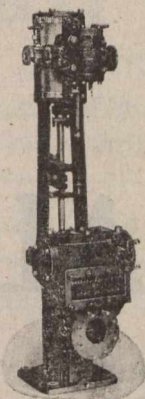
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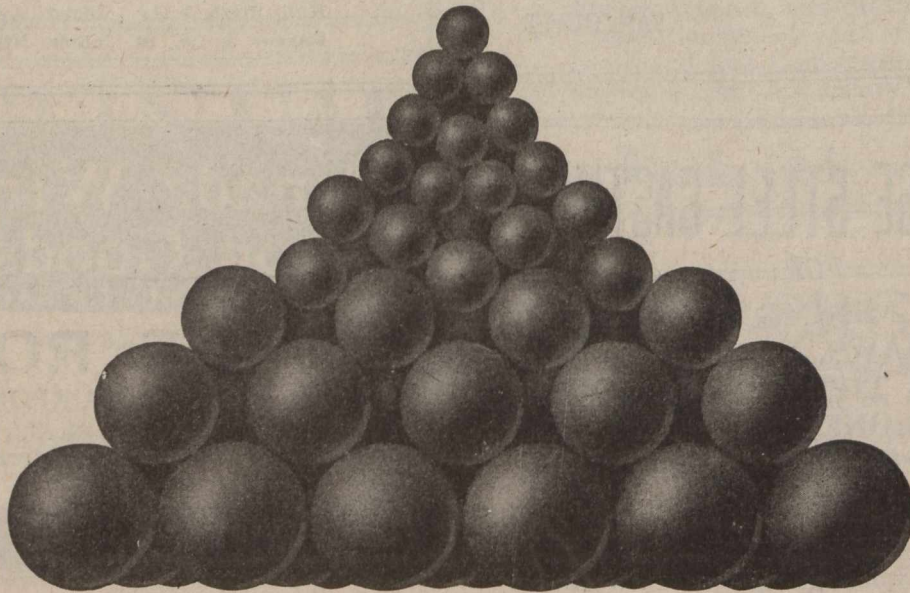
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VOL. XLI.

GARDENVALE, P.Q. December, 31, 1920

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J. J. Harpell, Managing Director.

A. S. Christie, Eastern Manager,
Room 205 Drummond Building, Montreal.
'Phone Uptown 7773.

H. W. Thompson, Western Manager,
1402 C.P.R. Building, Toronto.
'Phone Adelaide 3310.

F. E. Payson, Pacific Coast Manager,
528 Winch Building, Vancouver, B.C.
'Phone Sey. 3920.

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F. W. GRAY, M. I. Min. E., Editor,
Gardenvale, Quebec.

REGINALD E. HORE, Consulting Editor,
1403 C. P. R. Building, Toronto

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MINING OPPORTUNITIES IN MANITOBA

Mineral Areas

Approximately three-fifths of the total area of Manitoba is Pre-Cambrian. In the Pre-Cambrian of Ontario, the well-known camps of Sudbury, Cobalt and Porcupine have been developed. In Manitoba, there was but little prospecting before 1912, when the Rice Lake Camp was opened up, and the Hudson Bay Railway gave access to the mineral areas in Northern Manitoba. Attention is being directed particularly to the Pas Mineral Belt and the Rice Lake Area, but prospecting is being carried on in the Cross and Pipestone Lake Area, the Oxford Lake, Knee Lake, God's Lake and Island Lake Area, and the West Hawk Lake, Falcon Lake, Star Lake Area.

Development

Since 1915, development has been rapid in the Pas Mineral Belt. Twenty million tons of low-grade copper ore have been explored by diamond drilling at Flin Flon Lake and are now being actively developed under option. High grade copper is exported from Schist Lake to the smelter at Trail, B.C.; over seven million pounds of copper have already been realized. Other copper prospects are under development and the building of a smelter at the Flin Flon property will lead to the establishing of a large copper industry. Gold is now produced at Wekusko (Herb) Lake, and active underground development work is being carried on at Wekusko Lake, Copper Lake and in the Rice Lake District east of Lake Winnipeg.

Transportation

Transportation is available to the Rice Lake Area by steamboat from Winnipeg to the Hole River, and thence by launch and Provincial wagon road. The Copper Belt is reached from The Pas by the Ross Navigation Co's. steamboats to Sturgeon Landing, thence by wagon road and canoe. Herb Lake is reached from Mile 82 on the Hudson Bay Railway (less than one day from The Pas.)

Mining Regulations

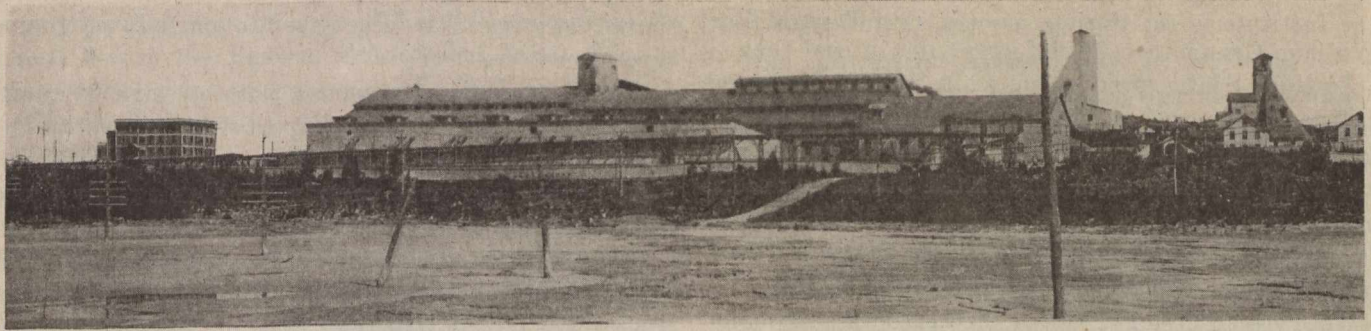
The mineral resources are under Federal control and the Federal mining regulations apply to Manitoba. No mining license is required. Work to the value of \$100.00 a year must be performed for a period of five years on claims filed under the quartz mining regulations. The office of the Mining Recorder for the Rice Lake district is in Winnipeg, and for The Pas Mineral Belt at the Pas.

Opportunities

The districts are comparatively new, and on the eve of substantial development. There are good opportunities at the present time for prospectors, mining companies, and particularly for development companies.

For maps, reports and general information, apply to—

THE COMMISSIONER OF NORTHERN MANITOBA
THE PAS, MANITOBA.



EDITORIAL

Coal Production During 1920 Highest in Canadian History

While the statistics of coal output in Canada during 1920 are only available in very approximate form, they indicate a production of between 14 and 14½ million long tons. This is a million tons larger than the record production of 1913 and the only slightly smaller production of 1918.

A recovery of almost two million tons from the disappointingly small production of 1919, and a betterment of the best previous years by a million tons, is the most unreservedly satisfactory feature of mining in Canada during 1920. Canada's coal supply has been the weakest part of her economic structure, and the most malignant menace to her national independence.

The improvement in coal production is more interesting as a psychological reflex than as an achievement in production. In the last-named regard it is indeed nothing to crack about, the actual production being disproportionately small compared with the country's ability to produce coal. As an index to the general attitude of Canada towards coal supply it has much interest because it indicates the inculcation of a coal conscience in our population.

Canada has had some broad hints in regard to her coal insufficiency. Periodic panics reflected in coal selling prices, fuel controllerships, rationing of coal, official appeals to Washington, cavillings and heart-burnings, ill-considered restrictions on coal exports may be mentioned, but probably the broadest hint is a nineteen percent discount on the Canadian dollar in New York, to which our importations—quite unnecessary importations—of coal are a major contributory cause.

In the period from 1914 to 1920, seven years, Canada produced from her own mines twenty million tons less than their capacity, and by doing so increased her adverse trade balance by two hundred million dollars, and greatly increased the price of coal to the consumer in the Dominion.

The war and its aftermath has had a revealing effect upon the regional use and distribution of Canadian

coals. When Sir George Foster called his first coal conference in 1917 it was amusingly plain that the use of western coal was regarded by western people as a temerarious experiment, and it was a little difficult for the men who came from the bituminous coal-fields of British Columbia and Nova Scotia to understand the trepidation with which the use of bituminous coal for domestic purposes was regarded by those who had learned to depend utterly upon anthracite as a domestic fuel. The recent meeting of the Canadian Institute of Mining and Metallurgy disclosed the gratifying fact that in Winnipeg and district in 1920 no less than eighty percent of the fuel requirements were being supplied from the western mines. The extension of the radius of consumption of western coal during 1920 was so great, and so contradictory of some previously held opinions that it is fair to assume the ultimate radius of distribution and use of western coal has not been reached.

In reviewing the outputs of the three main coal districts of Canada, namely, British Columbia, the Prairie Provinces and the Maritime Provinces, it is evident that Alberta's contribution is chiefly to be thanked for the good showing of 1920, and it is further evident that Alberta has now definitely assumed the lead in coal production among the provinces.

There is one serious drawback to Alberta coal mining, as now practised, namely, a too great preponderance of small mines. The waste of capital, the over-extension of supervision and corporate organizations, the spoiling of the coal areas by letting in water and making many holes in the cover, and the general uneconomy of such methods is strikingly reminiscent of Nova Scotia before the formation of the Dominion Coal Company. It is evident that Alberta is passing through a formative period in regard to its coal trade, and that before really important progress can be made it will be necessary for the coal areas to get into the hands of large companies.

We believe the record of the western coal trade in 1920 is definite confirmation of a statement tentatively

put forward by the Editor at the Toronto Meeting of the Institute in the Spring, namely, that West of Fort William, Canada can be self-supplying in coal fuel.

In Nova Scotia, production, while notably improved, still lags some two million tons below the output capacity of 1913, and as yet the St. Lawrence markets are being supplied from the United States. It seems a reasonable ambition for the coal trade in Nova Scotia to supply all the coal required by the Maritime Provinces, Quebec, and a portion of Eastern Ontario.

The cost of living in Canada, the success of manufactures, the movement of crops and the markets of the farmers, the rate of exchange and the general freedom of our national functions depend more upon the tonnage of bituminous coal available and its selling price than upon any other economic fact. If the large users of coal, and the government of Canada, ever undertook to study the prime importance of coal, solicitude and fostering care would supersede the traditional neglect that has been the fate of the coal industry in Canada since its dawning in the early years of last century. We have a coal industry in Canada that antedates the discovery that anthracite would burn. Canada exported coal when Chicago was a swamp, and before the Mississippi had been mapped. During all that period we have looked to the United States for coal supply first, and to Canadian coal mines have given secondary and contemptuous consideration.

If the 1920 figures indicate a new attitude towards coal mining in the Dominion it will also indicate that Canada intends to write a new and better industrial record than that of the past.

DEPRESSION IN THE CANADIAN STEEL TRADE.

The Steel trade in Canada is badly depressed as the year closes. This is particularly so in regard to pig-iron and steel ingot production. In the fabrication trades, such as the car-works, structural steel mills, foundries, etc., the depression is not so marked. The lowering of steel prices in the United States, and the better transportation service now being given by the railways, has rather tended to assist the secondary iron and steel industries in Canada, but it is having a very different effect on primary steel and iron producers in the Dominion.

The blast-furnace and open-hearths of the Nova Scotia Steel and Coal Company at Sydney Mines are closed down. At Sydney, only one blast furnace is operating, and while some hindrance to operations proceeds from the strike of the railwaymen on the Steel Plant, the lack of orders is actually the major cause of the slackness of work. The Plate Mill is working to finish up some orders of small dimensions, and there is a prospect of rail orders, but the outlook for business is not good.

The Welland Works of the Electric Steel & Metals Company has definitely ceased operations. The Steel

Company of Canada, and the Algoma Steel Company have both found it necessary to curtail producing operations drastically.

The shipbuilding companies, with one or two exceptions, have no business in prospect when present orders are filled, and those shipbuilding yards that possessed least of the elements of permanence have already closed down or gone into liquidation.

The condition of affairs is very similar to that which existed in the coal trade in the Spring of 1919. At that time there was an apparent lack of demand, but actually there was a world shortage of coal. The lack of demand for steel today does not arise from over-production, but from purchasing inability, and also, to a very large extent, is attributable to an abstention from buying by large users of steel on this continent in expectation of lower prices. In Europe two factors are working together to present an appearance of over-production which is essentially misleading. These are the recovery of the steel producing capacity of Germany and Belgium, and the poverty of Europe generally. Actually, we believe, the world is very very short of steel of all descriptions, and is especially short of steel railway rails.

So far as America is concerned, the long-continued cessation of immigration, and the measures now being taken to restrict immigration — which we believe will be later regarded as ill-advised and the result of immature consideration — are likely to act as restraints on production, which, added to the losses in population which the world has suffered in recent years, by war, famine, pestilence and the decrease of the birth-rate, will before long manifest itself in unmistakable fashion. The fact that there has been a large drop in the prices, and in the demand for such things as wheat, sugar, steel and cotton, does not do away with the fact that the world is lacking a full supply of these commodities, and that the hands to produce these supplies in the near future are lacking, because some are dead and others will not be born.

When the steel market revives, it will do so with over-night suddenness, and the demand will be found to be insistent and large and requiring a long period of time to satisfy.

THE COMING ACTIVITIES OF THE CANADIAN INSTITUTE OF MINING & METALLURGY.

During the next few months the Canadian Institute of Mining and Metallurgy has a programme of great activity. When the meetings in prospect are over, and the meeting of October 25th in Winnipeg is included, it will be apparent that the Institute can justly claim to cover Canada thoroughly and representatively. At Winnipeg, the Institute was officially welcomed by the Attorney-General on behalf of the Premier of Manitoba, and in the deliberations of the Meeting, it was found that the Institute provided an influential and respected medium through which the needs of the

newly-born mining industry of Manitoba could put its needs before the Federal Government—and, what is more to the point—get them attended to.

The Annual General Meeting of the Institute is to be held in Ottawa, and, has been usual in former meetings in the Dominion Capital, the presence of the members of the Institute there will doubtless receive official cognisance. While no programme of the Ottawa meeting is yet available, the efficiency of the Ottawa Branch is traditional, and with the presence of loyal and long-trying supporters of the Institute in high places there, the members will look forward to the Ottawa gathering with pleasurable anticipation.

The Mining Society of Nova Scotia intends to hold its Annual Meeting in Halifax, probably in April, and it is the desire of the members of the Mining Society, who are also members of the Institute, to have the Halifax Meeting looked upon as the Eastern Meeting of the Institute; as the Vancouver Meeting was regarded as the Western Meeting, and as the Winnipeg Meeting served to display the banner of the Institute in the midst of the embattled farmers in the Middle West—first cousins of the miner and sons of the soil like the miner, with some of the miner's little peculiarities of clannishness.

Halifax is the seat of government in Nova Scotia, one of the oldest Capitals of the Dominion, and since the Canadian Mining Institute—as it was then—held a memorable and festive function in that City, much has happened. Halifax is no longer somnolent, and should it ever occur to anyone to write a true account of Halifax's wartime experiences, there would be in that volume much to astonish and much to enthuse the people of Canada. The Mining Society of Nova Scotia was moved from Halifax in 1914, and no meeting has since been held in that City. The interval has been longer than was intended, but this has partly been due to the war. It is quite certain that Halifax will welcome the idea of holding an Eastern Meeting of the Institute in Canada, and that the Local Government will join in that welcome.

The last annual meeting of the Mining Society of Nova Scotia, held in Glace Bay, was marked by technical papers of unusual excellence, papers that were re-produced in the mining journals of the whole world, and added not only to the excellence of the Annual Transactions of the Institute, but gave it wide advertisement. Papers of equal excellence may be looked for at the next meeting, and it is hoped by the Council of the Mining Society of Nova Scotia that a large attendance of Institute members and officers will be present from Montreal, Ottawa and Toronto.

An Institute that can within half a year compass successful meetings attended by representative mining men in the Far West, the Middle West, Ottawa and the Far East of Canada, and hope to receive the official welcome of the government at each centre, is justified in its existence, in pride in its achievements and in desire to still further extend its influence and widen

its membership.

This statement perhaps may be objected to as slightly previous and as assuming that the Ottawa and Halifax Meetings of the Institute will be entirely successful. We will, however, persist in venturing the assumption.

SCIENTIFIC HONORS.

It is traditional in learned and technical societies of national repute and long standing to award medals and other insignia of honor to members who have distinguished themselves in professional duties or have added some notable contribution to technical literature. The Canadian Mining Institute has not as yet considered itself in a position to make such awards, but possibly the time has arrived when their institution should be considered. The members of the Institute include some wealthy men, and include also men of sufficient technical distinction to enable discriminating adjudication of such awards were they available. We commend this suggestion to the consideration of those members of the Institute who have found mining lucrative and wish to leave a permanent memorial of their membership.

When titular honors are denied to scientific achievement by our legislators, who apparently are unable to distinguish between achievement and notoriety, some mark of appreciation should be available by which scientists and technologists in Canada can be honored at home. There are men living and moving amongst us today whose names will be spoken by our children as we speak of Logan and Dawson, of Van Horne and Strathcona, but the country that bore them does not know their fame.

NEW SECRETARY FOR THE INSTITUTE.

The "Journal" learns unofficially that Mr. Geo. C. Mackenzie, formerly Secretary of the Munitions Resources Commission at Ottawa, and up till recently President of the Electric Steel & Metals Company of Welland, Ont., has been appointed Secretary of the Canadian Institute of Mining & Metallurgy, and will commence his duties at headquarters in Montreal with the week beginning the 3rd January.

The "Journal" believes Mr. Mackenzie to be admirably fitted for the position he has taken. His task is not an easy one, but it will have the inspiration of being one of over-growing importance and prestige. It will not be possible to suit everybody in the Institute. That would test the capacity of a sublimated archangel, but the members individually and as a whole are loyal hard-working men who have traditionally supported the Secretary, their differences of opinion arising from a common desire to make the Institute larger in numbers and more successful in its policies.

We tender our good wishes to the new Secretary,

and shall be happy to assist the progress of the Institute by every means that is open to us. Mr. Mackenzie is just in time to engage in a very busy six months, as we have elsewhere noted.

PROTECTIVE TARIFF AND THE COST OF LIVING.

The Freetrader affirms that tariffs on imported manufactured goods restrict the growth of primary industries by raising the costs of livelihood of the workers.

Put in another way, the argument is that the whole evil of import tariffs resides in the high rate of wages necessitated by the tariff impost, which forbids the full use of labor in the production of basic raw materials. This is to predicate that the first desideratum for the production of such commodities as wheat, potatoes, coal and iron-ore is cheap labor.

Actually, however, it is not the cheapness of labor, but its abundance and its quality that determines the cost of producing primary materials. Relative to the United States, we have always had cheap labor in Canada, but the condition has not been one that advanced our productivity as a nation, but the reverse, for the higher wages paid in the United States have for generations drained Canada of its young people, and have diverted year after year the tide of European emigration to the country of our neighbors. Now whether the high wages paid in the United States were and are a result of protective tariffs there may be much debate, but high wages and protection have endured so long together in the United States that they are inseparable in the public mind. So ingrained is this sentiment that any proposal to reduce import tariffs on manufactured goods is regarded as a threat against wages and employment—and, apart from effect of specific action to reduce import tariff—the psychological effect on a working population is to induce alarm and a desire to leave a threatened territory. In some respects it may even be that this state of mind brings about the very effects that are dreaded, but, whether this be so or not, tariff charges are unsettling, and not lightly to be courted.

While the effect of high wages may be negated by high living costs, there is nevertheless a decided satisfaction in the receipt of a high wage, for its usual accompaniment is a more luxurious standard of living. This is a feature that should not be overlooked by a country that is in the market for labor.

In Canada, at any time when protective tariffs have been at their highest, they never reached the point of effectiveness in raising living costs, and thereby necessitating high remuneration of labor, that the causes arising out of the war have done. If import tariffs have had any real effect on living costs and

wages during the past few years, that effect has been in the direction of lowering prices by American importers in an attempt to offset the influence of the heavy discount on Canadian funds in New York. The discount on our dollar has been a much more potent deterrent to imports into Canada from the United States than any item on our tariff schedule. Similarly no import tariff of any outside country has been such a deterrent to Canadian exports as the existing discount of all other currencies in favor of Canada—with the sole exception of the United States. There is no doubt about the demand for Canadian goods, but the drawback is the price that we ask for exported goods. Are we to lower our import tariffs with the expectation that by reason of consequent lowered living costs we shall be able to compete in European markets?

Such a course might be suggested, were it not that the economic weight of the United States would find no barrier against it in Canada, and—except in those few instances where a superior combination of location and materials in Canada dictated an opposite course, manufacturing in North America would concentrate around the great central coalfield of the United States.

The policy of protective tariffs in Canada has been adopted to help out our national deficiencies. As a nation Canadians have been the victims of hypnotism arising from constant iteration of the vastness of our natural resources, but, compared with the country of the United States, Canada presents vast extents which are chiefly remarkable for the paucity of their natural resources. Canada's problem consists in the intensification of the utilisation of domestic resources of inferior grade and difficult location, in competition with resources of the United States which are ideally located and of excellent grade, and the chief compulsion to adopt protective tariffs in Canada comes from the necessity to offset the economic deficiencies under which we labor in the attempt to perpetuate and consolidate our political independence in North America.

To be quite frank about this matter, is it not fairly evident that Canada can only avoid political absorption by the United States by achieving economic independence? There is no question of annexation sentiment, emanating from one side or the other, implied in this statement. It is a statement of the inexorable trend of economic conditions, which always gives political power to those nations that possess (or utilise, which is an equivalent thing) essential raw materials.

Our problem, therefore, is to maintain high wages in Canada, a high standard of living, and that extent of tariff protection that shall put us in the best bargaining position, and shall best avail to protect Canadian nationality and Canadian political independence. If tariffs should cause high living costs and high wages is that—for Canada—essentially an evil thing?

From "Iron & Steel of Canada".

Coal Mining in Nova Scotia During 1920

(By the Editor)

Last year's review of the coal trade of Nova Scotia (issue Jan. 7th 1920), forecasted that with uninterrupted work and no major accidents or delays, the output of coal in 1920 might reach 5,750,000 or even 6,000,000 tons. The year has seen no material interruptions to steady work, and has fortunately been free from disasters, yet the output will probably not be found to exceed 5,600,000 tons. The reason why production has not been greater is to be found in the still continuing shortage—or lessened number—of men employed in cutting coal at the working face. The number of men employed in the non-productive and auxiliary operations of handling the coal to pit-mouth and preparing it for market, and on the surface, is in excess of the number required to give an economical balancing of the working forces as a whole.

A calculation of the number of men employed in 1916 at the coal face, and the number now so employed, would disclose that the percentage of reduction in output is identical with the percentage of reduction in the number of faceworkers. Until the number of faceworkers is restored to the figures of 1916 it will be found impossible to restore production to the previous maximum. The questions of the provision of equipment, or of the condition of the existing equipment, does not bear on production in Nova Scotia, as in all cases the equipment is greater and better than it has ever been, and at no time during the year has any difficulty ever been experienced in taking away all the coal that could be produced by the workers at the coal face.

The question of pit-room is probably not quite so satisfactory, as the continued and unrelieved shortage of faceworkers since 1916 has restricted the amount of development work. It is an axiom in coal-mining that arrears of development work can only be overtaken with great difficulty, if at all.

The year 1920, has however been quite remarkable for the amount of underground development, and for the work done in testing virgin seams, both by drilling and by surface openings and prospect pits. The knowledge of the coal operators of their areas is probably wider and more accurate at the end of 1920 than at any previous time, particularly in regard to submarine workings. The course of certain undersea disturbances, and the "lay" of the submarine coal seams is more accurately known now than ever before. It is understood that the Geological Survey has detailed a paleontologist to study the fossils of the Sydney district, and that some microscopic examination of the coal seams is contemplated. Some work on topography is also likely to be undertaken, supplementing that done by Dr. A. O. Hayes before he left the service of the Survey. There is probably not in all Canada an industrial area of such importance as the Sydney coal-field that has received less attention in recent years from the Geological Survey. A thorough topographical survey, accompanied by much-needed revision of the geological sheets, on a scale as elaborate as that of the Nanaimo, Vancouver Island, sheets, would be of much assistance to the mining engineers in Nova Scotia, and is years overdue. A new topographical sheet of the Pictou district was issued by the Geological Survey during the year, and has proved very welcome.

The Government of Alberta, through the staff of the University of Edmonton, is undertaking a comprehensive study of the origin and occurrence of the Alberta coals and of their combustion qualities. Some of the best equipped scientists in Canada have been retained by Alberta for this work, and it is not without interest to Nova Scotia to know that one or two of these gentlemen obtained their initial coal experience there.

Trend of Production.

The trend of production is shown by the table following :

	Output (Long tons)	Percentage of decline from 1913	Percentage of Cape Breton Production
1913	7,263,485	81½%
1914	6,650,031	8½%	81½%
1915	6,709,951	7½%	82½%
1916	6,171,434	15%	81½%
1917	5,665,477	22%	77%
1918	5,211,000	28%	77%
1919	5,160,000	29%	75%
1920	5,600,000 est.	23%	75%

This table discloses that a definite upturn in production is under way, and that the shortage of skilled miners, so often referred to, in this and previous annual reviews, has chiefly affected Cape Breton Island.

The production of the leading operators, with a rough approximation of the aggregate output of the smaller companies which probably errs on the conservative side, compares with 1919 as under:

	1919	1920
	(Long Tons)	
Dominion Coal Company		
Cape Breton Collieries	3,087,638	3,250,000
Springhill Mines	393,441	420,000
Nova Scotia Steel & Coal Co.	552,044	625,000
Acadia Coal Company	407,326	502,000
Intercolonial Coal Mining Co.	184,417	160,000
Inverness Railway & Collieries	138,388	186,000
Other Operators	395,749	457,000
	5,160,000	5,600,000

Dominion Coal Company.

As was pointed out in the 1919 Review, the Dominion Coal Company's Cape Breton production has suffered not only from a greater disturbance of the balance of the working force than any other company experienced—arising from the large number of men that enlisted from Cape Breton Island—but the shortage of miners has coincided with an impairment of the capacity of the mines for output that was known to be impending in 1913, but which the conditions of the war period did not permit to be offset by the necessary new undertakings. When men were available in 1914 and 1915, expenditures could not be undertaken because of trade depression; and later, when money was available, men were not, and deliveries of machinery and construction materials had to defer to munitions priorities.

During the past two years, however, the Dominion Coal Company has accomplished many improvements, some of which are as follows. The underground haulage and pumping systems of No. 2 and 9 collieries have

been remodelled, electrically operated endless haulages having been substituted for a rather clumsy combination of compressed-air locomotives and several auxiliary haulages that necessitated many shifts of the load. Concentration and electrification of the pumping arrangements has also been completed.

A new shaft is being sunk between Nos. 1 and 2 collieries, close to the shore, which will serve as an intermediary shaft for the winning of the Phalen Seam in this vicinity and seawards, and will also materially shorten the distances that the workmen have to walk to work. Centralized pumping operations are also projected in this area.

A new colliery on the Emery Seam, No. 24, has been developed during the year and is now producing between 300 and 400 tons daily. No 17 Colliery has also become a producer during 1920, although partially developed and equipped in 1914.

Additional openings are understood to be projected upon the lower seams in the land area of the Glace Bay district during 1921.

The Morien shafts were unwatered, and some machinery installed there, but intensive development of this property which has large tributary sea areas—has been deferred. Production from the Cape Breton collieries is now close upon 300,000 tons monthly, and it is probable that the output in 1921 may reach 3,750,000 tons.

Nova Scotia Steel & Coal Company.

A satisfactory recovery in outputs was made by the Scotia collieries in 1920, and production is now at the rate of 60,000 tons monthly. A new colliery is being opened in the Bonar Point district that is expected to be a substantial producer in the Spring of 1921. Very satisfactory results are understood to have been obtained from the testing operations on the Stubbart Seam in the Point Aconi district.

It is possible that this Company may increase its production in 1921 almost to the pre-war figure of 750,000 tons.

Other Cape Breton Companies.

The Hiawatha Mine, in the Morien District, at False Bay Beach is a new producer, under the direction of Messrs. V. McFadden and Cavvichi. It is understood this property may put out up to 300 tons a day by the Spring.

The Indian Cove Coal Co. (which is the successor of the Sydney Coal Co. has developed an output which will exceed 57,000 tons in 1920, comparing with an average for many previous years of about 5,000 tons annually.

The Inverness Railway & Collieries Ltd., shows a marked improvement over the figures of 1919. A new seam, overlying the Seven Foot seam that has been very extensively worked seawards, has been proven, and, should trade conditions be favorable, a still further increase in outputs may be looked for in 1920.

Other small companies operating include the Anglo Company at New Campbellton, the Bras d'Or Coal Co. near North Sydney, and a small mine operated by Glace Bay interests in the same neighborhood, all of which show larger production than in 1919.

Mainland Collieries.

The Acadia Coal Company has achieved, relatively to its position, the most substantial increase in coal output of any Nova Scotia Company. This Company, which is now controlled by the Scotia Company, is mining coal from ten separate mines. Technically, its

management is of unusual excellence, and the property, which is potentially one of the best in Nova Scotia, is doing very well, and should do better, with fair luck. The writer forecasted a year ago that Acadia might reach the output of 1913, namely, 539,000 tons, and it has not fallen far short of this estimate.

The Acadia Coal has acquired the mine of the Milford Mining Company at Thorburn, near New Glasgow.

As was also noted last year, the Springhill Mines in 1919 had the unique distinction of producing more than they did in 1913, but 1920 figures have bettered by 30,000 tons. A possible production of 450,000 tons in 1920 was forecasted, but production suffered from some heavy roof-falls in the main slope of the most important mine at Springhill. Even with this drawback the 1920 output at Springhill is the best since 1908.

The Export Embargo.

A reminder of the supreme importance of the coal mines of Nova Scotia to eastern Canada was given during the Summer by the unwelcome imposition of an embargo on coal export from Nova Scotia, other than to Newfoundland and the United States. It appears to occur to Ottawa every little while that the coal mines of Nova Scotia are the only ones between the Atlantic and the Middle West, a distance of 1,900 miles, constituting Canada's sole source of coal supply in six provinces, but so far governmental solicitude for the coal production of Nova Scotia has been expressed in terms of price restriction and control of distribution.

The embargo on export coal was not well conceived, and particularly in the case of the small operators, it deterred them from undertaking expenditures to develop output. What the coal industry of Nova Scotia needs is definite encouragement, and guarantees from government-directed enterprises that a policy of using Canadian coal, to the point of maximum avoidance of the use of imported coal, will be followed. If such guarantees are not now given, the rectitude of government interference in times of scarcity can not be upheld, and, so long as government and public utilities in Canada do not use Canadian coal when it is available, no platform of national protection can be anything but a hollow sham. The government can not with propriety advise the public to buy and produce at home should it continue to buy—as was done in the past—United States coal because it was cheaper than Canadian. The world has lately learned that "cheapness" is not a condition that can be expressed in currency values. There are very few things that are "cheap" if bought abroad, when home production is possible, and coal is most assuredly one of those commodities that is dear at any price if brought from the outside, and cheap at any price, if produced in preference at home.

St. Lawrence Market.

The resumption of St. Lawrence shipments that was anticipated in last year's review did not materialise, and, despite the export embargo only a negligible quantity of Nova Scotia coal was shipped to Montreal and St. Lawrence ports. In 1921, it is quite probable that a substantial beginning towards a restoration of this temporarily lost market will be attempted. The former customers of Nova Scotia coal companies are anxiously awaiting the re-appearance of Nova Scotia coal on the Montreal market. It should receive a sympathetic consideration if the public realise that

Nova Scotia's five years' exclusion from Montreal market was entirely a war casualty, occasioned by heavy enlistments of miners, and by the taking of the coal-freighting fleet for munitions transportation by the Admiralty. For years, the ships that should have carried Nova Scotia coal to Montreal were carrying munitions to East Africa, Salonica and the Admiralty alone knows where else.

Consolidations of Mining Properties.

The much to be desired consolidation of the mining companies, which this journal has urged for many years, came nearer consummation in 1920 than at any time since the formation of the Dominion Coal Company. The reconstruction of the original structure of the General Mining Association only now requires a union of the mining operations of the Dominion Steel Corporation and the Nova Scotia Steel Company. This is a foreordained inevitable event of the future, and the sooner it takes place the better for Nova Scotia. In the 1919 Review, we ventured to assert that "only by consolidation of interests can the scattered, and in many instances financially weak coal companies of Nova Scotia hope to weather the future." The patent advantages that have already followed co-operation between the two large coal companies provide the strongest argument for their actual union. The general favor which consolidation of coal-mining interests has received from the public in Nova Scotia during the past two years is the most hopeful sign of the times to the provincial coal trade.

Output Prospects for 1921.

A study of the position of the several companies indicates an output capacity in 1921 of 6½ million tons, but a forecast of the actual production is more difficult to make than has been the case since 1914, because there is not the same assurance of insistent demand and uninterrupted outlet for the coal that has existed for the past six years.

Labor and Wages.

The year has seen almost continuous negotiations between the United Mine Workers and the coal companies for increased wages. The agreement of January last, which gave the miners a substantial increase in wages, was barely signed when a new demand was made for a further increase, accompanied by request for alterations in working conditions, which, had they been granted, would have been found to be far more onerous than the wage increase asked, their general tendency being to restrict production and to attempt to fix as a permanent feature the very uneconomical arrangement of the working forces and certain conditions which had resulted from war exigencies.

A Royal Commission was appointed to consider the whole question of wages and working conditions at the mines in Nova Scotia and New Brunswick. No person with first hand acquaintance with coal mining was appointed on this Commission, and its recommendations were of an impracticable character. The Union summarily rejected the Commission's recommendations, and after protracted negotiations — which have been fully reported in the "Journal" — an agreement was come to between the Executive of the United Mine Workers in Nova Scotia and representative operators which has since been ratified by the individual vote of the union members. This agreement grants an increase in wages, effective 1st November, of 55 cents per day to day-paid workmen, and a ten

per cent increase on contract tonnage rates. There was very determined opposition to the ratification of this agreement from the Mainland and Inverness Districts, but the Sydney District gave a large vote in its favor which carried the Province. There is reason to hope a settlement of the wages question has been obtained that will last for at least a year, if it should turn out that the coal operators can pay the high rate of wages the agreement calls for. There is every likelihood that the Nova Scotia collieries will have to mine coal in 1921, not to satisfy an insistent demand for coal more or less regardless of price, but on a strictly competitive basis, and, so far as the consumption of coal for steel-making purposes is concerned, there are good grounds for belief that present wages costs are higher than will permit the coal to be used in steel processes with any substantial hope of successful competition with steel and steel products made in competitive countries. It may be that the demand and price of coal for export business will enable the coal companies that are associated with steel enterprises to concentrate upon coal production for commercial sale rather than for consumption in steel manufacture, but there are many considerations that make this undesirable, and, as we have stated previously, it is to be doubted whether the higher wages which the miners have gained, accompanied by the unemployment that will result from them, will be found to be better than more steady work at lower rates of remuneration.

ADVANCE FIGURES OF CANADIAN COAL PRODUCTION DURING 1920.

The very approximate figures of 1920 coal production available at the time of writing show a comparison with 1918 and 1919 as follows:

	LONG TONS.		
	1918	1919	1920
Nova Scotia & New Brunswick . . .	5,450,000	5,330,000	5,650,000
Alberta & Saskatchewan	5,650,000	4,800,000	6,100,000
British Columbia	2,290,000	2,170,000	2,700,000
	13,390,000	12,300,000	14,450,000

A comparison with production in 1913 and since is as under:

	Long Tons
1913	13,400,000
1914	12,200,000
1915	11,850,000
1916	12,930,000
1917	12,550,000
1918	13,360,000
1919	12,590,000
1920 (est.)	14,450,000

The foregoing figures are transposed, in round numbers, from the short ton statistics of the Mines Branch, Ottawa. Strict accuracy is difficult, as some of the provinces have fiscal years that do not coincide with the calendar year, and there is a difference between output and production (very marked in British Columbia because of the large reject in the coal as mined in some districts). Also, while the provinces generally use the long ton in statistics, and the coal operators almost invariably do so, the Ottawa figures are given in short tons.

Coal Production in British Columbia During 1919

ROBERT DUNN, Victoria, B.C.

An increase in coal production will be shown by the collieries of all the coal fields of British Columbia for 1920 in comparison with the previous year. A conservative estimate places the output at 2,787,384 tons the figures for 1919 being 2,267,541 tons, an improvement of 518,843 tons.

On Vancouver Island there has been a notable advance. The big producers, viz., Canadian Western Fuel Co. and the Canadian Collieries (D) Ltd., have more than maintained the pace set in 1919. While the Island Field has lost the "Jingle Pot" Mine, which ceased operation early in the year, the adverse effect of this has been fully taken care of by the speeding up of the regular producers and by the marked development of the production of the Granby Mining & Smelting Co's Collieries at Cassidy. The output of the Island will aggregate approximately 1,783,800 tons as compared with about 1,700,000 tons in 1919.

There also will be an improvement in the Nicola-Princeton Field where the production of 1920 is expected to total 151,584 tons as compared with 150,705 tons in the previous year.

The outstanding advance, however, is in the Crow's Nest Pass District, Eastern British Columbia. The aggregate for 1920 is placed at 852,000 tons in round figures as compared with 562,000 tons in 1919. The explanation, of course, is that in 1919 there was a three month strike at Fernie, materially reducing the output of the principal colliery of the District, the Crow's Nest Pass Coal Co.

It must not be assumed that the past year has been altogether free of labour trouble in the Crow's Nest Pass District. There have been disputes; in fact for some months there has been more or less open warfare between two labor organizations, namely the United Mine Workers of America and the so-called One Big Union. In this section the authority of the Dominion Government exercised for the purpose of preserving industrial peace in order that production might be maintained during and immediately after the war, still exists. W. H. Armstrong, as Director of Coal Operations, still is in control and it has been possible by virtue of the mediatory service of his department, to keep the mines, fairly consistently, on a producing basis throughout the year. This, therefore, accounts for the fact that the mines of Coal Creek and Michel will show an output for 1920 of about 686,000 as against 480,000 tons last year while the Corbin Coal & Coke Co. will have a production of something like 166,000 tons as against 82,000 tons last year.

To revert to the conditions on Vancouver Island it is interesting to note that the Canadian Collieries (D) Ltd. has conclusively demonstrated its ascendancy with a total (estimated) of 746,000 tons. The nearest to this production is that of the Canadian Western Fuel Co. Ltd., the long established collieries of Nanaimo, B.C., with about 459,000 tons. Reference has been made to the showing of the Cassidy Collieries of the Granby Company. This industry was in its infancy in 1919 and it is only necessary to state that its product for 1920 will aggregate something like 210,000 tons to indicate that it has grown into a business of importance in the course of the past twelve months. The Pacific

Coast Coal Mines Ltd., with 99,800 tons, also has commenced to climb while the Nanoose-Wellington Collieries Ltd., Nanoose Bay, has done well with 45,000 tons approximately to its credit.

With regard to the Nicola-Princeton District the chief producer is the Middlesboro Collieries with a total of about 95,000 tons. Then comes the Fleming Coal Co. with 30,000 tons, the Princeton Coal & Land Co. with 19,000 tons, and the Coalmont Coal Co. with some 7,584 tons. The latter Company was re-organized recently and is developing its holdings so that it may be expected to take a more important part in the colliery activities of the section from this date forth. Several million tons of coal are being developed. An aerial tramway is being installed between the Mine and Coalmont on the Kettle Valley Ry. A screening plant is being installed and a tippie constructed at the railway.

A new field is being opened up by the Chu Chua Coal Mining Syndicate. It is situated on the Indian reserve a short distance south of Chu Chua Station, and not far from the City of Kamloops. This coal is of excellent quality and, although the seam, now under development is somewhat narrow, some three feet in width, this is expected to improve as the work continues. The Kamloops Natural Gas, Oil and Coal Co. Ltd. also is doing some diamond drilling in the coal measures at Coal Hill, situated a short distance from Kamloops.

The Tolkwa Collieries, located near the Grand Trunk Pacific Ry. in northern British Columbia, has not done much this year, its production, as far as can be judged at present, being about 1,300 tons. A short distance from this property a new seam is being opened up which contains high grade coal, some of which soon will be marketed. It seems probable that the immediate future will see extended development of the coal areas of this District. The ever-increasing price of fuel oil and its scarcity in the world's markets is causing renewed interest in all the promising coal fields of the north. The Telkwa, Morice River, Peace River and Groundhog fields have attracted interest this year and large scale development may be expected before long. Undoubtedly those areas contain large quantities of good grade coal and but for the admitted transportation difficulties they now would be in the productive class.

JOHN L. LEWIS RE-ELECTED PRESIDENT OF UNITED MINE WORKERS.

The recent elections for office in the United Mine Workers of America are regarded as a decided victory for the conservatives among the members of that union. John L. Lewis was re-elected President, defeating Robert H. Harlan by the largest majority ever received by a candidate for the presidency. The Vice-President, Phillip Murray, was also re-elected, defeating Alexander Howat. The Secretary, William Green was re-elected by acclamation. Harlan and Howat were understood to represent the radical portion of the membership. Harlan represented the international officers of the U. M. W. of America in Montreal at the meetings in January 1918 when the coal operators of Nova Scotia agreed to recognise the U. M. W. in Nova Scotia.

Northern Ontario Letter

THE GOLD MINES.

The Porcupine District

The silver and gold of Northern Ontario, in receiving around 18 p.c. premium on United States funds during the fourth week of December, are realizing at the rate of about \$4,140,000 a year on the aggregate output of something like \$23,000,000. This premium is "net" to the producing companies and amounts to more than fifty per cent as much as the average yearly dividend disbursements.

During 1920, the net revenue in premium to the precious metal mines of the Temiskaming district has exceeded \$2,250,000, the average premium having been well above 10 p.c. This alone constitutes a fair rate of interest on the capital involved. In the case of the Hollinger it has amounted to nearly 3 p.c. on the Company's total issued capital, and at the present high point is at the rate of between 5 and 6 p.c. This amount added to comparatively large earnings has appeared to place the Hollinger in a position where dividends are expected at the rate of 1 p.c. every four weeks, beginning with the first of the New Year. At worst, it is believed, this rate will not be delayed longer than spring.

Shortage of hydro-electric power in the Porcupine district is serious. The condition, however, is entirely temporary. Careful investors are taking advantage of the present temporary depression to accumulate a large amount of the share capital of the producing companies. These interests are found to be disregarding the present power shortage, and are basing their analysis on conditions under which the mines will operate at full capacity. To figure what may be expected at the Hollinger, Dome, McIntyre-Porcupine, Northerown, Porcupine V. N. T., Schumacher, and so on, with the return to a full power supply and with operations at full blast, the present quotations which are based on present curtailed earnings show clearly the inducement to invest. The mines have large ore reserves. They are equipped with most modern mining and milling plants, and the supply of labor is now abundant. It seems reasonable, therefore, to estimate the earning power of these mines by the end of 1921 at an average of at least fifty per cent higher than at the present time.

Further reports are current with regard to a possible consolidation of the Northerown mines with the Porcupine V. N. T. This report received support this month when a brief examination of the holdings of the Northerown was made by Major J. McIntosh Bell for the Porcupine V. N. T. Company.

In the meantime, the Northerown continues aggressive operations. Two new veins have been cut at the 500-ft. level on the Thompson-Krist side of the property. The veins lie within about twenty feet of each other. One is about five feet in width and the other about ten feet. No official announcement has so far been made relative to the gold content of the veins, although it is understood to be fairly low. Plans have been arranged to carry on considerable exploration work on the new veins.

A narrowing down in milling operations is expected to mark the first quarter of 1921 at the Dome Mines, and perhaps also at the McIntyre. Power shortage conveys at least a threat of this. Any hardship ex-

perienced will not extend beyond May 1st, at the longest, and the mines appear to be confronted with exceptionally favorable conditions after that date.

One feature of the change to more favorable economic conditions is expected to consist of quite general activity on many of the outlying gold prospects. Although the producing mines of the Porcupine district are located in a comparatively small area, yet interesting deposits have been found over an extensive stretch of country and gives rise to the belief that further exploration work might lead to a broadening out of the producing zone.

Recently, the Hollinger Consolidated has been able to produce about \$20,000 daily. The tonnage going to the mill has reached as high as 2,400 tons daily. It has not been stated whether or not the management hopes to maintain this record throughout the winter, but it is regarded as reasonably certain that the coming summer will witness this mine operating at full capacity of not far under 3,500 tons daily for the first time in its history.

Kirkland Lake Field

During the month of November the Lake Shore mine again increased its output, the report just submitted to the president and directors by Manager R. C. Coffey, showing 1,810 tons of ore treated and resulting in a recovery of \$49,340, the average production amounting to \$27.25 per ton and the mill working at full capacity of 60 1-3 tons every twenty-four hours.

The November production compares with \$47,078 in October, \$40,151 in September, and \$35,261 in August. The total production from this mine since starting up its mill in March, 1918, has reached an aggregate of \$1,148,148.

A feature of the official statement just issued is that although the mill has generally been rated a capacity of 60 tons daily, and has usually averaged between 50 and 55 tons per month, yet the November operations exceeded the 60-ton mark, and with the mill operating only 94.44 per cent of the possible running time.

The work of sinking the main shaft to deeper levels is proceeding satisfactorily, a depth of 564 feet having been reached at the end of November, indicating the likelihood of the 600-ft. level being established by the end of December.

Larder Lake Area

Application was made for letters patent to incorporate the Canadian Associated Gold Fields, Ltd., with an authorized capital of \$30,000,000, made up of 30,000,000 shares of the par value of \$1 each. This concern proposes to take over the Associated Goldfields, of Larder Lake, the plan being to pay the Associated 20,000,000 shares, with about 2,000,000 shares to satisfy the Goldfields, Ltd., and the balance of around 8,000,000 shares to be retained in the treasury, to be sold to the public.

The Northern Ontario correspondent of the Journal referred in the past to this concern, and received quite pointed criticism for doing so. However, the information submitted in the Journal was entirely correct, the only unfortunate phase being that it was interpreted as reflecting adversely upon the reputation of a mining engineer who recently made an independent examination. Such reflection was not intended. As regards the enterprise the opinion is being freely expressed in mining circles that it is quite unfortunate that such a promotion (having a larger authorized capital than any precious-metal mining company in the Dominion) should not be supported by reports on

its property by mining engineers who are known to the mining profession of this country.

THE SILVER MINES.

Operators in the Cobalt field are confident of being able to compete with other silver producing mines and survive the adverse influence of the return to low quotations for the metal. With copper mining which supplies a large part of the world's silver output as a by-product almost at a stand-still in the United States and with further information coming from Mexico indicative of additional curtailment in that country, the downward tendency in silver quotations is believed to have run its full course.

Workmen in the Cobalt district appear to take a very reasonable attitude and it seems likely to expect a gradual reduction in wages, at least in proportion to the decline in the cost of living. Mine workers generally express the belief that it would be better to accept a little lower pay and keep the mines all operating, rather than to endeavor to demand the present high rate with the threat of curtailment of work.

The Nipissing Company is in a strong position, its latest financial statement having shown more than \$4,600,000. In this respect, the Nipissing is the leader in this part of Northern Ontario, even leading the Hollinger Consolidated. Current premium on United States funds is adding at the rate of around \$500,000 a year to the company's net income. Recent bullion shipments from this property have been exceptionally heavy, the total for the first half of December amounting to 561,216 ozs. It is learned, also, that representatives of the Nipissing are making an examination of the old Norwalk property in the Michipicoten district. The underground workings are now being de-watered.

A new company, known as the Ruby Co-operative Cobalt Mines, has been incorporated for the purpose of taking over and operating the old Ruby Silver Mines, situated in the south-eastern part of the township of Bucke, in the Cobalt district. The company has an authorized capitalization of \$1,500,000, made up of 1,500,000 shares of the par value of \$1 each. Of this, 750,000 will be distributed among the members of the original syndicate, and the balance of 750,000 shares left in the treasury to finance subsequent work. Clifford H. Moore, of Cobalt, is president of the Company, with the following directors: Dr. E. W. Mitchell, Dr. E. F. Armstrong, of Cobalt; Kenneth McDonald and B. Hartly, of Haileybury.

The annual report of the Coniagas mine will be placed in the mail this week, and shows a very successful period for the fiscal year ended August 31st. During the period the Company paid \$500,000 in dividends.

Elk Lake and Gowganda Area

The idea to provide railway facilities for the Gowganda silver area is being rejuvenated by the promoters who planned the construction of a light narrow-gauge line last year. The present plan differs from that of last year, in that a standard-gauge road is now favored, with 56 lb. rails. Mining interests do not appear to be very enthusiastic about the project, after having been disappointed last year. The fear is expressed that the scheme may only serve to discourage the Government from building a macadam road, and perhaps in the end fail to succeed in providing rail transportation.

Information coming to Elk Lake conveys the report that power shortage is being experienced at the plant of the Miller Lake-O'Brien mine, and the indications

point toward closing the mill early in the New Year. The mine has considerable auxiliary equipment, however, and the development of the mine will continue throughout the winter. With the advent of power in the spring, everything will be in readiness to proceed with production at full blast.

TORONTO MINING QUOTATIONS.

The following are the closing quotations for active gold, silver and oil stocks on the Standard Mining Exchange on December 27th 1920.

Silver.		
	Ask.	Bid.
Adanac Silver Mines, Ltd.	21 ¹ / ₈	2
Bailey	4 ¹ / ₄	3 ¹ / ₂
Beaver Consolidated	27	26
Chambers-Ferland		6 ¹ / ₂
Cobalt Provincial	25 ¹ / ₂	
Coniagas	2.00	
Crown Reserve	17	15
Gifford	11 ¹ / ₄	1
Hargraves	15 ⁵ / ₈	11 ¹ / ₄
La Rose	25	23
McKin.-Dar.-Savage	25	23
Mining Corp. of Can.	99	90
Nipissing	9.00	8.60
Ophir	17 ³ / ₈	1
Peterson Lake	10 ¹ / ₂	9 ¹ / ₂
Temiskaming	26	25
Trethewey	16	15
Gold		
Apex	2	1 ¹ / ₄
Atlas	16	14
Dome Lake	2	1 ¹ / ₂
Dome Mines	12.00	11.00
Gold Reef	2 ³ / ₄	2 ¹ / ₄
Hollinger Cons.	5.55	5.49
Keora	15.1 ² / ₂	15.
Kirkland Lake	38	35 ¹ / ₂
Lake Shore M. Ltd.	1.06	1.04
McIntyre	1.80	1.79
Moneta	10 ¹ / ₄	
Newray Mines, Ltd.	5	3 ¹ / ₂
Porcupine Imp.	1 ¹ / ₂	
Porcupine V. N. T.	16	17 ¹ / ₄
Preston East Dome	2 ¹ / ₂	2 ¹ / ₄
Schumacher	17	16 ¹ / ₂
Teck-Hughes	11	9
Thompson Krist	6 ¹ / ₂	6 ¹ / ₄
West Dome	7	6 ¹ / ₂
West Tree Mines Ltd.	5 ¹ / ₂	5
Oils.		
Ajax Oil	28	
Eureka	26 ¹ / ₂	
Petrol Oil, Old	35	
Rockwood Oil, Gas	3	2 ¹ / ₂
Vacuum G.	16	11 ¹ / ₂

METAL QUOTATIONS.

Fair prices for Ingot Metals in Montreal, Dec. 29th, 1920. (In less than carload lots).

	Cent per lb.
Copper, electro	18 ³ / ₄
Copper casting	18 ¹ / ₂
Tin	41
Lead	6 ¹ / ₂
Zinc	7 ¹ / ₄
Aluminum	35
Antimony	7 ³ / ₄

British Columbia Letter

Stewart, B.C.

At the Premier Mine, Salmon River, Portland Canal, the winter's work is in progress. Supplies for the mill are being taken in over the snow, sixty-five horses being used. Ore is being taken by the same means to tidewater for shipment to the smelter. The mill is about three-quarters complete. The force of workmen numbers approximately 200. Two five-ton Holt tractors now are being used over part of the trail. The installation of the hydro-electric power plant is finished.

Anyox, B.C.

There has been some uncertainty of late as to the permanence of work at the Anyox Camp, Granby Mining & Smelting & Power Co. Following the laying off of some 400 men and the announcement by the management that, unless the employees were prepared to accept a reduction in wages of about 75 cents a day, it would be necessary to practically cease operations, news has been awaited as to the attitude of labor. Nothing has developed, work is continuing, and the assumption is that the men have recognized the force of the Company's position and have acquiesced in the "cut" proposed.

Alice Arm, B.C.

The Dolly Varden Mine Railway, connecting the Company's wharves with the mine property, has closed down for the winter. This was rendered necessary because of recent heavy snowfalls. A. J. T. Taylor, president of the company, is satisfied with the season's operations. The production of over one million ounces of silver since September, 1919, is not a bad showing in his opinion. Besides development work has given, he says, gratifying results. Work is being continued at the mine during the winter, between 65 and 100 men being employed, and Mr. Taylor hopes that it will be possible to maintain production at a high level next year. High grade ore has been sacked and shipped to the Tacoma (Wn.) Smelter and the lower grade has been going to the Granby Company's Smelter, Anyox, for treatment.

Trail, B.C.

For the first week in December the ore receipts at the Trail Smelter of the Consolidated Mining & Smelting Co. totalled 12,502 tons. During the week ending December 14 the smelter receipts were 9,093 tons, bringing the total for the year up to 360,778 tons. Recent new shippers are the Silver Cup, of the Lardeau, and the Society Girl, at Moyie.

A considerable number of men employed in and around the Trail Smelter have been discharged and S. G. Blaylock, manager for the Canadian Consolidated Mining & Smelting Co., states that only necessary construction will be continued. The operation of the smelter will not be affected. This means that the proposed new mill for the handling of the ores of the Rosslund Camp will not be commenced this winter and that other contemplated works will be deferred.

Cranbrook, B.C.

That over 30 uncommon minerals have been sampled and forwarded to the Department of Mines, at Ottawa, for analysis and intensive study within the last few months, from Eastern British Columbia, as one result of his collecting tours, is the statement of W. D. Thomlinson, the New Denver mineralogist.

Mr. Thomlinson commenced his work of field research for the laboratories of the Department of Mines just before the war, and during the war the work was suspended. It was resumed in the past summer.

One of the minerals forwarded Mr. Thomlinson believes to be stream tin—he did not himself have the opportunity to test it. If this belief proves to be well founded, a tin area has been discovered.

Barium sulphate or heavy spar, which has an important commercial use, is another of these undeveloped resources. It is being found in association with lead and zinc ores, but is usually mistaken for a form of limestone. Some considerable deposits of this have been brought to light.

One of the most important finds is of a rare clay, adapted to a very exclusive use, of which previously only one deposit has been worked commercially on this continent. Indications point to a deposit of commercial dimensions near Merritt, and two such deposits near Princeton.

In the Lardeau a curious alloy has been found, its elements being gold, silver and mercury. The latter may have possibly escaped from early milling operations, but if not, the alloy is a natural product not previously known to science, and Mr. Thomlinson will, in that case, endow it with the name of "Lardeauite." Native quicksilver, acting on a natural alloy of gold and silver known as electrum, and found in only a few places in the world, may have produced the new rarity.

After being thoroughly tested and classified, Mr. Thomlinson says, the samples will be shown at various great exhibitions, beginning with the chemical exhibition in New York next season, where experts from all the world will assemble. The commercial world is looking for deposits of many economic substances to exploit, and will certainly look into some of these new finds, he suggests.

If prospectors could acquire familiarity with some of these uncommon minerals that the world wants, in addition to their knowledge of the ordinary ores, Mr. Thomlinson states, important developments in the lines of new industries would certainly be brought about in the course of time.

In the meantime, they will be serving their own interests by providing him with samples of all finds that are at all out of the ordinary run.

Allenby, B.C.

The closing down of the Canada Copper Company operations both at the Mine, Copper Mountain, and at Allenby Mill so soon after the commencement of work has had a depressing effect not only in the district immediately affected but throughout the province. It is appreciated that, with copper priced as at present, it is difficult for an industry in British Columbia, faced as it is with high costs, to produce copper at a profit. In the case of the Granby Consolidated at Anyox, where the smelter is being kept active, the men have agreed to a reduction in their wages amounting all round to about 75 cents a day. Another company which appears to be carrying on is the Tidewater Copper Co., Sidney Inlet, West Coast of Vancouver Island, which just recently shipped 400 tons of concentrates to the Tacoma (Wn.) Smelter. It is stated that shipments will be made once a month from this date and that, because of the economical water-wheel method of generating power, it will be possible to produce copper at a cost permitting a margin even under existing market conditions. The owners of this property

are credited with having sunk \$650,000 into development and new equipment within the past twelve or fourteen months, with results that assure its maintenance indefinitely as a shipper. With the other provincial companies hit as they are, not excepting the Canadian Consolidated Mining & Smelting Co., of Trail, it is refreshing to find one concern that is able to carry on despite adverse markets.

Princeton, B.C.

The Princetown Mining and Development Co., Ltd., have completed the installation of their plant and will recommence the work of development. This property is situated east of the town of Princeton. Three tunnels have been driven and a considerable body of concentrating copper-silver ore has been disclosed.

Greenwood, B.C.

The old Providence Mine is to be re-opened. An Ingersoll compressor has been purchased and is being installed. The mine is being pumped out and will be ready for mining when conditions are satisfactory.

Nelson, B.C.

Government purchase at a price of 80 cents per ounce of all silver offering, known to be the product of native ores, and increased silver coinage, are advocated by Robert R. Hedley, the well known mining man, as a means of assuring a market for Canadian silver, stabilizing the metal markets generally, and maintaining mines in operation through the present period of slump in metals, thus reducing the threatened unemployment.

Mr. Hedley, who was the manager of Hall Mines, Ltd., for 10 years, during the period it operated the Nelson smelter, has been spending a fortnight in the Slooan and arrived in the city a day or two ago.

In the case of Kootenay mining, Mr. Hedley pointed out in an interview yesterday, the price of silver is one of the principal governing factors, as silver constitutes the chief value in the majority of Kootenay ores. A stable price, therefore, for Canadian-produced silver would be an anchor that would assure the continuance in operation of many Kootenay mines.

That the Dominion Government would not be taking any undue risk in thus purchasing silver beyond its present normal consumption, is Mr. Hedley's considered opinion. "It can be demonstrated," he said on this point, "that when world conditions return to or approach normal, 80 cents an ounce for silver will be a reasonable minimum price. The United States is purchasing its own domestic production of silver and storing it at 99½ cents an ounce, removing it from the world's market, and as long as that drain continues, it is probable that the law of supply and demand will compel a price for silver higher than 80 cents."

The world's silver production for 1920, he stated, was provisionally estimated to be 30,000,000 ounces less than the production in 1913.

India, the world's heavy purchaser, which for generations had absorbed as high as 200,000,000 ounces annually, will probably not be credited with more than 10,000,000 ounces this year. If the price of silver in the early part of the year was the reason for restricting the Indian purchases, India will probably purchase extensively at prices below \$1.00 an ounce.

Mexico is not at present a large producer of silver, and what she produces will largely go into her coinage. The United States and Mexico together contribute the bulk of the world's supply, and three-quarters of this comes as a by-product of mining for copper, lead and gold, now curtailed to far below normal.

"From these facts it can be argued," said Mr. Hedley, "that Canada can with advantage coin such silver as she may produce in the next two years at 80 cents per ounce. The production in the two years will not total more than 30,000,000 ounces, and of that, it is probable that the world's market will absorb the larger part, and at a price better than 80 cents."

Canada's silver coinage in circulation at the end of 1919 amounted to \$27,084,148, Mr. Hedley stated; as compared with \$14,327,662 in 1910. In the 10 years ending with 1919, the Canadian mint coined silver to the amount of \$15,233,505.

Vancouver, B.C.

Judgment has been given against W. Pollard Grant, Vancouver lawyer, in his suit for a declaration that he holds legal title to a one-fifth interest in the Engineer Mine of the Atlin District, B.C. This is a step towards clearing up the estate of the late Captain Alexander so that a transfer of the Atlin property can take place. As soon as a clear title can be delivered it is expected that the Alexander Mine will be sold for a substantial figure, that development will be initiated without delay, and that the work will mean much for the advancement of that part of the north country.

Lorne Campbell, president of the Kootenay Light & Power Co., and former Minister of Mines, does not view the present situation in respect of mining and other industrial endeavor in a pessimistic way. He says: "The passing of the mushroom industries and of those businesses built up on the effects and causes of the war will give legitimate businesses a chance to carry on upon a sound business basis. Peace time conditions have returned and the reconstruction of business on a peace time basis is now under way. The general deflation resulting from the arrival of this period means that industries will require less capital to finance manufacturing and other producing concerns. The net result will be a reduction in the cost of living and credit conditions will return to a more normal basis." Mr. Campbell spoke optimistically of mining prospects in the Kootenays now that labor is available and referred to the activity in coal development and production in the Province of Alberta.

Mr. Glenville A. Collins, mining engineer of Seattle Wn. has taken over the management of the Drum Lummon Mines, Ltd., vice Mr. W. Porteous Sloan. This property is situated near Hartley Bay, Douglas Channel, B.C.

PERSONALS.

Dr. S. L. Walker, Prof. W. A. Parks, Prof. A. L. Parsons and Mr. Ellis Thompson of the staff of the University of Toronto are attending the meeting of the Mineralogical Society in Chicago, this week.

Mr. H. P. De Pencier is in Toronto on his way from New York to the Dome mine.

Mr. Ocha Potter has been appointed superintendent of the Ahweek mine, Michigan.

Mr. Brigham, manager of Hollinger Consolidated Mines is in Toronto.

F. M. Sylvester, of Vancouver, B.C., formerly of Spokane, Washington, is now president of the Moose Group Mining Co., which has mining property situated in the neighborhood of Alice Arm on Observatory Inlet, of which P. W. Racey, formerly of Rossland, B. C., is in charge. Mr. Sylvester was for some years general manager for the Granby Consolidated Mining, Smelting, and Power Co.

A Miner's Yearly and Daily Output of Coal

By W. W. ADAMS, Mine Statistician, United States
Bureau of Mines.

The present world-wide demand for increased production in all branches of essential industry involves a matter of vital concern to persons engaged in the mining industry, namely, the productive capacity of the individual mine employee. This applies particularly to coal-mining, upon which other industries so largely depend.

The folded and faulted conditions of the coal beds in some countries, as well as the thinness and depth of the seams, the adaptability to the beds of available mining machines and equipment are factors which cannot be overlooked in determining what increase in individual output may be looked for in any given country. This subject, while of fundamental importance, can only be referred to in a paper of this length, the primary object here being merely to present a comparative statement of individual output under prevailing conditions.

The quantity of coal produced by a miner does not accurately indicate the miner's capacity as a workman, not only because of the natural conditions referred to above that limit his annual output, but also because of human factors which may possibly, however, be controlled, such as the demand for coal, the car supply, use of labor-saving machinery, number of days worked during the year, accidents in the mine, etc. It will, however, be an aid in answering the important question as to how and where the immediate need for coal throughout the world may best be supplied, if we examine the output of the miners in the important coal-producing countries over a period of years.

Complete official information for recent years is, for several countries, lacking, particularly for France, Austria, and Prussia, but partial data from unofficial sources may be used to show the individual output of the miners in these countries.

An examination of the available and in most instances official sources of information for the principal coal mining countries (covering generally the 18-year period beginning with 1901) shows that the largest production per man during any year was 1,134 short tons, which represents the average production for each underground employee in the coal mines of the United States during 1918. The closest competitor of this country was New South Wales where each underground worker in 1918 produced 814 tons. British Columbia ranked third with 790 tons and Nova Scotia was fourth with 718 tons. The smallest individual output for recent years was that of Japan in 1917, where an average of 155 tons was mined by the underground employees, although in 1901 India showed an average of only 122 tons, the latter figure being the smallest during any year for the countries under consideration. During the 18-year period New South Wales and Nova Scotia have each averaged practically the same amount (718 and 715 tons respectively). The individual output for Great Britain was until 1910 above that of Prussia, but in 1911 Prussia passed the British record and has maintained the lead since that time. France has shown but little change in the miner's yearly production, averaging 302 tons prior to the War. Within the past three years, however, the daily output of the French miner has decreased although there has been an increase

in his wages. In Austria the annual output has averaged 296 ton per man during the past 18 years. Following Austria comes Belgium with an average of 236 tons during the 18-year period. The man-production in Belgium remained 250 tons until 1914 when it dropped to 200 tons and showed only a slight increase during the 5 years of the World War. The underground workers of India have shown an almost steady increase in annual output, the quantity having risen from 122 tons in 1901 to 203 tons in 1918, averaging 178 tons during the entire period. In Japan the average output over a 17-year period was 174 tons. The following paragraphs will show more in detail the situation in the various countries.

United States.

In producing around 600 million short tons of coal each year the United States employs about 600,000 underground workers. In 1901 these underground employees produced an average of 729 tons per man. Eighteen years later the quantity had increased to 1,134 tons, the greatest on record for this or any other country. At the beginning of this period one-fourth of the bituminous coal was mined by machines while at the end of the period the quantity of machine-mined coal was about 56 per cent of the total bituminous production. Again, the high average thickness of the coal seams and the comparatively regular and uniform position of the coal beds (except in the State of Washington and the anthracite field of Pennsylvania) greatly facilitate the work of the miner in getting out the coal. About 85 per cent of the bituminous coal is mined from seams between 3 and 10 feet thick, and only 4 per cent from seams below three feet in thickness. Seams less than 2 feet thick do not produce as much as 1 per cent of the total production. Nor is coal mined at as great depths in this country as is the case in some of the foreign fields.

The underground workers in the United States do not include any women or girls.

Not only the annual but also the daily output of coal per underground worker is greater in the United States than elsewhere, and the former holds true notwithstanding the fact that the working year is usually shorter in this than in most other countries. For the years under consideration the mines were operated from 95 to 258 days. The records show that each underground worker in 1901 averaged 3.37 tons a day and increased his daily output to 4.40 tons in 1918. The closest competitor of the United States for which the number of working days is shown is New South Wales where the daily output per employee is only slightly below that in the United States.

New South Wales.

As a producer of coal New South Wales occupies a very low position among the countries here considered, its yearly output being about 10 million short tons, but in quantity of coal produced annually by each underground worker the country is second only to the United States. The individual production has increased from 689 tons in 1901 to 814 tons in 1918 and the annual output for 18 years has averaged 718 tons. About 12,000 underground workers are employed.

The length of the working year is not given in the

official reports except for the principal mines since 1909 which shows that the miners are employed from 168 to 238 days. Applying these figures to the entire Colony it appears that the daily production of the underground worker increased from 3.32 in 1909 to 4.07 tons in 1918, thus indicating that New South Wales ranks as a close second to the United States in the daily as well as the annual output of coal per man. Approximately one-fourth of the annual production is machine-mined.

Most of the coal (over 65 per cent) is obtained from the mines in the northern district of the colony where the seams range in thickness from about 7 to 20 feet with a probable average of about 12 feet. In the southern district most of the coal is mined from the Bulli seam which averages between 6 and 7 feet in thickness. Among the underground employees only 3 per cent are below 16 years of age. No women or girls are employed underground.

Nova Scotia.

Nova Scotia employs about 10,000 underground workers to produce between 6,000,000 and 7,000,000 tons of coal each year. With an average annual production since 1901 of 715 tons by each underground employee, the province ranks third among the countries now being considered, being slightly below New South Wales and considerably above British Columbia.

Prior to 1906 the individual output was above that in New South Wales, but in that year the Australian colony took the lead which, except in four instances, it has maintained down to the present time. Since 1901 the operating time of the coal mines has varied from 203 to 299 days, usually being about 280 days during the year. The daily output of the underground worker has varied from 2.45 tons to 3.35 tons with an average of 2.68 tons throughout the 18-year period. This in the daily as well as the annual output of coal by the individual worker, Nova Scotia occupies a position below the United States and New South Wales but above all other countries whose reports show the length of time the mines are operated. Of the total output of coal in 1911 at least one-fourth was machine-mined. In 1916 not less than 44 per cent was mined by machine.

The coal seams of Pictou county are of greater thickness than those in other parts of the province but produce only about one-tenth of the coal, while the seams of Cape Breton county, from which nearly three-fourths of the annual production is obtained are between 4½ and 7½ ft. thick.

British Columbia.

With about 4,000 underground employees each year, British Columbia produces between 2½ and 3 million tons of coal and thus contributes approximately one-fourth to the total production of coal in the Dominion of Canada. The total production is hardly to be compared with that of many other countries, yet British Columbia ranks fourth in the annual output per worker, being exceeded only by the United States, New South Wales and Nova Scotia. The individual output is about 1½ times that of Great Britain. The lowest annual tonnage was 494 tons in 1911 when labor troubles caused the mines of the East Kootenay district to suspend operations from April to November, while the maximum output was 790 tons in 1918, showing an 18-year average of 611 tons. The number of operating days is not given in the official reports, and therefore, the daily output of the workers cannot be stated. Of the underground workers less than 3 per cent are boys (ages not given) and approximately 9 per cent

are Japanese and Chinese. About 60 per cent of the coal production is from the mines of the Coast District, although here the usual output per worker is considerably below that in the East Kootenay district. No Orientals are employed underground in the latter district, but in the Coast district they at times comprise one-tenth of the underground workers.

The coal seams vary in thickness between wide limits, but it is probable that the average thickness of the seams of the entire province is about 9 feet. Information as to the quantity of machine-mined coal is not available.

Great Britain.

Coal mining in Great Britain gives employment to between 800,000 and 900,000 underground workers each year and the annual production is around 300 million short tons. During the war the production was somewhat less. The output of coal averaged 400 tons for each underground employee in 1901 and increased to 419 tons in 1906, but since the latter year there has been a decline in the individual output which continued down to 1918 when the output per man was only 337 tons. The decrease is also noticeable in the daily output of coal per man which has also receded from its high record of 1.55 tons in 1905 to 1.19 tons in 1918, the lowest during the last eighteen years.

The decrease in the annual production of the British miner is beyond doubt, due to the lower daily output per man rather than to a reduction in the number of working days to the year. In fact, the lowest annual output per man has been during the years of the greatest number of working days, and this in spite of an annual increase in the use of coal-cutting machines. The working year has fluctuated between 261 and 295 days, being above 270 days each year since 1910.

Coal-cutting machines are coming into more general use in the coal-mining industry of Great Britain. In 1901 only 345 machines were used with which about 2 per cent of the entire output was produced. In 1918 the number of mining machines had increased to 4,041 and the quantity of machine-mined coal was over 11 per cent of the total production for that year.

While the coal seams vary in thickness from about 1 foot to 30 feet, it is perhaps safe to say that the seams throughout the Kingdom have an average thickness of about 5 feet. About 7 per cent of the underground employees are boys below 16 years of age. No women or girls work underground at the mines.

Prussia.

Among the coal-mining nations of the world Germany ranks third, occupying a position considerably below that of Great Britain and very much above that of France. Over 90 per cent of the coal production is from the mines of Prussia and the figures for that Kingdom are here used as representative of the Empire as a whole, for which complete and comparable statistics are not available. While varying considerably from year to year, the annual coal production of Prussia is roughly speaking 160 million short tons, although in 1913 it almost reached the 200 million mark. Normally about 440,000 underground workers are employed. For these employees the record shows an annual production ranging from 352 to 459 tons per man. The individual output in Prussia surpassed that in Great Britain for the first time in 1911. This is due, however, largely to the greater number of days during which the miners in Germany are employed. The number of working days to the year, always high, has shown an almost constant increase, being 293 days in 1901 and 303 in

Year	United States	New South Wales	Nova Scotia	British Columbia	Great Britain	Prussia (steinkohle)	France	Austria (steinkohle)	Belgium	Japan	India
Annual production per man employed underground.											
1901	729	689	719	623	400	357	304	250	248	176	122
1902	699	656	837	593	405	352	278	248	255	181	125
1903	760	648	748	529	403	368	318	258	257	175	144
1904	711	606	696	576	404	366	306	267	250	179	152
1905	755	671	693	654	405	365	312	285	246	213	161
1906	774	726	706	623	419	400	291	298	254	179	169
1907	852	719	675	566	417	392	304	295	249	158	179
1908	725	740	695	533	388	370	291	298	246	172	179
1909	831	557	615	570	380	361	304	293	251	145	181
1910	832	684	708	596	368	367	296	295	255	168	189
1911	819	763	696	494	371	381	300	308	244	178	196
1912	889	834	717	642	348	411	312	333	240	189	202
1913	916	820	729	582	371	422	307	329	238	182	204
1914	803	770	657	569	341	389	---	328	200	179	200
1915	867	775	680	596	393	447	---	350	182	156	192
1916	998	727	810	754	377	459	---	351	211	170	200
1917	1,071	728	778	715	359	436	---	278	218	155	204
1918	1,134	814	718	790	337	409	---	259	207	---	203
Average for years shown	843	718	715	611	383	392	302	296	236	174	178
Daily production per man employed underground.											
1901	3.37	----	2.74	----	1.50	1.22	1.05	----	0.84	0.73	
1902	3.55	----	3.39	----	1.49	1.22	1.05	----	.87	.76	
1903	3.46	----	2.69	----	1.52	1.23	1.08	----	.85	.71	
1904	3.52	----	2.58	----	1.53	1.24	1.07	1.00	.83	.75	
1905	3.56	----	2.76	----	1.55	1.28	1.10	1.04	.85	.94	
1906	3.70	----	2.68	----	1.53	1.31	1.09	1.07	.85	.74	
1907	3.69	----	2.56	----	1.45	1.28	1.07	1.06	.83	.69	
1908	3.72	----	2.66	----	1.43	1.24	1.04	1.08	.82	.69	
1909	----	3.32	2.45	----	1.42	1.24	1.04	1.08	.83	.72	
1910	3.78	3.70	2.46	----	1.35	1.26	1.04	1.09	.84	.73	
1911	3.72	3.69	2.48	----	1.36	1.29	1.06	1.13	.82	.77	
1912	3.95	3.50	2.56	----	1.32	1.30	1.08	1.21	.82	.80	
1913	3.85	3.63	2.53	----	1.28	1.32	1.08	----	.80	.83	
1914	3.88	3.29	2.54	----	1.25	1.26	1.07	----	.76	.79	
1915	4.14	3.95	3.35	----	1.36	----	.94	----	.75	.76	
1916	4.24	3.89	2.80	----	1.28	----	1.01	----	.75	.76	
1917	4.27	3.66	2.72	----	1.26	----	.96	----	.73	.72	
1918	4.40	4.07	2.50	----	1.19	----	.91	----	.72	----	
Average for years shown	3.81	3.67	2.68	----	1.39	1.26	1.04	1.08	.81	.76	

Annual and Daily Production of Miners. (Accompanying article by W. W. Adams).

1914 the latest year for which the working time is shown. The daily output by the Prussian miner was until 1911 less than that of the miner of the United Kingdom, but from that year until 1914 the individual output of the miners in the two countries has been practically identical. The daily production in Prussia has ranged from 1.22 to 1.32 per man. No women or girls are employed underground.

About 65 per cent of the coal production of Prussia is obtained from the Dortmund district which includes the coal basins of the Lower Rhine and Westphalia, and here also are employed about 65 per cent of the underground workers. The Dortmund district, however, does not produce the largest tonnage per man, being surpassed by Upper Silesia both in the annual and daily output of coal per man, and this notwithstanding the fact that the miners of Upper Silesia usually work a somewhat smaller number of days than do the miners in the other districts of Prussia.

France

Among the European countries France ranks third with its annual production of 40 million tons of coal, and thus normally occupies a position below Prussia but considerably above Belgium. The output has, of course, been greatly reduced since the destruction of the mines in the northern part of the country.

The quantity of coal produced annually by the French miner does not vary much from year to year, the amount being 278 in 1902 and 307 in 1913, with an average of 302 tons over a 13-year period. Later figures cannot be given because of lack of information as to the number of employees and number of days of operation. The daily output of the miner in France is usually a fraction over one ton, but in 1917 and 1918 it fell below this figure in spite of an increase in the average wages paid to the underground workers in those years.

The mine workers are usually employed about 300 days during the year. No women are employed underground, but about 6 per cent of the underground workers are boys between 16 and 18 years of age, and 6 per cent below 16 years. The average thickness of the coal seams is probably somewhat less than 3 feet 3 inches, which indicates an average thickness slightly above that in Belgium. About two-thirds of the coal produced prior to the war, was from the Valenciennes coal basin in the departments of Pas-de Calais and the Nord. In this field, however, the daily output per worker, while equal to or above that in most of the other coal fields of France, is slightly below the individual production in the coal basin of Le Creusot et Blanzy which furnishes only 6 per cent of the annual output of coal.

Austria.

Excluding the lignite industry, the coal mines of Austria employ about 52,000 men underground and the annual production is around 17 million short tons. The official reports do not segregate the employees underground from those on the surface except in connection with the statistics of wages and hours of labor, and the totals thus given do not exactly agree with the number of employees reported in connection with the output of coal. However, this segregation has been used to determine the production per underground worker, and on this basis it may be seen that the annual output has ranged from 250 tons to 351 tons per man. The daily output varied from 1 to 1.21 tons per man until 1912, since which time no information is available as to the

number of days the men have been employed during the year.

During the 12-year period beginning with 1901, the working year of the Austrian miners did not change materially, having varied only between 268 and 279 days per year. No women or girls are employed underground, but about 11 per cent of the underground workers are boys presumably below 16 years of age.

Nearly two-thirds of the coal of Austria is obtained from the provinces of Moravia, Silesia and Galicia, the coal seams in Upper Silesia being a continuation of those of Prussia and Russia. An average of about 2 ft. 8 in. obtains in the Ostrau-Karwin district which is the principal coal-mining district of Silesia. About one-third of the yearly output is from the mines of Bohemia where the main seam of the Kladno-Rahonitz basin has a thickness of 20 to 36 feet.

Belgium.

Prior to the World War, the Belgium coal mines employed in round numbers 105,000 men in the underground workings and produced about 25 million short tons of coal. With the beginning of hostilities, there was a sudden reduction both in the output of coal and the number of men employed. This situation became worse as the war progressed so that in 1918 there were only about three-fourth the usual number of employees and the production was less than two-thirds normal. The yearly output per underground worker had averaged about 250 tons during the 13 pre-war years, but fell to 200 tons in 1914, and remained thereabouts throughout the war.

That the reduction in the annual individual output was mainly due, however, to a shorter working year is shown by the fact that the daily output of the miners was only slightly below normal, being about .74 tons during the war, as against .83 prior thereto.

Under normal conditions the miners in Belgium worked nearly 300 days each year, but in 1914 the number of working days fell to 263 and the following year it was 241. In 1917 the working time rose to 296 days, but the following year it fell back to 288 days.

Mining operations in Belgium are carried on under great natural disadvantages. The coal seams are thin, averaging only 26 inches for the entire country. Moreover, the contorted and folded conditions of the seams and the great depth at which they lie render mining extremely difficult and greatly reduce the productive capacity of the individual miner.

The number of woman employed underground in the coal mines of Belgium was 120 in 1901 and only 3 in 1912, since which year none have been employed. Boys between 14 and 16 years old usually comprise about 4½ per cent of the underground workers, and prior to 1914 about 2 per cent of the underground employees were boys between 12 and 14 years of age, but since 1914 the employment of children of the latter age appears to have ceased.

Nearly three-fourths of the coal production is from the Province of Hainaut, where the deepest mines are situated, and there the individual tonnage is lower than that in Namur. However, the Province of Hainaut includes the Mons district where the coal seams (average 22 inches) are thinner than in other parts of Belgium, while the Province of Namur, although producing only 4 per cent of the coal production, contains the thickest seams (average 28 inches) in the Kingdom.

Japan.

Since 1901 the coal production of Japan has trebled in quantity, being slightly less than 10 million tons

in that year and reaching a total of 29,000,000 tons in 1917. The reports of the Japanese Bureau of Mines do not usually segregate workers underground from those on the surface, but based upon the segregation in the annual report for 1917 it may be seen that the underground employees have increased from around 56,000 in 1901 to 187,000 in 1917. The greatest annual increase in the number of employees underground was in 1907 when nearly 30,000 more men were employed than in the preceding year. The average annual output per underground worker has varied from 145 tons to 213 tons, the average for the 17-year period being 174 tons.

In 1907 Japan gave way to India in the annual output per worker, owing to the fact that India has shown an almost constant increase, while in Japan the individual output has remained practically unchanged.

The individual daily production of coal in Japan has ranged from .72 tons to .94 tons per man, showing an average of 0.76 tons for the entire period. The working year has varied from 201 to 251 days. In 1917 about one-fourth of the underground employees were women and girls. More than four-fifths of the workers underground, both men and women, were over 20 years of age; about one-sixth were between the ages of 15 and 20 years; and only a little more than 1 per cent below 15 years of age.

About three-fourths of the coal produced is obtained from the mines of the Island of Kyushu, and especially from the Chikuho coal field in the northern part of the island where the coal seams vary in thickness from 4 to 33 feet, with a probable average thickness above 10 feet. The Chikuho coal field supplies about two-thirds of the production of the island of Kyushu, and about one-half of the output of the whole empire. One-tenth of the annual production of coal is contributed by the mines of Hokkaido (Yezo) Island where the Ishikari coal field produces nearly all of the coal. The seams of this field have even a greater thickness than those in the Chikuho coal field, and the field will doubtless increase in importance as transportation facilities improve.

India.

The coal mines of India which are regulated by the India Mines Act, have an annual production of about 20 million tons and employ about 95,000 men in underground work. In the production per man underground, India occupies a position below Belgium on the one hand and above Japan on the other. In this regard India gained the ascendancy over Japan in 1907 and an annual increase since that year has widened the margin of India's lead. The daily output of the Indian miners cannot be stated because the official reports do not show the number of days the mines are worked. Practically 85 per cent of the coal production is obtained from the coal fields of Bengal where the average thickness of the seams is approximately 9 feet. About 40 per cent of the underground mine workers are women. Something less than 1 per cent are boys and girls below 12 years of age.—Reports of Investigations, U. S. Bureau of Mines.

U. S. GEOLOGICAL SURVEY SEARCHING FOR ASBESTOS IN THE WESTERN STATES.

The Press Bulletin of the U. S. Geological Survey remarks that the United States now obtains most of its high-grade, long-fibre asbestos from Canada, but geolo-

gists of the Survey hope that large deposits which will yield material of good quality may yet be found in the Western States, especially in Arizona, where asbestos of unusually long fibre and silky texture has been discovered.

In the Apache and San Carlos Indian reservations in Arizona, asbestos is found associated with rocks of the Apache group, which is made up of several formations. The principal deposits are in the Salt River region, where the Apache group is represented chiefly by beds of quartzite and limestone, which are at many places invaded by diabase. Throughout this area much diabase has been injected into beds of limestone, and the asbestos is found near the contact of the limestone with the diabase. Places where the limestone has been broken by the diabase have been particularly favorable for the formation of asbestos. The asbestos is invariably associated with serpentine, and although serpentine occurs at many places without asbestos, serpentine "float" fragments of it that lie loose on the surface, having been washed out from its outcrop, are a valuable aid to the prospector for asbestos. In this region asbestos itself is also generally found as float for a considerable distance below its outcrop.

THE ASBESTOS MARKETS.

The strike of the asbestos miners at the King Beaver Mines at Thetford was brought to an end on the 15th of November by the men going back to work at the old wage rate of \$4.00 per day, instead of the \$4.50 per day asked.

There have been a number of accidents in the Thetford mines through collapsing of the sides of the asbestos quarries, probably connected with the unusually mild and damp weather, and the lack of really hard frost.

The Quebec correspondent of the Canadian Institute of Mining & Metallurgy's "Bulletin" states that demand from the United States for asbestos is not as keen as it was in the Summer, especially as regards mill-stock qualities. The European demand is very satisfactory, however, and asbestos mining is less affected by the commercial depression than any other branch of mining in the Province.

New York market letters prophesy higher prices for most grades of asbestos in 1921, but this will of course turn on the general state of manufacturing, and much will depend on the condition of the motor industry. Asbestos is used in such varied ways as to enter into most staple industries, which is a guarantee of its continued demand, and indicates that the briskness of demand will fluctuate with general manufacturing activity in the United States. While high-grade asbestos is much sought after, probably the most encouraging feature of the business at this time is the extension of uses for short fibre material and material that formerly was regarded as waste and unsaleable.

"Asbestos," of Philadelphia, states in regard to the market for Canadian asbestos: "We see no immediate sign of overproduction in Canada, especially of crude and long fibre. We do, however, see marked increase in the use of Rhodesian, African and Arizona fibre, with several new contenders showing on the horizon. The questions as to whether or no there is a demand for yarns and cloths made of blue and brown asbestos must in honesty be answered in the negative. There is no 'demand' true enough, but spinners are turning more and more regularly to blue and brown and are gradu-

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ally educating the trade to accept yarns and cloths made therefrom. With Canadian crudes selling at \$3,500 per ton it is not to be much wondered at that spinners seek to use fibres which can be bought at a fifth of that price..... There will be no serious break in the raw material market until non-Canadian fibres are proven tried and accepted by the trade and consumer. When that time comes, if it does, then Canadian must be brought nearer to the level asked for non-Canadian."

Following prices current in November are excerpted from "Asbestos."

Average market prices paid by consumers for average quantity, quality and freight haul from producer, about as follows:

Asbestos Air Cell Covering, 4 Ply	35% to	40% off.
" Air Cell Paper in rolls	\$10.00 to	\$12.00
" Cement	2.50 to	3.00 cwt.
" Cloths, 10s Commercial	1.50 to	2.00 lb.
" Listings and Tapes	1.75 to	10.00 lb.
" Millboard	10.00 to	18.00 cwt.
" Packing, Steam, High Pressure	1.25 to	2.00 lb.
" Packing Sheet	1.00 to	1.50 lb.
" Wick and Rope	.65 to	1.00 lb.
" Paper Commercial	10.00 to	18.00 cwt.
" Paper and Millboard Special	17.00 to	35.00 cwt.
" Yarns, 10s Commercial	1.35 to	1.90 lb.
" Yarn and Cloth, Special	2.00 to	6.00 lb.
Magnesia Carbonate, Powdered	15c to	20c lb.
85% Magnesia Pipe and Boiler Covering	10% to	20% off.

A Montreal Letter

ALEXANDER GRAY.

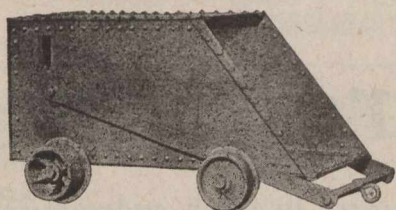
Oil Shale Plans Proceeding.

"Amid encircling gloom", while constructive forces are eradicating economic ills we know of, and destructive elements in share and commodity markets are anticipating dire happenings which may not occur, it is an auspicious event to have the Anglo-Persian oil interests, through the D'Arcy exploration Company, complete the foundation of the first unit in which the New Brunswick oil shales will be treated. Some weeks ago this was foreshadowed in "The Canadian Mining Journal". It was then intimated a plant was being ordered. Not only has that fact been verified, but the foundation work being finished, the expectation is the New Year will number among its achievements the successful inauguration of a Canadian oil-shale industry, backed by influential interests and conducted by experts. It has been "a long, long way to Tipperary," for Messrs Lodge and Mackenzie who exploited the qualities and extent of these New Brunswick shales—and, again it is not Canadians who "carry on."

Efficiency as a Remedy.

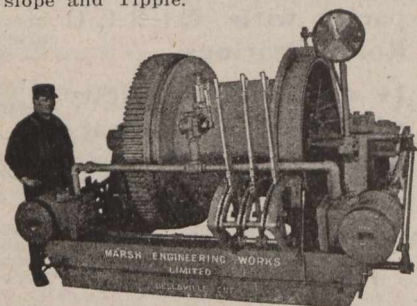
At least one large mine has the proof that the do-as-little-as-possible period is over. In one month of late, with the same number of men employed, there was an improved efficiency of 40 per cent., and less grumbling than had been noted for six years.

There being more applicants than vacancies, notwithstanding this property has been notoriously short-handed, the operating conditions leave no room for



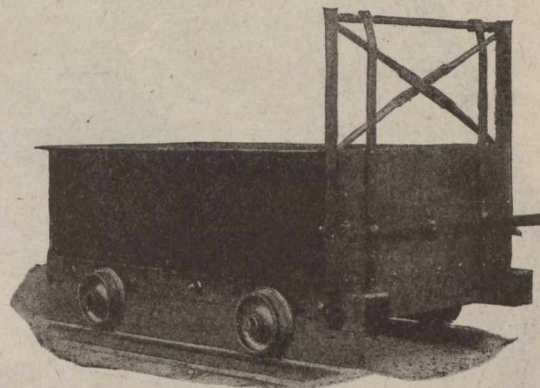
STEEL SKIPS

For use on Mine Tipples. Made any size to suit your work, and if desired, with double bottom, and rivets countersunk and flush on the inside, to facilitate easy dumping. Roller bearing wheels also, if desired, with dust excluding, oil retaining hubs. These Skips are made to suit your slope and Tipple.



MINE HOIST, for Heavy Duty. 50 H.P. Reversing Steam Engine, 40 in. dia. Drum. All gears cast steel, machine cut. Will lift two and a quarter tons at a speed of 400 feet per minute. This is a sample only of the many styles and sizes of Mine Hoists we make. We can build you any kind you want, either Steam, Electric, Gasoline or Belt Power.

THE MARSH HOIST & OTHER MINE EQUIPMENT, ARE RECOGNISED AS THE BEST, BUT WE ARE CONSTANTLY STRIVING TO MAKE THEM STILL BETTER.

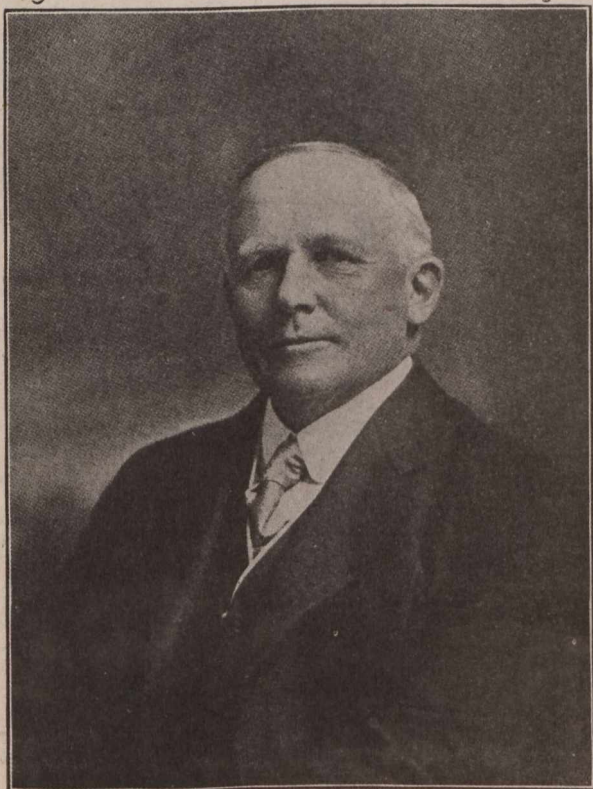


END DUMP CAR, for Mines or Quarries. Particularly adapted for use on Tipples. Door opens by engaging with latch on Tipple framework. Roller bearing wheels, if desired, dust-proof and self-oiling. Note the wide opening of the door for discharging large stones.

MARSH ENGINEERING WORKS, LIMITED, Established 1846 **BELLEVILLE, Ontario, Canada**

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“slackers.” Rather than be deprived of their livelihood by those eagerly seeking employment, men who have been reactionary to an almost intolerable extent have voluntarily concluded their best interests rest with their employers.



MR. MATTHEW LODGE OF MONCTON, N.B.

Nor is this spirit confined to one producing company. Others are having the same experience. For a change, a pick-and-choose policy is possible. Where wage concessions are impending, as at Cobalt, it is a reassuring sign of the times to have miners conciliatory, for they are well aware that metal markets are askew.

Uncertainty of tenure is proving an incentive to increased production per man. In the matter of wage schedules, perhaps their revision downward must harmonize with living requirements still none too lenient and yet in the altered circumstances it is co-operation which will make easier whatever readjustments are necessary.

Were it not for the shortage of power—a shortage, it is claimed, that might not have been so acute had foresight been exercised about the conservation of water—gold outputting immediately would be accelerated. Hand-drilling has been tried and found wanting for other than those carried on the pay-sheet at cost plus. So long as exchange on New York, which is the settlement basis, affords a premium, gold mines have an extra to bank. Silver exported carries a corresponding premium—but that premium no longer is handsomely poised upon peak prices for the metal.

In all other directions producers are awaiting the restoration of Peace Markets and resumption of buying big enough to go around. Give essential economies, precious metal mines can make “Snug Harbor” with their increased production. Special and base metals are not so fortunately situated—pending the provision of international credits and broader industrial movements. All of which goes to show how adventitious is the willingness of labor to assist in the solution of serious problems—largely their own.



Ore Cars

We carry in stock and can make prompt shipment of strongly built, light running, steel mine cars in the following sizes:

- 14 and 16 cubic feet capacity with C I R C O Roller Bearings.
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Canadian Ingersoll-Rand Co. Ltd.
 Sydney Sherbrooke Montreal Toronto
 Cobalt Winnipeg Nelson
 Vancouver

VANCOUVER MEETING OF THE INSTITUTE, FEBRUARY 9th TO 11th, 1921.

The provisional programme of the February meeting of the British Columbia Division of the Institute is as follows:

WEDNESDAY, 9th.—Morning session. Business and election of officers. Reviews of mining in the province by the Provincial Mineralogist and the Resident Engineers of the Department of Mines.

Afternoon Session.—Symposium of Fuel Supply, cost, distribution and substitutes. A lecture will be given in the evening.

THURSDAY, 10th.—Morning Session. Topic, "Metallurgical Problems of British Columbia."

Afternoon.—Topic, "Non-metallic minerals of British Columbia." Smoker in the evening, the feature of which will be a play by the Players' Club of the British Columbia University.

FRIDAY, 11th.—Morning Session. Discussion of Special Geological Problems affecting mining in British Columbia.

Afternoon.—Discussion on the Relation of the Institute to the Federal and Provincial Governments. Evening: Annual Dinner.

The Branch is offering two prizes for the best papers by students in the third and fourth years of the mining course at the University of British Columbia, one paper to be on a mining subject and the other on a metallurgical subject, the papers to be presented at one of the sessions of the meeting.

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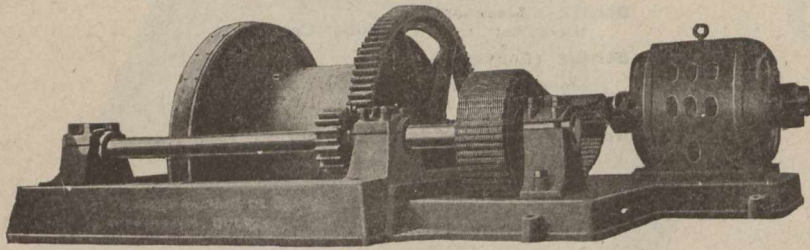
**Northern Canada Supply
Co. Limited**

COBALT, HAILEYBURY, SOUTH
PORCUPINE, TIMMINS

The Canadian Miners' Buying Directory.

- Acetylene Gas:**
Canada Carbide Company, Ltd.
Canadian Fairbanks-Morse.
Prest-O-Lite Co. of Canada, Ltd.
- A.C. Units:**
MacGovern & Co.
- Agitators:**
The Dorr Co.
- Air Hoists:**
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited.
- Alloy and Carbon Tool Steel:**
H. A. Drury Co., Ltd.
International High Speed Steel Co., Rockaway,
Peacock Brothers Limited.
- Alternators:**
MacGovern & Co.
Spielman Agencies, Regd.
- Aluminium:**
- Amalgamators:**
Northern Canada Supply Co.
Mine and Smelter Supply Co.
Wabi Iron Works.
- Antimony:**
Canada Metal Co.
- Antimonial Lead:**
Pennsylvania Smelting Co.
- Arrester, Locomotive Spark:**
Hendrick Manufacturing Co.
- Arsenic White Lead:**
Coniagas Reduction Co.
- Assayers' and Chemists' Supplies:**
Dominion Engineering & Inspection Co.
Lymans, Limited
Mine & Smelter Supply Co.
Pennsylvania Smelting Co.
Stanley, W. F. & Co., Ltd.
- Ash Conveyors:**
Canadian Link-Belt Company
- Ashes Handling Machinery:**
Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.
- Assayers and Chemists:**
Milton L. Hersey Co., Ltd.
Campbell & Deyell
Ledoux & Co.
Thos. Heys & Son
C. L. Constant Co.
- Asbestos:**
Everitt & Co.
- Balls:**
Canadian Foundries and Forgings, Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
Peacock Brothers Limited.
The Electric Steel & Metals Co.
The Wabi Iron Works.
The Hardinge Conical Mill Co.
- Ball Mills:**
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
Mine and Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works.
- Balances—Hensser:**
Canadian Fairbanks-Morse Co., Ltd.
Mine and Smelter Supply Co.
- Rabbit Metals:**
Canada Metal Co.
Canadian Fairbanks-Morse Co., Ltd.
Hoyt Metal Co.
- Ball Mill Feeders:**
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
- Ball Mill Linings:**
Hardinge Conical Mill Co.
Hull Iron & Steel Foundries, Ltd.
- Belting—Leather, Rubber and Cotton:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Northern Canada Supply Co.
Jones & Glasco.
- Belting:**
R. T. Gilman & Co.
Gutta Percha & Rubber, Ltd.
- Belting—Silent Chain:**
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glasco (Regd.)
- Belting (Transmission):**
Goodyear Tire & Rubber Co.
- Belting (Elevator):**
Goodyear Tire & Rubber Co.
- Belting (Conveyor):**
Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.
- Blasting Batteries and Supplies:**
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Ltd.
Northern Canada Supply Co.
Canadian Explosives, Ltd.
Giant Powder Co. of Canada, Ltd.
- Bluestone:**
The Consolidated Mining & Smelting Co.
- Blowers:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
- Boilers:**
Northern Canada Supply Co.
Canadian Ingersoll-Rand Co., Ltd.
Marsh Engineering Works
MacGovern & Co., Inc.
R. T. Gilman & Co.
Fraser & Chalmers of Canada, Ltd.
The John Inglis Company
Wabi Iron Works.
- Blue Vitriol (Coniagas Bed):**
Canadian Fairbanks-Morse Co., Ltd.
- Borts and Carbons:**
Diamond Drill Carbon Co.
- Boxes, Cable Junction:**
Standard Underground Cable Co. of Canada, Ltd.
Northern Electric Co., Ltd.
- Brazilian Rough Diamonds:**
Diamond Drill Carbon Co.
- Brazilian Mica:**
Diamond Drill Carbon Co.
- Buggies, Mine Car (Steel):**
Hendrick Manufacturing Co.
- Brazilian Ballas:**
Diamond Drill Carbon Co.
- Brazilian Rock Crystal:**
Diamond Drill Carbon Co.
- Brazilian Tourmalines:**
Diamond Drill Carbon Co.
- Brazilian Aquamarines:**
Diamond Drill Carbon Co.
- Bridges—Man Trolley and Rope Operated—Material Handling:**
Canadian Mead-Morrison Co., Limited
- Bronze, Manganese, Perforated and Plain:**
Hendrick Manufacturing Co.
- Buckets:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
The Electric Steel & Metals Co.
R. T. Gilman & Co.
Hendrick Manufacturing Co.
Canadian Link-Belt Co., Ltd.
Marsh Engineering Works
Mussens, Ltd.
MacKinnon Steel Co., Ltd.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Wabi Iron Works
- Buckets, Elevator:**
Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.
Peacock Brothers Limited.
- Cable—Aerial and Underground:**
Canada Wire & Cable Co.
Northern Canada Supply Co.
Standard Underground Cable Co. of Canada, Ltd.
- Cableways:**
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
Mussens, Ltd.
The Wabi Iron Works
R. T. Gilman & Co.
- Cages:**
Canadian Ingersoll-Rand Co., Ltd., Montreal, Que.
Northern Canada Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Mine & Smelter Supply Co.
Mussens, Ltd.
The Wabi Iron Works

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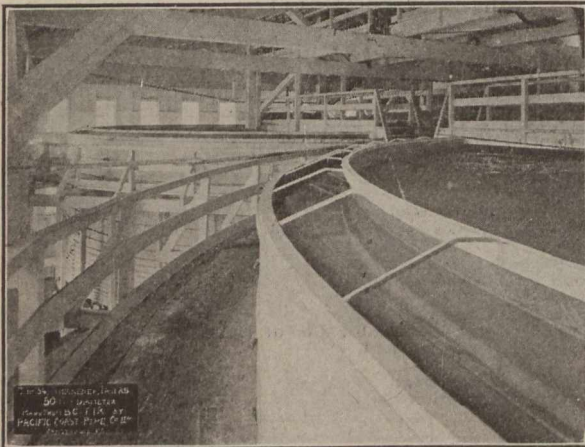
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Canadian Miners' Buying Directory.—(Continued)

Cables—Wire:

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

Cable Railway Systems:

Canada Wire & Cable Co.
Canadian Mead-Morrison Co., Limited.

Cam Shafts:

Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Peacock Brothers Limited.

Car Dumps:

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

Carbide of Calcium:

Canada Carbide Company, Ltd.

Cars:

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

Car Wheels and Axles:

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

Carriers (Gravity):

Jones & Glassco

Castings—Brass

The Canada Metal Co., Ltd.

Castings (Iron and Steel)

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

Cement and Concrete Waterproofing:

Spielman Agencies, Regd.

Cement Machinery:

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

Chains:

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

Chain Drives:

Jones & Glassco (Regd.)

Chain Drives—Silent and Steel Roller:

Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.

Chemical Apparatus:

Mine and Smelter Supply Co.

Chemists:

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

Chrome Ore:

The Electric Steel & Metals Co.
Everett & Co.

Classifiers:

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

Clutches:

Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.

Coal:

Dominion Coal Co.
Nova Scotia Steel & Coal Co.

Coal Cutters:

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

Coal Crushers:

Canadian Mead-Morrison Co., Limited
Canadian Link-Belt Co., Ltd.
Peacock Brothers Limited.

Coal Mining Explosives:

Canadian Explosives, Ltd.

Giant Powder Company of Canada, Ltd.

Coal Mining Machinery:

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

Coal and Coke Handling Machinery

Canadian Mead-Morrison Co., Limited.
Canadian Link-Belt Co., Ltd.

Coal Pockets:

Canadian Mead-Morrison Co., Limited.

Coal Pick Machines:

Sullivan Machinery Co.

Coal Screening Plants:

Canadian Link-Belt Co., Ltd.
Canadian Mead-Morrison Co., Limited.

Cobalt Oxide:

Coniagas Reduction Co.
Everitt & Co.

Compressors—Air:

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

Concrete Mixers:

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

Condensers:

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

Concentrating Tables:

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

Converters:

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

Conveyors—McCaslin Gravity Bucket:

Canadian Mead-Morrison Co., Limited.

Contractors' Supplies:

Canadian Fairbanks-Morse Co., Ltd.

Consulters and Engineers:

Hersey Milton Co., Ltd.

Conveyors:

Canadian Link-Belt Co., Ltd.
The Mine & Smelter Supply Co.
Jones & Glassco (Regd.)

Conveyor Belts:

Gutta Percha & Rubber, Ltd.

Conveyor Flights:

Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co., Ltd.

Conveyor—Trough—Belt:

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

Conical Mills:

Hardinge Conical Mill Co.

Copper:

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

Couplings:

Hans Renold of Canada, Limited, Montreal, Que.

Cranes:

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

Crane Ropes:

Allan Whyte & Co.
Canada Wire & Cable Co.
Greening, B., Wire Co., Ltd.

Crucibles:

Canadian Fairbanks-Morse Co., Ltd.
The Mine & Smelter Supply Co.

Crusher Balls:

Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Limited, Hull, Que.
Osborn, Sam'l (Canada) Limited.
Swedish Steel & Importing Co., Ltd.

Crushers:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
Hardinge Conical Mill Co.
Osborn, Sam'l (Canada) Limited.
The Electric Steel & Metals Co., Ltd.
R. T. Gilman & Co.
Lyman, Ltd.
Mussens, Limited

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Nickel, Oxide and Metal

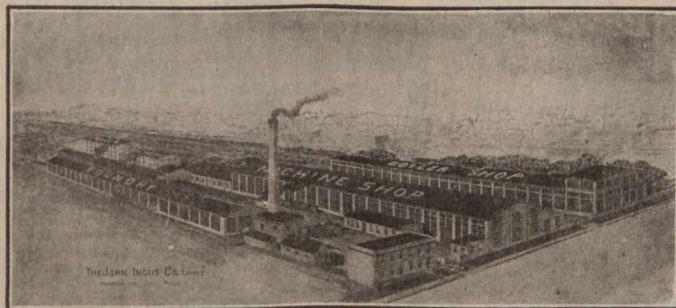
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J. W. ANDERSON, 7 Bank Street Chambers

Canadian Miners' Buying Directory.—(Continued)

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Hadfields, Limited
Fraser & Chalmers of Canada Ltd.
The Wabi Iron Works
- Cut Gears:**
Hans Renold of Canada, Limited, Montreal, Que.
- Cyanide:**
American Cyanamid Company.
- Cyanide Plant Equipment:**
The Dorr Co.
The Mine & Smelter Supply Co.
- D. C. Units:**
MacGovern Co.
- Derrick:**
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited
- Diamond Drill Contractors:**
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.
- Diamond Tools:**
Diamond Drill Carbon Co.
- Diamond Importers:**
Diamond Drill Carbon Co.
- Digesters:**
Canadian Chicago Bridge and Iron Works
- Dies:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
- Dredging Machinery:**
Canadian Steel Foundries, Ltd.
Canadian Mead-Morrison Co., Limited
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.
- Dredging Ropes:**
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.
- Drills, Air and Hammer:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
The Mine & Smelter Supply Co.
Mussens, Limited
- Drills—Core:**
Canadian Ingersoll-Rand Co., Ltd.
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond:**
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company
- Drill Steel—Mining:**
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rock
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.
- Drill Steel Sharpeners:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Northern Canada Supply Co.
Sullivan Machinery Co.
Osborn, Sam'l (Canada) Limited.
The Wabi Iron Works
- Drills—Electric:**
Canadian Fairbanks-Morse Co., Ltd.
Sullivan Machinery Co.
Northern Electric Co., Ltd.
- Drills—High Speed and Carbon:**
Canadian Fairbanks-Morse Co., Ltd.
Osborn, Sam'l (Canada) Limited.
H. A. Drury Co., Ltd.
Hadfields, Limited
- Dynamite:**
Canadian Explosives
Giant Powder Company of Canada, Ltd.
Northern Canada Supply Co.
- Dynamos:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Company
- Ejectors:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Ingersoll-Rand Co., Ltd.
Northern Canada Supply Co.
- Elevators:**
Canadian Mead-Morrison Co., Limited.
Canadian Link-Belt Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
Jones & Glassco (Regd.)
Mussens, Limited
The Wabi Iron Works
- Engineering Instruments:**
C. L. Berger & Sons
- Engines—Automatic:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited
Fraser & Chalmers of Canada, Ltd.
- Engines—Gas and Gasoline:**
Canadian Fairbanks-Morse Co., Ltd.
Alex. Fleck
Fraser & Chalmers of Canada, Ltd.
Osborn, Sam'l (Canada) Limited.
Sullivan Machinery Co.
Gould, Shapley & Muir Co., Ltd.
MacGovern & Co., Inc.
The Mine & Smelter Supply Co.
- Engines—Haulage:**
Canadian Ingersoll-Rand Co., Ltd., Montreal.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
- Engines—Marine:**
Canadian Fairbanks-Morse Co., Ltd.
MacGovern & Co., Inc.
Swedish Steel & Importing Co., Ltd.
- Engines—Steam:**
Canadian Fairbanks-Morse Co., Ltd.
Canadian Mead-Morrison Co., Limited.
R. T. Gilman & Co.
MacGovern & Co., Inc.
Fraser & Chalmers of Canada, Ltd.
- Engines—Stationary:**
Swedish Steel & Importing Co., Ltd.
- Engineers:**
General Engineering Co., New York
The Dorr Co.
- Ferro-Alloys (all Classes):**
Everitt & Co.
- Feed Water Heaters:**
MacGovern & Co.
- Fire Fighting Supplies:**
Gutta Percha & Rubber, Ltd.
- Flashlights—Electric:**
Spielman Agencies, Regd.
- Flood Lamps:**
Northern Electric Co., Ltd.
- Flourispar:**
The Consolidated Mining & Smelting Co.
Everitt & Co.
- Forges:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Forging:**
Canadian Mead-Morrison Co., Limited.
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
- Frogs:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
- Frequency Changers:**
MacGovern & Co., Inc.
- Furnaces—Assay:**
Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.
- Fuse:**
Canadian Explosives
Giant Powder Company of Canada, Ltd.
Northern Canada Supply Co.
- Gaskets:**
Gutta Percha & Rubber, Ltd.
- Gears:**
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glassco (Regd.)
- Gears (Cast):**
Hull Iron & Steel Foundries, Ltd.
Canadian Link-Belt Co., Ltd.
- 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.
Gutta Percha & Rubber, Ltd.**Hose (Fire):**Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.**Hose (Packings)**Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.**Hose (Suction):**Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.**Hose (Steam):**Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.**Hose (Water):**Goodyear Tire & Rubber Co.
Gutta Percha & Rubber, Ltd.**Hammer Rock Drills:**Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Mussens, Limited
The Mine & Smelter Supply Co.**Hangers and Cable:**

Standard Underground Cable Co. of Canada, Ltd.

High Speed Steel:Canadian Fairbanks-Morse Co. Ltd.
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited.
Hadfields, Limited
International High Speed Steel Co., Rockaway,**High Speed Steel Twist Drills:**Canadian Fairbanks-Morse Co., Ltd.
H. A. Drury Co., Ltd.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.**Hoists—Air, Electric and Steam:**Canadian Ingersoll-Rand Co., Ltd.
Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Jones & Glassco
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
Northern Canada Supply Co.
Mine & Smelter Supply Co.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
R. T. Gilman & Co.
Mussens, Limited
Canadian Link-Belt Co., Ltd.**Hoisting Engines:**Canadian Fairbanks-Morse Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
The Electric Steel & Metals Co.
Mussens, Limited
Sullivan Machinery Co.
Canadian Ingersoll-Rand Co., Ltd.
Canadian Mead-Morrison Co., Limited
Marsh Engineering Works
Fraser & Chalmers of Canada, Ltd.
The Mine & Smelter Supply Co.**Hoisting Towers:**

Canadian Mead-Morrison Co., Limited.

Hose:Canadian Fairbanks-Morse Co., Ltd.
Gutta Percha & Rubber, Ltd.
Northern Canada Supply Co.**Hose (Steam, Air, Water):**

Gutta Percha & Rubber, Ltd.

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

Dewar Manufacturing Co., Inc.

Lanterns—Electric:

Spielman Agencies, Regd.

Lead (Pig):The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
Hoyt Metal Company.**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.
Canadian Link-Belt Co., Ltd.
Northern Canada Supply Co.
Jones & Glassco**Machinists:**

Burnett & Crampton

Machinery—Repair Shop:

Canadian Fairbanks-Morse Co., Ltd.

Machine Shop Supplies:

Canadian Fairbanks-Morse Co., Ltd.

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

Canadian Fairbanks-Morse Co., Ltd.

Metal Merchants:Henry Bath & Son
Geo. G. Blackwell, Sons & Co.
Conlagas Reduction Co.
Consolidated Mining & Smelting Co. of Canada
Canada Metal Co.
C. L. Constant Co.
Everitt & Co.**Hoyt Metal Company.****Metallurgical Engineers:**General Engineering Co., New York
The Durr Co.**Metallurgical Machinery:**General Engineering Co., New York
The Durr Co.
The Mine & Smelter Supply Co.**Metal Work, Heavy Plates:**

Canada Chicago Bridge & Iron Works

Mica:Everitt & Co.
Diamond Drill Carbon Co.**Mining Engineers:**

Hersey, M. Co., Ltd.

Mining Drill Steel:H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited.

International High Speed Steel Co., Rockaway, N

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

Dominion Wire Rope Co., Ltd.

Mine Surveying Instruments:

C. L. Berger & Sons

Molybdenite:

Everitt & Co.

Monel Metal (Wire, Rod, Sheet and Foundry Metal):

International Nickel Co.

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

Canadian Miners' Buying Directory.—(Continued)

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

Walls:
Canada Metal Co.

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

Nickel Anodes:
The Mond Nickel Co., Ltd.

Nickel Salts:
The Mond Nickel Co., Ltd.

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

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

Oil Analysts:
Constant, C. L. Co.

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

Ore Sacks:
Northern Canada Supply Co.

Ore Testing Works:
Ledoux & Co.
Can. Laboratories
Milton Hersey Co.
Campbell & Deyell
General Engineering Co., New York
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.
Gutta Percha & Rubber, Ltd.

Paints—Special:
Spielman Agencies, Regd.

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

Permissible Explosives:
Giant Powder Company of Canada, Ltd.

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

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

Pillow Blocks:
Canadian Link-Belt Company

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.
R. T. Gilman & Co.

Powder:
Giant Powder Company of Canada, Ltd.

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

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

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

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

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

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

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

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

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

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

Pumps—Diaphragm
The Dorr Company

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

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

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

Balls:
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.

Roller Chain:
Hans Renold of Canada, Limited, Montreal, Que.
Canadian Link-Belt Co., Ltd.

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

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

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

Canadian Miners' Buying Directory.—(Continued)

Rope—Wire:

Allan, Whyte & Co., Ltd.
Canada Wire & Cable Co.
Dominion Wire Rope Co., Ltd.
Greening, E. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing

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

Samplers:

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

Scales—(all kinds):

Canadian Fairbanks-Morse Co., Ltd.

Screens:

Greening, E. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Canada Wire and Iron Goods Company.
Canadian Link-Belt Co., Ltd.

Screens—Cross Patent Flanged Lip:

Hendrick Mfg. Co.

Screens—Perforated Metal:

Hendrick Mfg. Co.

Screens—Shaking:

Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.

Screens—Revolving:

Canadian Link-Belt Co., Ltd.
Hendrick Mfg. Co.

Scheelite:

Everitt & Co.

Separators:

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

Shaft Contractors:

Hendrick Mfg. Co.

Sheet Metal Work:

Hendrick Mfg. Co.

Sheets—Genuine Manganese Bronze:

Hendrick Mfg. Co.

Shoes and Dies:

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

Shovels—Steam:

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

Ship Bunkering Equipment:

Canadian Mead-Morrison Co., Limited.

Silent Chain:

Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.

Silent and Steel Roller:

Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Silver:

Conlagas 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

Solder—Bar and Wire:

Hoyt Metal Company

Special Machinery:

John Inglis Co., Ltd.

Spelter:

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

Sprockets:

Hans Renold of Canada, Limited, Montreal, Que.
Canadian Link-Belt Co., Ltd.
Jones & Glassco (Regd.)

Spring Coil and Clips Electric:

Canadian Steel Foundries, Ltd

Steel Barrels:

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

Stamp Forgings:

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

Steel Castings:

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

Steel Drills:

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

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

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

Structural Steel Work (Light):

Hendrick Mfg. Co.

Stone Breakers:

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

Sulphate of Copper:

The Mond Nickel Co., Ltd.
Conlagas Reduction Co.

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:

John J. Gartshore

Tables—Concentrating:

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

Tanks:

R. T. Gilman & Co.

Tanks—Acid:

Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks (Wooden):

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

Tanks—Cyanide, Etc.:

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

Tanks—Steel:

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

Tanks—Oil Storage:

Canadian Chicago Bridge & Iron Works
The Mine & Smelter Supply Co.

Tanks (water) and Steel Towers:

Canadian Fairbanks-Morse Co., Ltd.
Canadian Chicago Bidge & Iron Works
Gould, Shapley & Muir Co., Ltd.
MacKinnon Steel Co.
Mine & Smelter Supply Co.
The Wabi Iron Works

Tires—Auto, Truck and Bicycle:

Gutta Percha & Rubber, Ltd.

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 Apparatus:
Jones & Glassco (Regd.)

Transmission Machinery:
Canadian Link-Belt Co., Ltd.
Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glassco (Regd.)

Troughs (Conveyor):
Hendrick Manufacturing Co.

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

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

Trucks:
Canadian Fairbanks-Morse Co., Ltd.

Tubs:
Hadfields, Limited

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

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

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

Turbines—Water Wheel:
MacGovern & Co.

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

Twincones:
Canada Foundries & Forgings, Ltd.

Uranium:
Everitt & Co.

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

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

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

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

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

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

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

Wire—Bare and Insulated:
Canada Wire & Cable Co.

Wire Rope:
Allan, Whyte & Co., Ltd.
R. T. Gilman & Co.
Canada Wire and Iron Goods Company.
Canada Wire & Cable Co.
Dominion Wire Rope Co., Ltd.

Wire Rope Fittings:
Canada Wire and Iron Goods Company.
Canada Wire & Cable Co.

Wire Cloth:
Northern Canada Supply Co
Greening, B. Wire Co.
Canada Wire & Iron Goods Company

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

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

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

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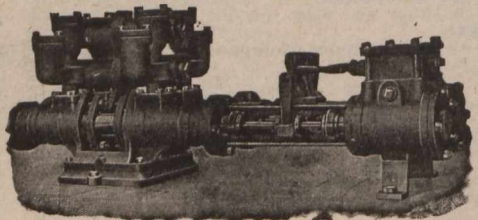
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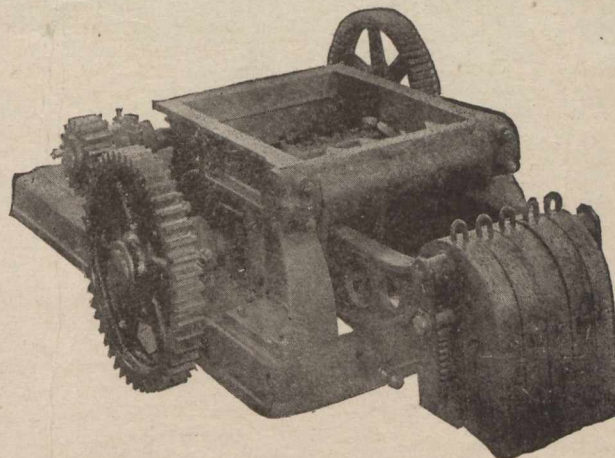
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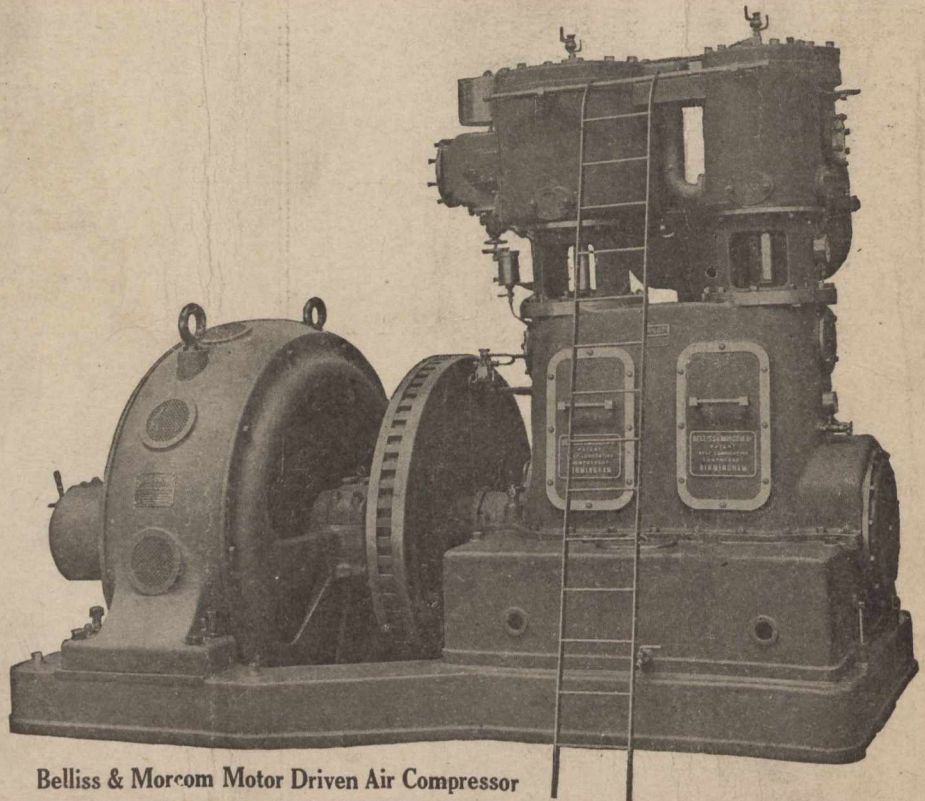
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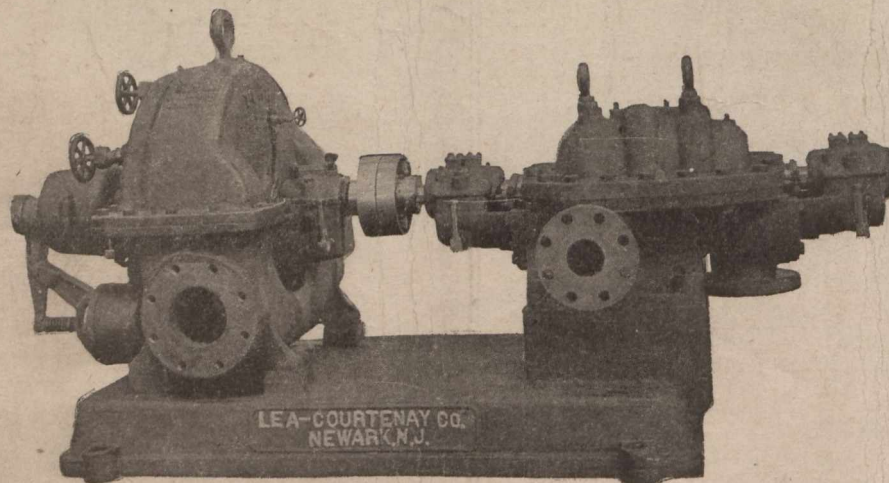
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