



CANADIAN



MINING JOURNAL

Vol. XLI.

Gardenvale, P. Q., October 8, 1920.

No. 40.

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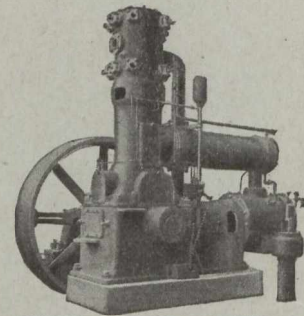
In these older types, heavy construction and massive bed plates or foundations are necessary to absorb the vibrations. But these exist, and cause wear and strain on the moving machine.

The perfect balance of the vertical and horizontal moving parts of the **Sullivan Angle Compound Compressor**, assisted by a slight counter weight, practically neutralizes the up and down and back and forth vibration. There is no twisting strain, because the two connecting rod boxes seat cheek to cheek on the crankshaft.

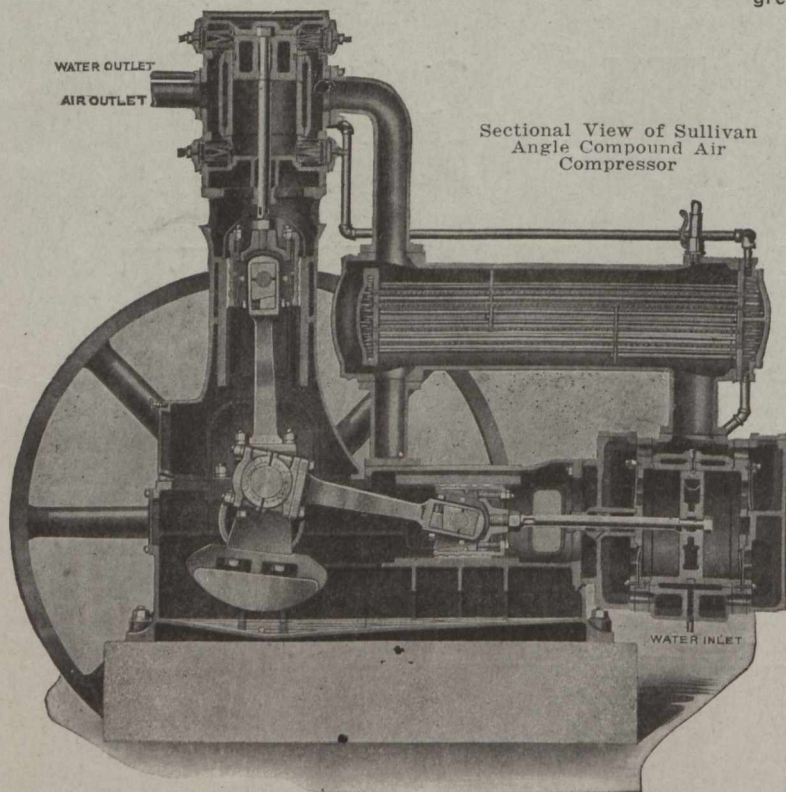
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- Reduction in horse power per unit of air compressed
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Air Compressor



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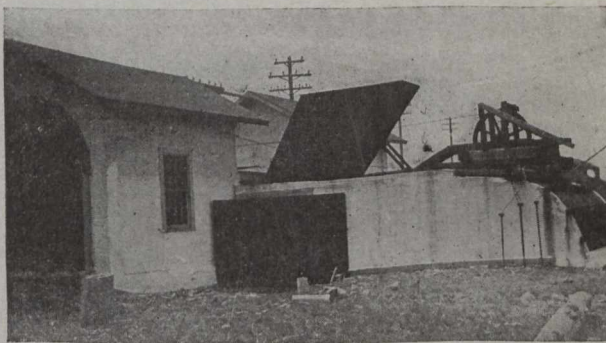
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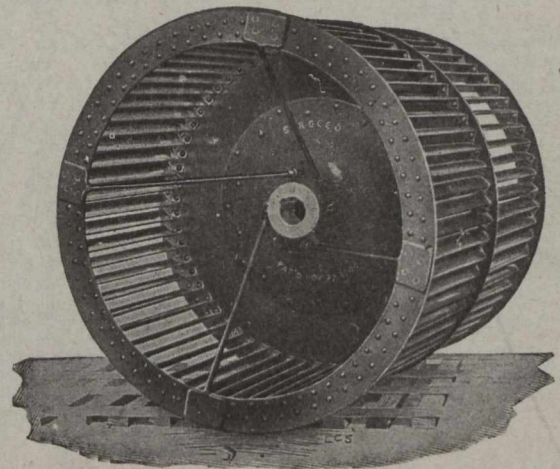
66 Sirocco 99

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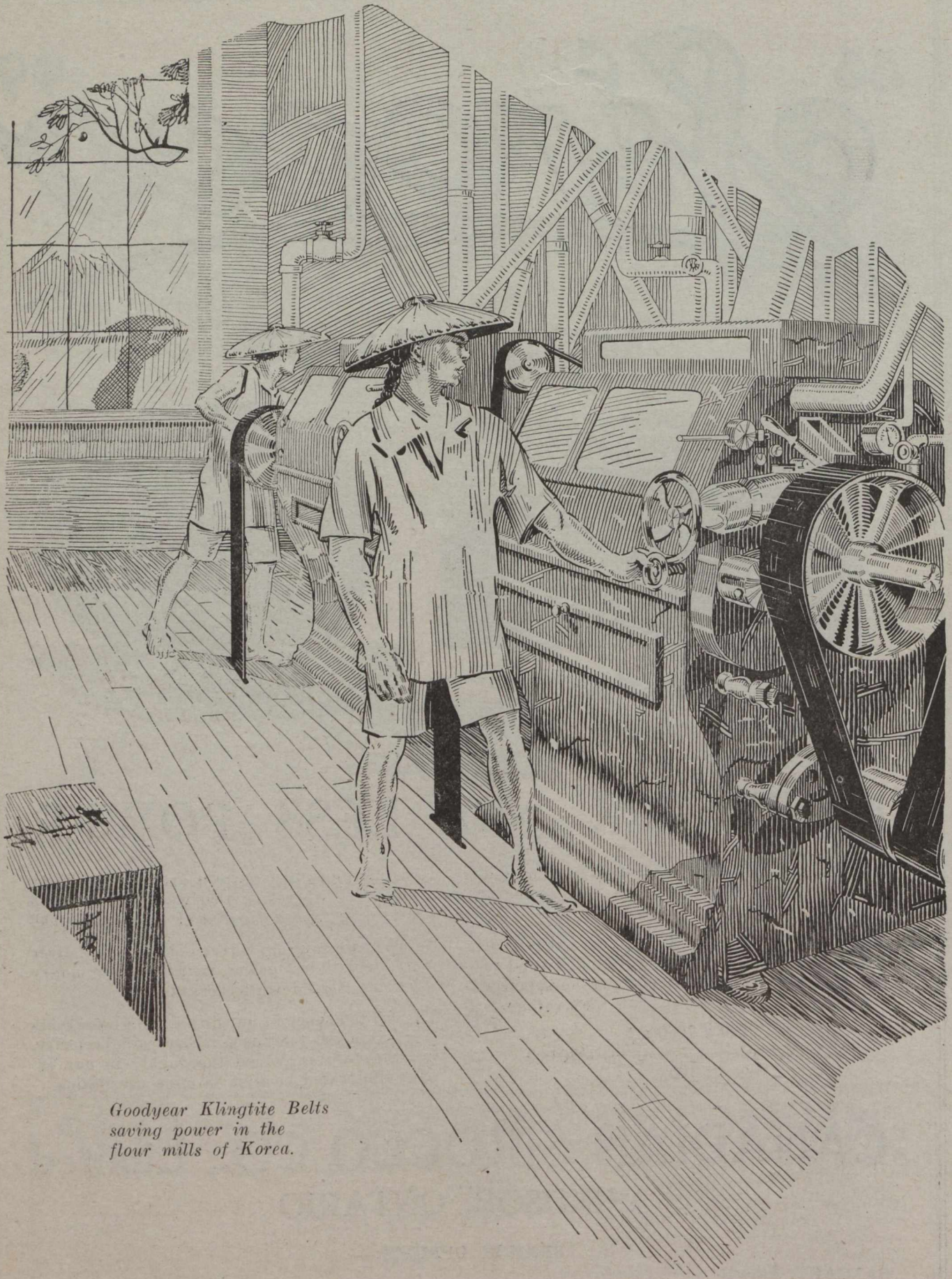
The limited space at our disposal here prevents going into the reasons for Sirocco superiority, but they are explained thoroughly in our 66-page illustrated booklet on mine ventilation.

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HON. H. MILLS, Minister of Mines.

Ontario's Mining Lands

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

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

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

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.

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

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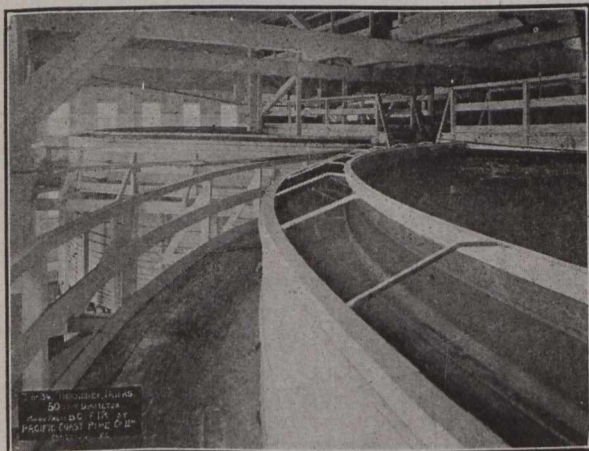
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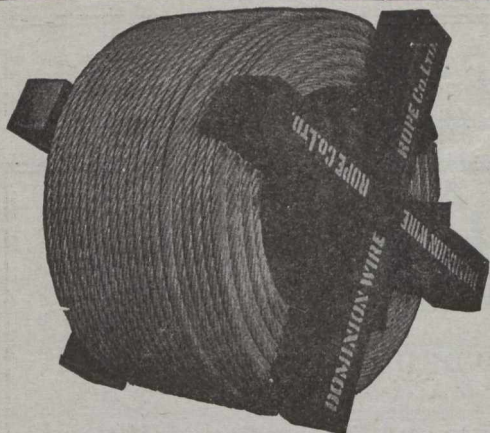
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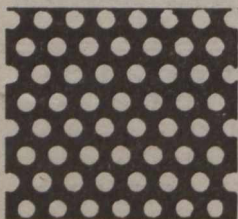
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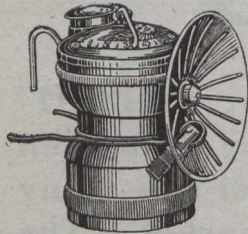
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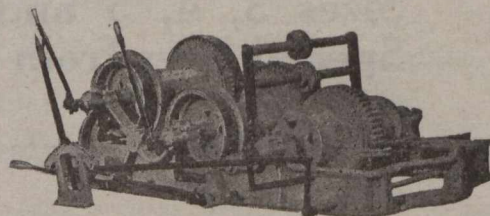
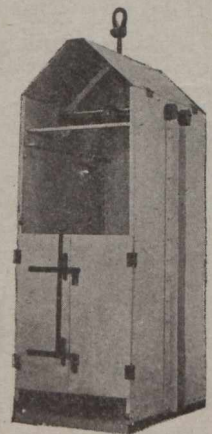
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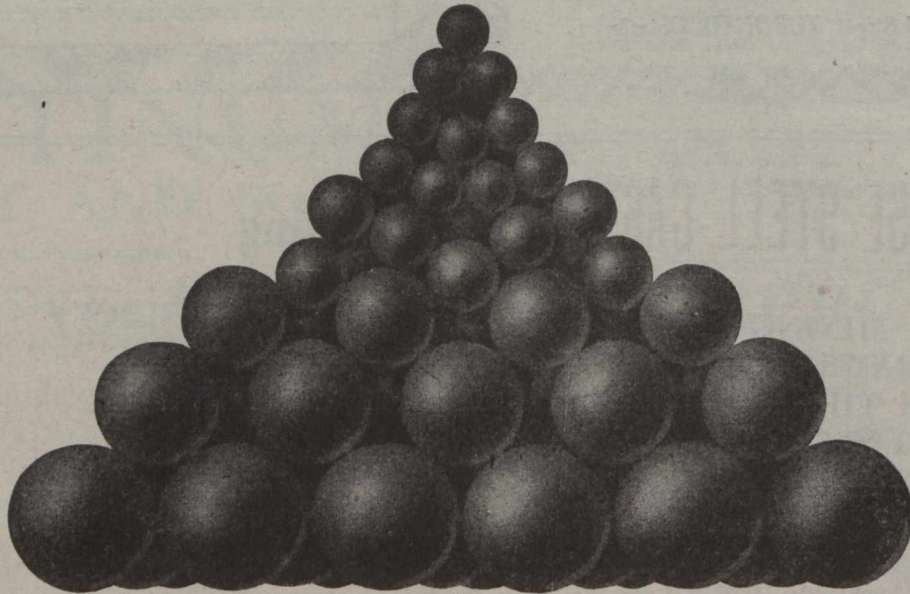
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VOL. XLI.

GARDENVALE, P.Q., October 8, 1920

No. 40

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EDITORIAL

INDUSTRIAL LEADERSHIP AND THE MANAGER.

The "Atlantic Monthly" for October contains an unusual essay by Mr. Sam A. Lewisohn, a well-known figure in the mining industry of the United States, which is interesting to members of the Canadian Institute of Mining and Metallurgy because of the approving quotation of portions of the notable paper which Mr. C. V. Corless read at the last Montreal meeting of the Institute. Mr. Corless's remarks are quoted as being "rather exceptional".

Mr. Lewisohn and Mr. Corless are at one in pointing out that the severe technical studies and undivided consideration of the material sciences which the technical graduate experiences in the course of his training tend to dehumanize him, and serve to unfit him for handling human relations unless there has been brought to bear some neutralizing influence.

It is pointed out that industrial leadership is more and more developing upon technical graduates, who as the managers of works, forming possibly one link in the chain of operations of a vast corporation, come into contact with men, as well as things, and in these days tend to supersede the former owner-manager. The change is not altogether for the worse, even in the matter of human relations, because as Mr. Lewisohn points out, the owner-manager, while possibly a man of the world, often was a person of dogmatic and biased viewpoint, whereas "the scientific approach of the engineer is unfriendly to intolerance." Therefore it is concluded that "engineer-managers who have combined with their knowledge of the material sciences a scientific study of human relations are usually superior to other industrial managers in their approach".

Mr. Lewisohn concludes by stating that the works manager is the person who is in the position of continuous administrative responsibility, and to him we must look primarily for constructive development in the everyday problems of our industrial life. "Whether he be engineer or layman, he should be properly trained to assume the leadership that is rightfully his." Herein is matter for much cogitation on the part of technical educationalists, for broadly considered, as Mr. Corless pointed out, and as the Committee of the Institute that was appointed to consider Mr. Corless's paper soon discovered when they sat down around a table, it cuts right to the root of training for citizenship.

There is the further consideration that, apart from scholastic training, the type of mind that excels in weighing and measuring material things often instinctively revolts against the study of mankind. Also, it has been fairly well demonstrated that it is much easier to find men with scientific and financial acumen, than to find men with a native capacity for leadership.

Mr. Lewisohn neatly sums up the disadvantage which the technical works-manager is up against when compared with the labor leader. The last-named has an experience which is largely political and forensic. The first-named has had a training which was confined "to studying the reactions of dead matter". Naturally when the question at issue is that of human relations, and what Mr. Corless calls "imponderables", the gentlemen with political and forensic ability possesses the advantage.

This is a sign of our times that was plainly visible at the last Industrial Conference at Ottawa.

THE SEARCH FOR PETROLEUM IN THE UNITED KINGDOM.

The Petroleum Department of the United Kingdom has issued a statement reporting the depth and showings of ten boreholes that are being drilled by the Government in search of petroleum.

Seven holes are located in Derbyshire. At Hardstoft, production by natural overflow continues steadily at about seven barrels daily. The amount of oil in stock to 28th August has reached 3,696 barrels, or 478 tons. This is the only well that has given an actual flow of petroleum.

The other six holes are down to depths varying from 2,900 feet to 4,006 feet. Three of the wells, at depths of about 3,700 feet are in the Carboniferous Limestone, and in one case, a sand 7 feet thick was encountered which gave indications of oil.

In North Staffordshire two wells are being drilled. Lost tools have delayed this work, and in one case the hole has been abandoned and a new one is being sunk.

In Scotland, one drill-hole is down 3,844 feet at West Calder, which met a slight show of oil at 3,705 feet. Drilling is being continued in shales containing occasional beds of ash. At D'Arcy the drill is down 724 feet where a strong flow of natural gas was encountered.

The search for petroleum in Britain has been carried on against the advice of most of the British geologists, who hold that the geological conditions are unfavorable, but, if the only objection that can be urged is that of expenditure, it can be well replied that much more useless expenditures have been made in the world during the past six years, and, at any rate, the presence of petroleum has been proved at Hardstoft. In regard to a matter of such national importance as the presence of oil within the United Kingdom, even negative evidence is a desirable thing to have, and it is to be hoped that the British Government will continue the search for petroleum until it is definitely proved that it does or does not exist in commercially valuable quantities.

The existence of valuable beds of oil-bearing shales in the South of England seems to be definitely proven, and, now that the Kent Coalfield is producing large tonnages of good coal from ample reserves, there seems reason to expect a territorial readjustment of industrial activities in England of a nature that could not have been remotely guessed at fifty years ago.

The connection of the Kent Coalfield along the course of the Thames Valley with the Coalfield of the Forest of Dean is a possibility seriously discussed. Should workable deposits of coal be ever reached in this part of England it will still further postpone Britain's descent to the home of the everlasting bow-bows, monotonously forecasted as her speedy destination from time immemorial.

NEWFOUNDLAND.

In this issue will be found a full and fair account of the status of the mineral industry in Newfoundland, given by Mr. D. James Davies, the Government Analyst, before the Imperial Mineral Resources Bureau. Mr. Davies correctly states that Newfoundland is a country "which is on the whole practically undeveloped". He has also to admit that for many years no geological work has been done by the Newfoundland Government, and, while it mentioned that the Natural Resources Department of the Reid Newfoundland Company has done excellent work in geological investigations, private enterprise in what is in every other country considered a national affair, does not excuse the omission of the Newfoundland Government. It is this very lack of the functions of a Geological Survey, to wit, investigation and publication to the outside world of the result of investigation, that accounts for the paucity of information regarding Newfoundland in encyclopaedias and geography manuals that Mr. Davies complained of in London. References in current literature cannot be made unless there is a source for the references. We had occasion recently in reviewing Dr. F. H. Hatch's little manual on Mineralogy to note

the omission of any reference to the Wabana ore deposit. We might note that the Germans were extremely well informed about Wabana in the days before the War, but they did not get their information through government reports.

DAYLIGHT SAVING IS COAL SAVING.

The "Electrical News" states that in a paper read before the Illuminating Engineers Society of the United States, Mr. Preston S. Millar discusses the advantages and disadvantages of daylight saving. Statistics are given showing the estimated saving in coal consumption and expenditure for artificial light in that part of the United States lying north of the Potomac and Ohio Rivers and east of the Mississippi River.

Mr. Millar estimates the reduced output of electric light and gas stations to have been as follows:

Reduced electricity output, total systems,
 during seven summer months 3 per cent.
 Ditto — residential loads only 8 per cent.
 Ditto — gas station, total output . . . 3 per cent.

Estimates of the approximate saving in coal and light expenditures throughout the United States during seven summer months under daylight saving are as follows:

	Annual Saving in Coal tons	Annual Saving in Expenditure for Electric Light
Electricity (central stations)	300,000	\$14,000,000
Gas	195,000	5,250,000
	495,000	\$19,250,000

Mr. Millar's conclusions are that daylight saving has disadvantages that exceed the undoubted advantages, but it has been generally overlooked that the primary reason for adopting daylight saving during the war years was to save coal and light expenditures, and, insofar as this has been achieved, the adoption has been convincingly justified.

In Europe, where the necessity to economise in coal and every other form of motive power, is infinitely greater than it has ever been on this side of the water, the justification of daylight saving on the economic score is still more complete, and "Summer Time" is probably an established institution in Europe for this generation.

Long before the daylight saving idea was brought to public attention by the exigencies of the war, it had been the custom in mining camps situated at points remote from a railway, to put the clock forward by degrees in the Spring, the idea being to gain extra hours of daylight for outdoor operations, and to save on power consumption for artificial light.

The discussion on daylight saving in North America has unfortunately degenerated into a phase of that deplorable hostility that has come to exist between the town and the country, and it is well to remember

that the questions of suburban gardening, hours of labor and morning dews had nothing to do with the action of governments in their original adoption of daylight saving legislation. It was adopted to save coal, and that it certainly has done.

EN PASSANT.

One result of the Press Conference that will be very pleasing to Canadian readers is the announcement made by the Managing Director of Reuter's Agency that a news service for Canada is being arranged that will "relieve the Canadian press from the innocent and unconscious, but none the less harmful, coloring of American news." This is prettily put.

If we could also have London cables that were free from political coloring the Canadian reader might have a chance to form independent opinions on European situations without having to wait for the arrival of European newspapers. How it is that no person appears able to transmit news from Europe without seeking to stamp it with some bias intended to form public opinion in Canada? It is news we require, not interpretations.

A conflict for priority between shipments of coal and shipments of wheat eastward from Alberta is causing criticism of the Canadian National Railway in the West. The Regina "Morning Leader" states: "the consumption of western coal in Manitoba, and even in the East, has become permanent. But the farmers ought not to be obliged to pay the penalty for that condition, or for the failure of other interests to make use of the railways at the proper season."

Any appropriations made for the enlargement and renewal of rolling-stock on the railways ought to take into consideration adequate provision for the carriage of coal eastwards. The export of coal from Alberta is going to require a large number of freight cars designed to carry coal for long distances in heavy individual loads with protection against the weather, and the railway that sees first the opportunity that coal carriage affords is going to reap a deserved reward.

The Toronto "Globe" quotes the assertion of the Railway Association of Canada that "antiquated, overloaded and wasteful systems of distributing goods are much more properly a subject for public anxiety" than railway charges. This statement also asserts that "serious additions to cost by the distributing trades will be found in relation to almost every article of common household use." The "Globe" considers this statement to be in the nature of a challenge to Boards of Trade, demanding an answer.

In the matter of coal distribution, the Railway As-

sociation's statement is exactly descriptive of the facts and corroborates a conclusion several times urged in these columns, namely, that the coal operator, in self-defence, should wherever possible, control the distribution of coal to the point of the ultimate consumers' yard or cellar.

A Toronto newspaper falls into a curious error in discussing the abortive O.B.U. strike in Alberta. It states the "alleged cause of the trouble in Alberta is "the refusal of the mine operators to abolish the "check-off", a long standing system for recording "the miner's output." The "check-off" of course is only another name for the "closed-shop", and it is the regulation which was enforced by the Government which permits only members of the United Mine Workers in good standing to work in the coal mines which is the ostensible reason for the strike call of the O.B.U. If this were all the O.B.U. stood for, that organization would have a fair case, but their aims only need to be expounded in order to meet defeat in Canada. Nevertheless, in objecting to the "check-off" the O.B.U. has demonstrated the boomerang action of violating a principle for reasons of expediency.

The latest indication of the changing nature of trade routes in North America is the announcement that the Granby Consolidated Mining & Smelting Company is arranging to send its smelter product to the refineries in New England by steamer from Vancouver via the Panama Canal. A similar announcement is made regarding the smelter product of the Anaconda Copper Company, shipments being made in this case from Seattle. There is somewhere west of the Great Lakes a "watershed" of rail traffic not as yet clearly defined, but becoming so. Along this line will be the division between eastward-bound rail traffic and westward-bound, and we believe the line of departure lies well east of the Rockies.

INTEREST IN FIRST-AID AND MINE-RESCUE TRAINING AT NANAIMO, B.C.

The presentation of medals and trophies to the winners in the first-aid and mine-rescue competitions held at Ladysmith, B.C., on Labor Day was made the occasion of a social gathering at Nanaimo recently.

The presentation of prizes was made by John Thompson, who congratulated the teams on the splendid work done during the past year both in Mine Rescue and First Aid work. Mr. Laird responded on behalf of the Rescue Team, and hoped to see more of the young men in this year for rescue work. D. H. Simpson's team won the Novices' Shield presented by the Canadian Western Fuel Co., and also the Mines Department Cup with gold medals and the Team event against all comers at Ladysmith, and the Niven Cup.

BORING FOR OIL AT DAUPHIN, MANITOBA.

The Manitoba Government is testing the presence of oil in the Dauphin District at a point six miles north of Winnipegosis by drilling. Boring has been commenced.

"THE TIN DEPOSITS OF VIRGINIA, U.S.A."

By Alex. Gray, Montreal

Under that caption the "Canadian Mining Journal" last week published a brief article from the pen of Mr. Marshall Haney.

The description of the tin occurrences of Virginia and North Carolina hardly is complete, however, without more details as to the experiences of those who gave their attention to those convenient fields.

Whether the cassiterite occurs in quartz veins—or pegmatites—is not material. As one of those who devoted some time and money to these veins, or dykes, fifteen years ago, it may not be inopportune to state that they emphasize the sagacity of the "Cousin Jack" tenet: "Where it is; there it is". Having found cassiterites very elusive throughout the Cornish mines—the crystals being insufficient to yield other than a small percentage of the turnover of ore, the "Cousin Jack" arrived at the conclusion that tin would not be so precious if it was more plentiful. This, notwithstanding the Cornish mines have been worked off and on, more or less continuously, since the Phoenicians paddled or sailed thence.

Tin mining, even in Cornwall became precarious, so much so that were it not for the Straits Settlement supplies the world long since would have been without its standard dinner pail. In later years Tasmania contributed a quantity of cassiterite, and more recently, Bolivia, and South Africa. Of the latter, those of us who felt that the earliest Cornish "carbonas" were going to be dwarfed by the South African deposits, had reason to take the "Cousin Jack" view that cassiterite in bulk couldn't be where it wasn't. The greisen was all it ought to be but, as one sage asserted: "There were not enough fish in the stream", lateral and vertical continuity of the "pockets", the local enrichments, was lacking.

In a sense, the same is true of the Virginia and North Carolina occurrences. They have every operating advantage, are close to transportation and supplies. Labor is accessible, but the percent of cassiterite content made of the openings and shafts spoken of by Mr. Henry so many graveyards. The average yield in cassiterite was too low, regardless of the advantageous working facilities.

About the only benefit resulting to one or two of us from that adventure in the section dealt with by Mr. Haney was, that it made us familiar with Appalachian features informative as to Porcupine when it was revealed. Gold, bearing rocks of Virginia had not been subjected to denudation, the ore was practically free, milling at outcrop. Denudation had taken place in the Ontario North Country, hence the difference between what existed there at outcrop and the outcropping characteristics of the Virginia country.

That has nothing to do with the Virginia-North Carolina tin areas, of course, but the experience as recorded will serve to negative the roseate presentation of Mr. Haney. There is cassiterite down there, not enough of it to "do the needful."

OBITUARY.

The death is announced of Major Francis C. Connerly, late the Assistant Sales Manager of the Canada Wire & Cable Co., of Toronto, on September 18th.

BOOK REVIEW

Modern Tunneling. With Special Reference to Mine and Water-supply Tunnels. By David W. Brunton and John A. Davis. Linen Cloth Boards. 6 by 9 by 1¼ inches. 450 pages with Bibliography and Index. John Wiley & Sons. New York, \$4.50.

This is a comprehensive treatise on the art of tunneling, more particularly as practised in connection with the extraction of minerals and in the drainage of mine workings. The authors are well known as experts on tunneling, and write from personal knowledge of many of the tunneling operations they describe. The section on "Tunneling" in Peele's mining engineers' handbook was prepared by them also.

The history of tunneling is concisely, but very interestingly dealt with, particularly in the recital of the achievements of the ancients in rock excavation with the aid of primitive appliances. Mention is made of the stupendous undertakings for mine drainage before the invention of the steam pump, the drainage depth secured being, to modern ideas, very disproportionate to the labor involved. A complete resume of modern tunnels, giving all essential particulars in each case, makes a valuable chapter.

The choice of power for tunnel work is considered from many angles, and much attention is given to all phases of air-compression in relation to tunneling. Ventilation, rock-drilling machines, haulage, and incidental surface and underground equipment are each discussed with numerous illustrations. The methods employed in drilling, blasting, removal of material and timbering are described and criticised. A large chapter is given to means of securing safety in tunneling work. Very detailed figures are given on the cost of individual tunnels, which include the Coronado, Gunnison, Laramie-Poudre, Lucania, Marshall-Russell, Mission, Newhouse, Rawley, Roosevelt, Stilwell, and Strawberry tunnels, and the Los Angeles Aqueduct.

A bibliography of sixty pages is appended giving the references to literature arranged under the sequence of subjects used in the chapters of the book.

The work is unusually well bound, and is printed on good quality paper. It contains information of value to the mining engineer having charge of underground excavations.

The authors state they have "endeavored to lay stress upon safe, efficient and economical methods, and upon good points of equipment, while bad practice and obsolete machinery is ignored, except, as examples of the inadvisable, or as they have some bearing historically."

PERSONAL.

Mr. E. L. Bruce has been appointed Professor of Mineralogy at Queen's University, Kingston, and has taken up his duties.

The plain man, who takes his politics seriously enough when occasion needs, is not overly enthused over the present tariff discussion, as he has a sneaking belief—probably not clearly defined in his own mind—that if those who are so vociferously advocating abolition of tariffs were in a position to put the machinery into motion to bring this about, they would, like so many before them, not dare the experiment for fear of the consequences.

The Design of Chutes and Ore Bins

By JOHN S. WATTS, New Glasgow.

The functions to be performed by a chute, appear at first sight, to be so simple, as to often lead to failure to produce a satisfactory design, from a lack of appreciation of the vital points to be considered. Literature on this subject, is very meagre, so that the designer has practically nothing to guide him, but his own probably limited experience.

The minimum slope, which will cause the material to slide down the chute is variable for different materials, and even for the same material, under different climatic conditions, and also varies with the sizes and quantity of lumps and fines. The manner of delivery into the chute has also some effect.

Below is given a table for some of the more common materials met with, showing the slope or gradient at which they will slide under fair average conditions. That is with the material reasonably dry, with only a small percentage of fines, and the bottom of the chute, being made of smooth flat steel plates, without projecting rivet or bolt heads.

Coal in lump size, $18\frac{1}{2}^\circ$ from the horizontal.

Coal in small sizes, 27° from the horizontal.

Iron ore, 38° from the horizontal.

Gravel, 40° from the horizontal.

Sand, 38° from the horizontal.

These gradients are stated in degrees from the horizontal and should be considered the absolute minimum. Whenever possible the angles should be determined by actual experiment on the material to be handled.

It should be noted, that when the material is held in the bin or chute, by closing a gate, and the material allowed to settle, the above gradients will need to be increased, by two or more degrees, depending upon its nature, to overcome the increased friction of the material when at rest.

In designing bins, the bottom should be shaped and graded in all directions, leading to the gate, at the inclination required to start the material sliding, after being allowed to settle to rest.

The effective storage capacity of a bin which will completely empty itself, is much greater than that of one of equal total capacity, which cannot be completely emptied, by gravity alone, because, that part of a bin, where the bottom layer of material refuses to move, becomes filled up and is no longer available. The angle of repose, of the material in the dead part of the bin, may be sixty degrees or more, whereas by grading the bottom of the bin, to that angle required to keep the material moving, which will not usually be more than forty-five degrees, we gain for effective use the space enclosed between the angles of forty-five and sixty degrees.

This may be more clearly understood, by referring to Figure 1, and it must be noted that the inclination to the horizontal of the two inclined surfaces, must be sufficient to make the inclination along the valley, line AA, that which is necessary to start the material sliding under the worst conditions.

It is sometimes necessary to use a twin chute, such as is shown in Figure 2, to take the material from two receiving points to one common delivery point. Obviously, the inclination along line BB, is less than the angle B, and therefore the angle O, must be made such that the angle of inclination, from the horizontal, along line BB, will be that required to cause the material to slide.

When a long chute is used, delivering on to a rubber belt, and the material is mixed lumps and fines, it will be found that the grade which is right for the fines, will be too steep for the lumps, and that the larger pieces will gather so much velocity, that they will cut the belt, and probably bounce off it.

The remedy for this, is to have the chute made in two decks, the upper deck being fitted with a screen,

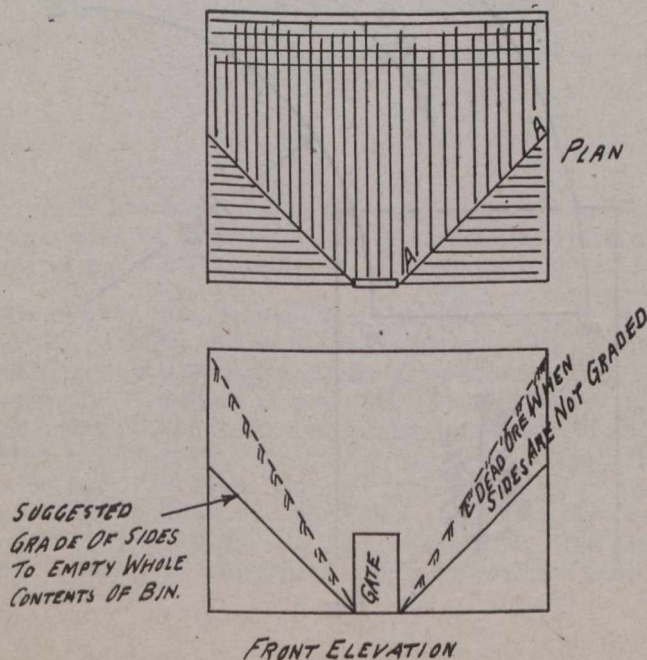


Fig. 1.

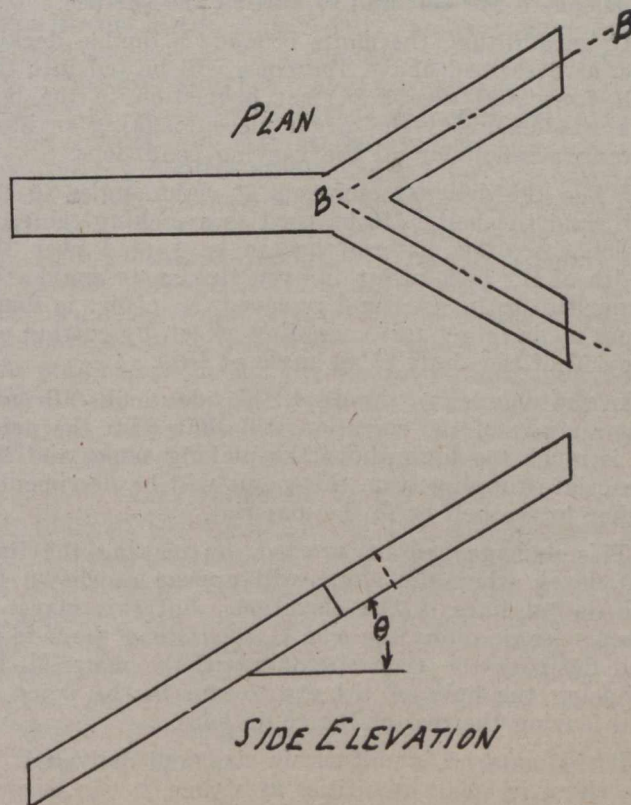


Fig. 2.

to take out the fines, which will fall into the lower deck. The upper and lower decks can then be arranged to have different inclinations, to suit the different sizes, and should preferably be hung, separately, on eye-bolts fitted with turnbuckles; so that the inclinations can be adjusted to suit, and if necessary, altered to take care of the varying velocities, due to variable climatic conditions.

When an extra long chute is required, the grade required to keep the material moving at the top, will cause it to attain a high velocity when the ore reaches the bottom. If the ore is hard, this high speed will cause the lumps to cut and abrade the belt. This can be cured by making the chute as outlined in Figure 3, the curved part of which, at the lower end, can be set so as to reduce the velocity of the material to that of the belt, and so prevent any damage to the belt at the loading point.

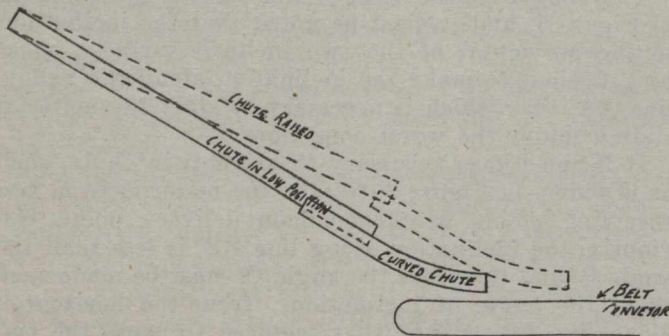


Fig. 3

By making the chute in two sections, as shown, hung on adjustable hangers, as suggested before, the grade of each chute can be adjusted independently, so as to get just the right velocity, and, at the same time keep the delivery end of the chute, just high enough to clear the belt, and avoid dropping the material on to the belt and so cutting the surface.

If, in addition, the chute is made a double decked one, as described above, the fines will be fed into the belt first, and give a perfect protection to the belt against damage by the larger pieces, making an ideal arrangement under all the varying conditions.

When the delivery chute, is at right angles to the belt, and the belt is to be used as a picking table, in which case, the material has to be spread over the width of the belt, in a thin even stream, to enable the impurities to be seen and removed, an effort is sometimes made to get this spreading effect, by cutting off the end of the chute at an angle of 45°.

In the plan view, Figure 4, this idea looks alright, but a study of the elevation will show that the point C, is much too high above the picking table, and the material dropping from this point will be detrimental either to the belt or to the material.

This damage can be averted, by making the line, CD, level, when the chute will appear as shown by the dotted lines in the elevation, but this gives a steeper grade along the side C, then along the side D, and destroys the even spreading of the material, by inducing the bulk of the ore to run to the point C, and leaving the rest of the chute bare.

If the material is uniform in size, and delivered to the chute in small quantities at a time, it can be prevented from travelling across the chute, by fitting

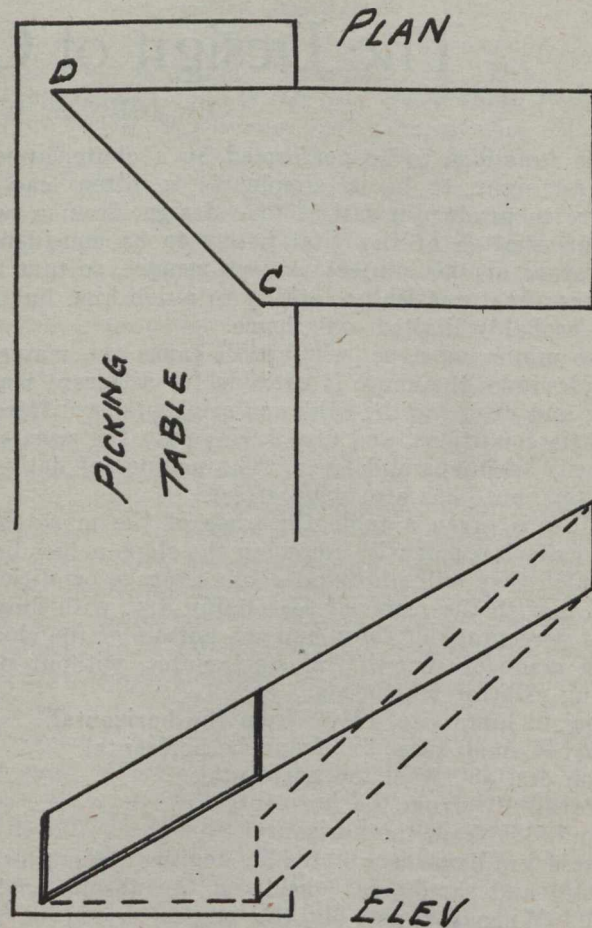


Fig. 4.

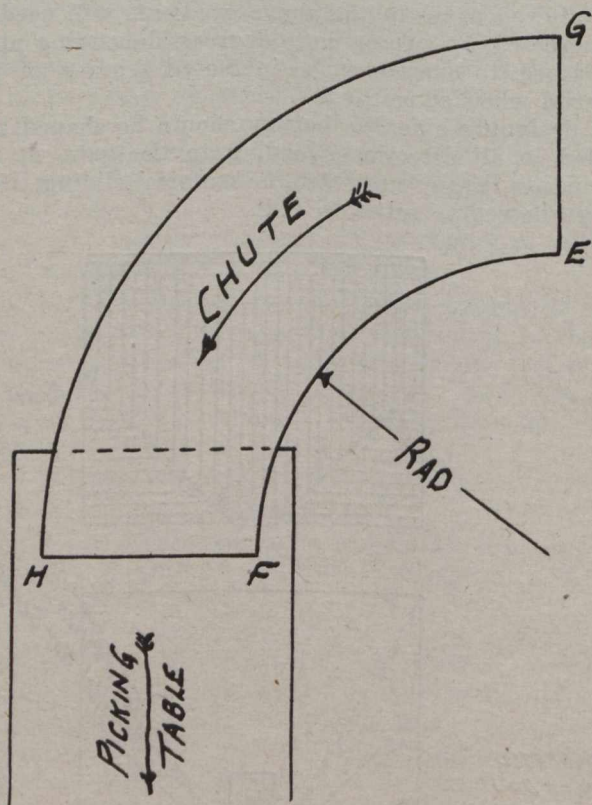


Fig. 5.

angle or the bars longitudinally along the bottom of the chute, and so forming channels compelling the material to travel parallel to the chute sides.

The neatest way however, is to fit a helical chute as shown in Figure 5. This type takes more head room, and is more expensive to make, but will accomplish the purpose more successfully, if properly designed and made, than any other type of chute.

In this helical chute, we have, as in the last one, a steeper grade along line E.F., than along line G.H., but the centrifugal force acts against the tendency to fall towards point F, and if the radius of the chute, is not made too small, will give an evenly spread delivery on to the picking table. The smaller this radius, the greater will be the difference between the grades along the two sides.

Another case, that requires consideration to evolve a satisfactory chute, is that shown in Figure 6. In this case, the chute is a twin one, having one receiving end, and two delivery points, to two picking tables. The conditions to be met, are, that the grades must follow

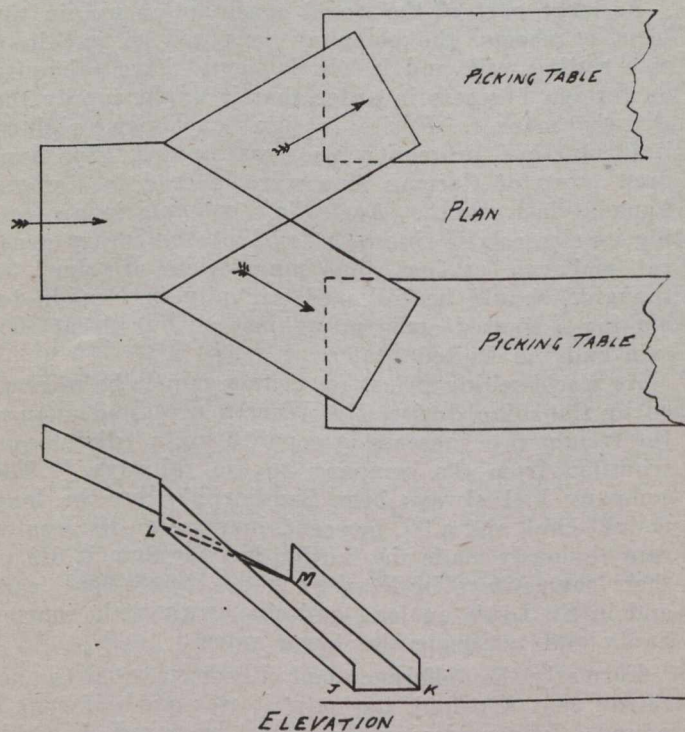


Fig. 6.

the arrow heads, shown on the plan, in order that the stream may be of even thickness across the width of the two parts of the chute.

To arrange this, it is obvious that lines L.J, and M.K must be parallel, and in the same plane, and this will usually involve having a slight drop at the point L, tapering off to nothing at point M. By a judicious arrangement of the respective grades in the single and in the twin parts of the chute, the drop at point L can be kept to a minimum, and sometimes eliminated. This depends upon the conditions as to centers of picking tables, length and height available, and can only be determined by laying out to scale on the drawing board.

CONSOLIDATED MINING & SMELTING COMPANY ASK INCREASED TARIFF PROTECTION ON LEAD AND COPPER-WIRE RODS

Mr. Warren, the General Manager of the Consolidated Mining & Smelting Company, presented the position of the products of the Trail Smelter during the recent visit of the Tariff Enquiry Board to the West. A readjustment of the tariff protection now given was suggested as necessary by Mr. Warren to meet changing conditions in exchange with European countries, particularly the German mark. Pending consultations between the Consolidated Company and representatives of the lead-metal trade on the advisability of a graded schedule of tariff increases designed to meet the exchange situation, and with representatives of Canadian copper-wire mills, Mr. Warren suggested tentative consideration of a specific duty of two cents per pound on pig lead, and 1 1-2 cents per lb. on copper-wire rods, a bounty on zinc exports, a temporary embargo on zinc imports and \$1.50 a ton duty on fluorspar.

Some of the statements made by Mr. Warren were as follows :

Lead

The trial plant could produce 100 tons of refined pig lead daily, just about the normal consumption in Canada, though it had not been doing so lately because of mining strikes. There is now a specific duty of one cent a pound on pig lead imposed in 1919, when the 15 per cent. duty and war tax of 7 1-2 per cent. were removed on the ground that some protection was needed because of the large surplus quantities of Mexican pig lead then held in Great Britain and France ; that Mexican lead was still available for the Canadian market, and in addition Spanish, German and Belgian lead could get into Canada under the British preference by reason of being "touched up" in England before coming to Canada.

British Preference Unfair

Mr. Warren said the British preference was unfair and without justification. They produce only 7,000 tons of lead in England a year and yet they send this lead from Germany or Spain to us under the preference at three-quarter cent a pound duty. The witness pointed out that at the average price of pig lead on the United States market for the last six months of eight cents a pound, the United States duty of 25 per cent amounted to two cents pound. Even with that protection the price in the last month of pig lead had dropped from \$8.75 to \$7.45 a cwt., and their own price was \$7.80 to Montreal and \$7.75 to New York, to meet British competition with the cheap leads obtained from Mexico, Spain, Germany and Belgium. In spite of the two cents duty in the United States the United States price had been forced down to \$7.75 by the Mexican and European leads.

Asks 2c per lb. on pig Lead

He claimed the Canadian pig lead should have at least an equal protection of two cents a pound. The real difficulty in meeting this competition, however, was that just now the English pound sterling is worth about \$3.90 in Canadian funds and the German mark depreciated to a still greater extent. The exchange situation negatives the protection on a wide variety of Canadian products besides lead.

"With the German mark where it is we cannot

compete with any German product", he said. "As soon as they can make all they need for their own purposes we will have a merry time competing with them and so far as lead is concerned there is grave danger that the producer cannot complete at least until the exchange situation is normal, unless additional protection be granted or an embargo be placed against their import."

Copper

With respect to copper, Mr. Warren's proposal was that the 1 1-2 cents a pound duty on copper ingots should be extended to include copper wire rods, which are now free when drawn into wire in Canadian plants. While the war duty of 7 1-2 per cent. was on the company began to build a wire rod mill so that it might supply the 12,000 tons of copper rods consumed by the five Canadian wire concerns in making telegraph wires, transmission wires, cables, etc. In addition to the wire rod consumption the normal Canadian consumption was only 6,000 tons in the form of ingots. The ingot demand could be filled with the company's copper refinery established during the war at the request of the British Government, with a capacity of 20 tons daily. To supply the Canadian consumer at a reasonable price it was necessary to increase the capacity of the copper plant 60 or 70 tons a day. That could be done only by building a rod mill so that the increased copper output could be made into wire rods, enabling the company to fill the whole domestic demand. This also necessitated arrangements being made to secure a supply of copper ore or concentrates sufficient to supply the enlarged plant.

\$4,000,000 expended to enlarge copper production

Contracts had been entered into with the Canada Copper Corporation under which a \$2,000,000 railway branch line had been built from Princeton to the large copper deposit it controlled nearby. The power line of the subsidiary company, The West Kootenay Power & Light Company, Ltd., had been extended 100 miles from Greenwood to the mines at a cost of \$1,250,000, and extensions had been made to the smelter costing \$750,000, including \$250,000 on the wire rod mill.

Smelter paying 1 1-2c. over New York prices

Hitherto the wire rod consumption in Canada, had either been produced in the United States or made in the United States from copper matte or blister copper exported from Canada. To get ores from the Canada Copper Corporation and to induce it to make the huge expenditures mentioned, the smelter had agreed to pay one-half cent a pound over the New York price. As there was no duty on copper going into the United States, all these provisions had to be made in order to keep the ores in Canada. There was no market for copper in the West either in the United States or Canada, and in shipping East, the Anaconda Smelter, which dominated the interior on the United States side, and the Trail Smelter in Canada, had to meet New York prices based on metals obtained by water from such sources as Chili.

Toronto, Montreal and Hamilton formed the Canadian market for copper ingots and wire rods. The freight rates for that market were therefore lower from New York, being 47 1-2 cents a cwt. to Toronto and 46 cents to Montreal, as against the new freight rates of 95 1-2 cents a cwt. from Trail to Toronto and \$1.10 to Montreal.

The cost of conversion of the copper into wire rods

was two cents a pound, double the pre-war cost. Fifteen per cent, of the copper ores came from the company's own mines and the rest were custom ores from independent mines. The New York price on copper rods was 20 cents a pound plus the freight. The duty of 1 1-2 cents asked for would absorb the difference in freight, the half a cent extra paid for the ores, and leave a small balance as protection.

Zinc

The zinc situation is entirely different. The Canadian consumption normally is 10,000 tons annually, and the company's zinc plant capacity exceeds 25,000 tons, developed primarily to provide high-grade zinc for munition purposes. In disposing of its surplus it competes in European markets with Germany, Belgium and the United States, and in the Orient with Australia, as well as with factories and mines in consuming countries. The company's zinc, being produced electrolytically, is superior to most zinc made by a distillation process. In war times that was a great advantage, but in peace time for most purposes the purer zinc would get the preference only when quoted at the same price.

Company Propose Roll Zinc Sheets

As large part of the world consumption was in the form of sheets, the company proposed to put in a zinc rolling mill, and it felt, it should have a bounty on foreign business in order that it might supply the British market. Until foreign exchange righted itself further protection also was needed. Five hundred tons of German zinc were offered in Eastern Canada last month. Australia's example in protecting its electrolytic zinc industry by a temporary general embargo against the importation of zinc, he thought, should be followed partially in Canada by making a limited embargo against all but Great Britain and the United States.

As world-selling prices on metals cannot be increased by Canadian duties, Mr. Warren protested against the freight rate increase in constituting a "direct contribution from the company to the railways." The company had always been handicapped by the long freight haul, and a 35 per cent. increase on its greater rate obviously made the burden heavier than it did to their competitors in New York on copper and lead, and in St. Louis on lead and zinc, with their shorter hauls, and, consequently, lower rates.

Formerly the difference had only been equal to one-third cent a pound, but now it was one-half cent a pound. In considering the duties he asked that this should be taken into account.

Besides the lead, copper and zinc, the company produces refined gold, refined silver, bluestone, fluorspar, and both sulphuric and hydro-fluor silicate acids. With respect to fluorspar needed by the company to produce hydro-fluor silicate acid for refining lead, and sent to Canadian steel firms in its raw state, Mr. Warren wanted \$1.50 a ton duty, the same as the United States duty.

While the war duty of 7 1-2 per cent. was in force the company secured a large deposit of rock near Grand Forks, B. C., spending \$250,000 in developing and equipping it, with a concentrating mill. The company's product went no farther east than the Soo, the Eastern iron plants being supplied from a deposit of the rock near Madoc, Ont. He feared that in the course of time Great Britain and the United States would resume their pre-war trade.

The Mineral Resources of Newfoundland

An Address by D. James Davies, Government Analyst,
Newfoundland, given before the Imperial
Mineral Resources Bureau, June 4th.

I have to express my warmest thanks to Lord Morris, your Vice-Chairman, for this opportunity of addressing you on the mineral possibilities of Britain's oldest Colony, — Newfoundland. The making up of this address has been rather uphill work, partly because most of the data necessary are in my office in St. John's and partly because most of our mineral areas and prospects at the present time are in the possibility stage, but if we can obtain the sympathy and co-operation of this Bureau, we hope that many of our prospects will be promoted in a short time from the possibility to the probability class.

Newfoundland has been rather ill-used by the Mother Country in the past and she has had to sit tight for decades listening to and reading about the glories and great resources of her big younger sisters — Canada, Australia and South Africa. She has had to be satisfied with only a column or so in the various popular encyclopaedias describing her fogs and fish. The geography books devote only a paragraph or two to this Island, which formed the foundation of our great Empire. I suppose the official and academic classes of the Mother Country have regarded Newfoundland for centuries as a fish shop far beneath their notice.

We are in the unfortunate position of being a badly advertised country situated quite closely to Canada and the United States, the best advertisers in the world today. We hope to get this defect remedied very shortly. We have today a few live men, chief among them is Lord Morris, who are bent on placing Newfoundland on the map, men who are bent on advertising her big iron ore and copper ore deposits, and in a few years time, we hope, when we visit this country that we will not have to tell otherwise well informed people, that we are not Canadians and that we are not fighting for a bare existence among the Esquimaux in the Arctic Circle.

Geological Survey of Newfoundland Required.

I am sorry to have to state that the geology of Newfoundland has not been determined in detail. A good deal of geological work was accomplished by Mr. Andrew Murray, our first geological surveyor, and after the death of Mr. Murray the work was carried on by the late Mr. Howley. For many years no geological work has been done by the Government, but, during the past two years some excellent work has been accomplished by the Reid Newfoundland Natural Resources Department — this Department employs many good geologists, who have served their apprenticeship with the United States and Canadian Geological Surveys.

The predominant formation in Newfoundland is the Precambrian which is subdivided into Huronian, Laurentian, and Avalonian. Avalonian is a local term applied to some of the Pre-Cambrian rocks of the Peninsula of Avalon because it has not been determined, as yet, to which sub-division of the Pre-Cambrian these rocks rightly belong.

I am told that the Newfoundland Pre-Cambrian resembles, in many respects, the Canadian Pre-Cam-

brian — the greatest mineral-bearing formation in North America—the rocks in which occur the great mineral-bearing bands of Sudbury and other North American districts. In Newfoundland we have the geological formation which is known to contain large mineral deposits in Canada and I know from my experience covering many years as Government Analyst for the Dominion, that we have a great variety of metalliferous and non-metalliferous ores occurring in the Island.

Even though the geological work done has not been by any means thorough and the prospecting work has been patchy and confined, more or less, to the coast, we might lay claim already to being a mining country. We possess in Bell Island one of the greatest iron ore deposits in the world. The geology of the Bell Island district has been worked very thoroughly by professors and students from Princeton University. A few particulars and figures concerning this mine, though they are widely known, might not be out of place in this address.

The Wabana Iron Ore Deposit.

The red rocks of Bell Island were used by sailors for anchors and ballast before the actual economic value of the rocks were realised—when the nature of the ore was recognized the property was taken up by Messrs. Butler and Topsail and sold by them to the Nova Scotia Steel and Coal Company in 1893. The first development work was carried out immediately and in 1895 preparations were made for large shipments of ore. In 1899 a portion of the areas was sold to the Dominion Iron and Steel Company. This Company acquired the lower ore bed, the Nova Scotia Company reserving for themselves the upper bed, which was superior to any of the other seams. The sale included a submarine area of 3 square miles adjoining the shore. Additional submarine areas were acquired from time to time as the work on the ore beds progressed and at the present time the Nova Scotia Company own about 83½ square miles and the Dominion Iron and Steel Company about 5½ square miles.

Many geologists have estimated the available commercial ore in these beds; Howley's estimate reached a total of 3,635,343,360 tons.

H. Kilburn Scott, of London, in 1909 estimated the ore on the Scotia property alone to total 652,500,000 tons and total recoverable ore, deducting that lost in pillars, faults and pier zones to total 395,525,000 tons.

Edwin E. Ellis, of Birmingham, Alabama, at one time with the United States Geological Survey, said that claims had been taken as far as 12 miles out from the shore and that it is planned to operate workings of that length—allowing for workings five miles long he estimated the ore at 3,250,000,000 tons.

Edwin C. Echel testified that in Newfoundland there were 3,500,000,000 tons of economically available ore within a radius of five miles of Bell Island—besides this there are billions of tons which are not economically available at this time. In one deposit alone in the Newfoundland district, he said, that the ore runs thirty feet thick and contains about 90,000,000 tons to the square mile.

During the year 1919 a pair of slopes were completed at Bell Island, the construction of which means to the Nova Scotia Steel and Coal Company a permanent supply of iron ore of enormous extent. They are now producing 1,200 tons of ore per day—with improved labour conditions this quantity can be much increased. These workings are over two miles to the dip from the outcrop of the bed and the slopes are among the longest known, yet, the ore extends below their deepest point.

During the past twenty-four years the blast furnaces of the Nova Scotia & Dominion Companies in Sydney Harbour have been supplied and several millions of tons exported in addition from an area of about two square miles of the ore field. The submarine holdings of the Scotia Company cover an area of 83½ square miles and of the Dominion Company 5½ square miles—a total of 89 square miles and the same geological conditions are believed to extend over the greater part of these areas.

Years	Nova Scotia Company	Dom. Iron & Steel Co.
	Tons	
1917	60,735	653,600
1918	76,767	639,300
1919	219,410	478,134
Total: 1917, 713,975 tons.	1918, 716,067 tons.	
	1919, 691,944 tons,	

practically an average of 700,000 tons per year.

On the Mainland immediately adjacent to Bell Island, on the shores of Conception Bay and Bay de Verde district, one can hardly dig a foot or two below the surface soil without coming in contact with lumps of rich haematite ore. These districts apparently, simply require the necessary capital and expert supervision to make them busy mining centres and incidentally to bring Newfoundland to the very front rank as an exporter of iron ore. Besides these haematite deposits, we have very big deposits of titaniferous magnetites on the West Coast and sooner or later it may become necessary for the smelters to adapt their furnaces for the smelting of such ores.

Copper Ores.

In Newfoundland copper ores rank next in importance to iron ores both from the point of view of development and probable existence on a large scale.

The locality of greatest development in copper mining is Notre Dame Bay on the East Coast. The map in this Bay is black with fee simple properties which were taken up and partly developed during the copper boom in the seventies and eighties—a time when it was necessary to ship eight and ten per cent hand-dressed ores in order to make a profit—a time when the present cheap concentration methods for sulphide ores were not available. Thousands upon thousands of tons of copper ore have been shipped from the various mines in this area in past years, but most, if not all the mines, were closed down about the same time on account of a slump in the price of copper, and in some cases on account of poor mine management. I have here a few brief particulars of the more important mining locations in this Bay.

Tilt Cove or the Union Mine

Operations, which were started in 1864, have been continued, more or less, spasmodically almost up to the present time. The total shipment from the mine to date as far as can be ascertained from available returns, have been 1,491,136 tons of ore, 78,015 tons of

regulus, 5,418 tons of copper ingots. I am told on reliable authority that there are at least one million tons of commercial copper ore in sight at Tilt Cove at the present time.

Betts Cove.

This mine was opened in 1875 and it was worked with great activity for ten years during which period 130,682 tons of ore and regulus were shipped, besides 2,450 tons of iron pyrites. Work was suspended on this mine in 1885 owing to the caving in of the mine bluff. It is thought the ore was far from being exhausted when the mine was closed down. The other localities which gave the most promise in this Bay were Barton's Pond, the Colchester Mine, S. W. Arm, Shoal Arm, Little Bay, Whales Back, Hall's Bay, Sanday Cove Island, Rabbitt's Arm, Thimble Tickle, Seal Bay. According to Mr. Howley's reports, the most celebrated of all the fore-going was the Little Bay mine. Operations were begun in August 1878, yet before the end of the season (presumably early in December) some 10,000 tons of ore were raised and shipped to Swansea. Between 1880 and 1885 61,796 tons were shipped from the mine. From 1885 to 1892 over 40,000 tons of ore, regulus and ingots of copper are given in the Customs returns. This mine was closed down about the same time as the others, but now extensive development work is being done at Little Bay and great things are expected of it in the very near future.

Between the years 1880 and 1882 the South West Arm Mine yielded 490 tons of ore, Halls Bay 240 tons, while Rabbitt's Arm Mine which was worked for only one year, yielded 1,260 tons of ore averaging twenty-eight per cent of copper. There is a highly mineralized section around Gull Pond, a few miles inland from the shores of Notre Dame Bay and a local development company, with local capital, are operating in that locality at the present time.

Quite a deposit of native copper is found in Oderin Island, Placentia Bay. Some development work has been done and the opinion of mining engineers, who have visited the Island from time to time, is that it is well worthy of investigation. Another prospect which I believe is now being investigated is situated on the Island of Presque, Placentia Bay.

So far I have only touched on these areas where successful mining has already been carried on. We have many other areas which may not hold forth at this time very much inducement to capitalists, but at the same time they are decidedly worthy of investigation by the Government or some other body who is desirous of tapping new resources for our Empire.

Manganese Ores.

Around the shores of Conception Bay we have a very big deposit of manganese ores partly carbonate and partly oxide. These beds are of lower Cambrian age and according to Dr. Dale, formerly of Princeton, the original area of this manganese was approximately from 200 to 300 square miles. Very little work has been done on this deposit. Surface samples have been analysed at the Government Laboratory from time to time. Those from Topsail and Manuels are, as a rule, very low grade, containing from 25 to 28 per cent total manganese. One sample from a ten inch vein at Manuels gave 37 per cent total manganese and one from Hopewell, about six miles west of Kelligrews, gave 38 per cent.

Some development work was done at Topsail some years ago. The manganese at this place is found in

several beds, one of which measuring 1.4 feet appears, according to Dr. Dale, to have been of sufficient importance to have warranted prospecting work being done. The most promising of all the manganese prospects in Conception Bay, is that which is situated at Brigus Head, South Point. Some mining work has already been accomplished at this place and two schooners loads (about 400 tons) were shipped abroad in the summer of 1917. I sampled these cargoes and the average manganese content obtained was about 36 per cent. I took a few chunks from a vein at Brigus Head the same year and I obtained 44.5 per cent of total manganese.

Mr. A. C. Hayes, of Princeton, visited Brigus Head in 1912 and he says that the best manganese measured 4.5 feet thick in a zone fifteen feet, and that manganese is found in the oxidised state in several beds at the water's edge. Bog manganese and bog iron ore are accumulating in the marsh lands on Conception Bay and black powdery manganese ores can be dredged from some of the lake bottoms.

Chrome Asbestos and Molybdenite.

The serpentine of the West Coast contain chrome ores and asbestos, and nearly 800 tons of chrome ore containing fifty five percent chromic oxide have been exported from the Bluff Head district. We have a most likely looking molybdenite prospect in the mica schists of Fleur-de-Lys. On the East Coast and on the South Coast around Placentia Bay we have segregations of argentiferous galenas, some of which have been mined in past years.

Coal, Petroleum and Oil Shale.

Our coal areas are being examined and developed and the reports, so far, are very favourable. Crude petroleum is being pumped at Parson's Pond on the West Coast. The operations are being conducted by Mr. J. D. Henry. I believe that a small refining plant has been in operation there for some time and it supplies illuminating and fuel oils to the fishermen of the North and West Coasts. Besides crude petroleum we have a tremendous tonnage of oil shale which may or may not be of commercial value. Most of the reports that I have read of this shale deposit are favourable but no actual distillation on a commercial scale has been done up to the present time. We have big deposits of gypsum, marble, limestone and slates. We have already shipped some barytes to the foreign markets and we have great indication of good commercial mica occurring around the coast of Newfoundland Labrador. We have a country within less than two thousand miles of Liverpool which is on the whole practically undeveloped. It possesses the formation which is known to be highly mineralised in North America and any development company would, I am sure, receive every consideration and help from the members of our Government who are keenly interested in the development of what we are proud to call "Our Island Home."

I have lived in Newfoundland for the past nine years and I have been all the time intimately associated with the minerals of the country. I have had long talks at my office in St. John's with almost every mining engineer and mining prospector that has visited our shores, and the opinion of most, if not all of them, is that we have an island with great possibilities,—an island that may develop into a land of husky miners to the extent that it is today the land of sturdy fishermen.

THE STEEL TRADE AND THE TARIFF ENQUIRY.

(From "Iron & Steel of Canada")

The iron and steel industry in Canada, with all its long train of antecedent and precedent interests, will shortly be made the subject of attack by advocates of tariff abolition, and will be required during the successive sessions of the Tariff Enquiry Board that are planned between now and the opening of the Houses at Ottawa, to give reasons for its existence and for the continuance of protection by import tariff.

Canada is not singular in its possession of convinced adherents of the free trade heresy, nor in the belief among certain non-industrial groups that a fiscal policy devised to suit the temporary requirements of a small and geographically central island, is suitable for any conditions under which the descendants of emigrants from that Island may reside.

A determined attack on protective tariff in aid of the steel industry in Australia is now in progress. The conditions, geographical, economic and social, of Great Britain, Canada and Australia, could scarcely be more dissimilar, yet there are those who believe, and would force others to believe, that free trade is a sovereign and inherently righteous policy applicable to all three countries.

There is no part of the British Empire, however, that is so unsuited for application of free trade principles as Canada, in its present stage of development. Canada is a continental area, only partially known, and containing only one-twelfth of its ultimate population. It lies alongside a friendly country that is opulent, powerful and enterprising beyond all previous historical precedent, with exchanges of industrial products facilitated also beyond all prior parallel by a hitherto unattained perfection in transportation facilities, and international financial combinations.

No advocate of free trade in Canada has ever explained how the industrial advantages possessed by the United States on the American Continent can be offset except by protection of home industries through equalising protective import duties. It has not been shown that the principle of free trade was applicable to Canada, nor have any of the political parties that from time to time have coquetted with the idea, ever dared to apply the principle of free trade in practice, because they knew the inevitable result.

We would distinguish between the incurable free-trader and the advocate of lower duties. The first named is not a reasoning being, and time is wasted in discussing the Canadian situation with him. The advocate of lower tariff is one who accepts the necessity for protection, but thinks the tariff is open to modification. It is the last named that the steel companies will have chiefly to combat, and we would review some of the reasons that suggest the tariff in connection with the steel industry should not be lowered

at this time. We believe the abolition of the protective duties will not be seriously urged by any seriously-minded person.

Adverse Exchange and Import Tariffs Have Not Checked Imports of Iron & Steel.

The tariff as a deterrent of importations has been for some time relegated to a second place by the discount on the Canadian dollar. The operation of economic law has — without the intervention of legislation — placed our dollar at a discount, a process that will, by restriction of imports, gradually restore our dollar to exchange parity. A reduction of import duties under these circumstances would be an entirely gratuitous and foolish proceeding, and would indicate that Canada was neither anxious to encourage home industry, or to support her foreign exchange rates.

The value of imports of iron and steel into Canada have averaged during successive five yearly periods since 1898 to 1919 inclusive, as follows:

	In Millions of Dollars
1896 to 1900	17
1901 to 1905	37½
1906 to 1910	51
1911 to 1915	99
1916 to 1919	169

The iron and steel industry in Canada may be said to have commenced in the period between 1901 to 1905. Since 1901 the value of imports of iron and steel has risen from 25 million dollars to 182 million dollars in 1919, or by six times.

From which it would appear that if a check on imports of iron and steel goods had been desired it has not been notably successful, nor can it be said that the import tariff imposed by Canada has been of a character to stifle outside competition.

Production of Iron & Steel in Canada.

Production of iron and steel in Canada is best measured by the annual output of ingots and steel castings. This, apart from an annual production that had not exceeded 30,000 tons, commenced with 200,000 tons from the Sydney Plant in 1902, reaching a pre-war peak in 1913 with 1,169,000 tons. In 1918, under the spur of war, steel ingots and castings to the extent of 1,873,000 tons were produced, falling in 1919 to 1,030,000 tons. It may be said, therefore, that but for the unusual and imperative demand occasioned by the war, the steel output of Canada has remained stationary for about eight years, or from 1912.

It is therefore fair to say that the import duties have not been too heavy, if judgment is based either on the volume of imports, or on the volume of domestic production. They have not been remarkably successful in stimulating the basic part of the iron and steel trade in Canada.

The General Iron & Steel Trade in Canada.

The statistics gathered by the Government in 1917 ascribe to iron and steel products the following extent

and importance, namely :

Number of establishments	1,049
Capital	\$307,407,980
Employees on Wages	70,071
Wages paid	\$ 68,947,610
Cost of Materials	\$204,732,121
Value of products	\$400,385,086

The number of works in Canada making the basic products of iron and steel, (on which protection by tariff is given) does not exceed nine, if blast-furnaces are counted, and is not in excess of say one hundred, if electric furnaces, small open-hearth furnaces and similar equipment is considered. It is apparent from a study of the foregoing figures that the great bulk of the iron and steel industries of Canada exist by fabricating and making into manufactured articles the partially finished steel and iron goods that are imported into this country, to the extent of almost 200 million dollars worth annually.

It is most evident that the existing tariff has not operated to restrict the growth of the general iron and steel trade in Canada.

The Influx of United States Iron & Steel Trades into Canada in Recent Years.

One of the outstanding features of trade in Canada during the past few years has been the large and unremitting increase in the number of United States concerns engaged in the metal trades that have set up establishments in Canada. The lists of incorporations and the trade notices contain a preponderance of items of this nature. The extension of United States concerns into Canadian markets is rather more notable than the formation of new enterprises backed by Canadian men and money.

The cumulative evidence of the increase of imports of iron and steel, before mentioned, taken together with the notable increase in establishments of United States origin within our borders, indicates that while the tariff has not hindered to any appreciable extent the imports of iron and steel into Canada from outside, it does make it desirable, from the viewpoint of United States interests, to come into Canada and set up establishments.

This we take it, was one of the objects of those who framed the tariff—so far as iron and steel is concerned—and it has been attained.

A Washington Opinion.

All of the foregoing gives point to the opinion of the Washington correspondent of "Iron Age," who may be taken as accurately representing the viewpoint of our not disinterested friends in the United States.

"Iron Age" in the issue of 26th August, states :

"Plans for the revision of the Canadian tariff laws have a particular interest to the United States's iron and steel industry. No other section of the Canadian tariff statutes is so comprehensive as the one

" which covers importation of iron and steel. More than one hundred individual paragraphs are devoted to this industry. The law, as it stands, was carefully written to protect Canadian industries. If Canada produced the article in question, it was pretty sure to put that article under a protective tariff. If Canada did not, the duty was low, or was removed entirely."

This is a fair statement from a representative quarter, and accurately portrays the viewpoint of the United States iron and steel producer, who, while not disinterested in the matter, yet looks to Canada for such a comparatively small portion of his business, that he can take an unbiased critical attitude regarding the tariff policies of this country.

The existing Canadian tariff was, as "Iron Age" states, very carefully prepared, and has not, as we have attempted to show, worked decidedly to the advantage of the Canadian producer, nor decidedly to the disadvantage of the United States importer. Much has happened, however, since the tariff was written, and new branches of the metal working industries have come into Canada, such as factories for automobile manufactures of various kinds, the manufacture of alloy steels and special tool steels, the manufacture of ship-plates, of black and tin-plate, steel shipbuilding on a large scale, and other important accretions to the industry. The tariff requires to be enlarged so as to foster these new industries, and it is very desirable that clear statements shall be presented to the Tariff Enquiry Board at its sessions.

The interests of Canadian iron and steel producers are diversified, and may conceivably clash, because of the extent of our country, and the relative nearness of certain portions of it to the United States, as opposed to the remoteness of certain other sections from any large centres of population or industrial activity.

So far as the eastern steel companies are concerned, they are most vitally interested in the preservation, and if possible, in the increase of the duties on import coal. In the present state of the coal market the existing duty on coal is entirely a negligible factor, if restriction of imports and encouragement of home production is desired. When coal costs \$12 at the pitmouth, a protective duty of 56 cents is neither here nor there.

On the other hand, the steel trades in central Canada desire coal as cheaply as possible, and may not favor even the retention of present duties.

There are other points of apparent divergence in the interests of the iron and steel trades taken as a whole in the Dominion, but there are far more numerous points of common interest, and much need for common action in arranging that the position of the industry shall be presented to the Tariff Board fairly and accurately.

THE TOMMY-KNOCKERS *

*The tommy-knocker is the gnome of the underground. He is often heard tapping the rock in mines, and superstitious miners do not like to work alone for fear of meeting him.

When I die (said the mining engineer) do not bury me at all;

Cache me on the bottom level, with a pick beside my pall;

Leave a candlestick and matches, then cave the stopes and drifts,

And I'll be a tommy-knocker for a hundred thousand shifts.

Yes, a jolly tommy-knock, always starting for a walk; Always pounding on the rock, searing honest Hunkies with my little tap, tap, tap—

Always listening for the blast 'till the pumps are pulled at last,

And the bloody surface tenderfoots are routed from their nap;

Then the depths of earth will be lighted and we can see right through,

And all the lost bonanzas will be nuts for me and you. Then we'll dig, dig, dig. (If we've been good engineers)

Ore shot with chunks of metal, through all the happy years.

We'll have angels for muckers, who'll never ask for pay,

And the ore will stope itself, over—under—anyway— Anyway you say!

Oh, boy! Don't wake me up

And say the men are striking and the tax-collector's here,

And the bottom of the metal market's gone,

And how you've lost the ore-shot, and all the other grief;

Jest let me snooze 'till Gabriel blows his hawn!

SAMUEL B. ELLIS,

"Engineering and Mining Journal."

GRANBY CONSOLIDATED TO SHIP SMELTER PRODUCT TO REFINERY VIA VANCOUVER.

Through arrangements made with the Robert Dollar Steamship Co. the Granby Consolidated Mining, Smelting & Power Co. will hereafter ship its smelter product to the refinery by an all-water route. This will eliminate the necessity of paying the high cross-country rail tariff which would otherwise prevail on the company's copper.

On its Far Eastern-New York service the Dollar Co. makes Vancouver its last port of call en-route to the Atlantic port and Granby will transfer its product to the company's vessels at that point. The copper will be lightered from the Brooklyn docks to the Laurel Hill refinery of the Nichols Copper Co.

It is understood that the copper company was able to make arrangements for shipment through the Panama Canal at a rate sufficiently attractive to decide upon the all-water transportation avenue. It will take something less than a month for the trip whereas during the height of the railroad congestion Granby's copper was sometimes 90 days in making the journey across the continent from smelter to refinery.—"Boston News Bureau."

SOME RECENT OBSERVATIONS AT THE GOLD & SILVER MINES IN NORTHERN ONTARIO.

By R. E. HORE, Consulting Editor.
Progress at Porcupine.

The possibilities of the Porcupine gold mines are becoming greater as development proceeds. A statistical review of gold mining in Ontario during the past decade would show remarkable increases in production. It would not, however, indicate with any approach to exactness what the mines are capable of yielding. It has been fairly well demonstrated by the production record that the Hollinger, McIntyre and Dome are great mines, but there is not yet recognition of the fact that they may be very much greater mines in the near future and that their possibilities are as yet only to a slight extent determined. The development work so far done has revealed quantities and quality of ore that assure profitable operation under normal conditions for many years. If men were available the output could be greatly increased almost immediately and the further development would probably show even the increased output to be much smaller than the ore deposits warrant.

Those who visited the Porcupine district, eleven years ago and compare conditions then with the present, are forced to recognize that the development of gold deposits in Ontario is an enterprise worthy of the best attention of our people and one to be encouraged by our governments. Where now there are great mining and milling plants and hundreds of residences and places of business, there was in the fall of 1909, a forest-covered wilderness where a few mine operators and prospectors were endeavoring to find out whether some outcrops of gold quartz were of sufficient size and richness to permit of mining. To reach the camp at that time from the railroad thirty miles away, was a trying trip for the traveller and the source of much worry for operators who had to take in supplies for development work. There were promising outcrops then at the Hollinger, McIntyre and Dome and around those outcrops, and the exploration shafts were anxious men who wondered whether they were warranted in spending the money necessary to secure the properties and develop them. There are many people who assume that the development of a mine like the Hollinger is a constant source of delight to the owners; but if the men who bought the Hollinger did not worry about the outcome in those early days, I am greatly mistaken. They had visions doubtless of the great mine that the Hollinger is today and they had courage to go ahead when payments had to be made, but they doubtless had visions too of an abandoned shaft and a pile of quartz with too little gold in it and a tidy bunch of check stubs to show for their venture. The making of mines is largely in the hands of such men, men who know they are venturing where there is no certainty of success.

Since those days there have been many problems to meet and overcome at the Hollinger; but the one most essentially factor to success, the ore deposit, has given no cause for disappointment. The work done has shown that the deposits are even better than they appeared to be in the early days. Ore faces, at which men may be put to work, are not difficult to find in the Hollinger mine. The problem now is to find the men.

It seems now that conditions are changing in favor of gold mining and it is hoped that before many months the mines will again be fully manned. It will then be found that the operators have not been idle and that preparations have been made to fully utilize the labor as it becomes available.

Promising Outlook for Gold Mining.

The past few years have been trying ones for gold mine operators, and the present tendency toward lower prices is consequently being hailed with delight. It has been generally known that during the past few months the public has been administering slow poison to the profiteers. Merchants and manufacturers have found it no longer possible to advance prices and continue to do business. They have then attempted to dispose of large stocks of high priced goods without lowering prices. This also has failed and they are now making concessions in order to unload. Actuated by common interest they have maintained prices for some months after it was realized that crash must come if the buying public realized their position. Cost of production of most articles still remains high, but the paucity of orders has made necessary reductions in selling prices. Merchants doing business in this falling market are naturally displaying nervousness in buying. Those who are not willing to believe that price are going lower, base their judgment largely on the fact that costs are still high. The public seems, however, to have concluded that prices are too high regardless of cost of production, and by refusal to buy, are bringing matters to an issue. It is apparent that both profits and costs must come down and possibly some who made unduly large profits in the rising market, may have to take losses in the falling. Someone must take the losses. Our bankers have been fixing things during the summer so that they will not be the goats. The uneasiness in the business world is largely due to the endeavor of each group to make someone else the victim, a normal endeavor when the belief is general that we have entered on a period of falling values.

Whether these views are correct or not remains to be seen. They are not the views of an economist and they are not here supported by arguments. They are views expressed by one who has no unusual advantages for obtaining information concerning the progress of events. They are little more than a statement of street gossip. The reason for expressing the views here is that the writer sees in all this something of vital importance to the gold mining industry, for if the view is a clear one, it can have but one meaning for the gold producer,—a bright prospect for the future of gold mining, where the product is one of fixed value and unlimited market.

Foreign Labor in the Mining Industry.

To a large degree the great growth of the mining industry in recent decades, has been made possible by the utilization of foreign labor. Comparatively few Canadians or Americans have shown a desire to work in the mines. If mine operators were not able to draw on Europeans, for a large part of the labor needed, it would be impossible to get the work done. It is fundamental to the success of mining enterprises in this country that no obstacles should be placed in the way of men who would come to this country and do work that our own people do not want to do.

When the copper mines of Michigan were opened and the operators looked for experienced miners, they found few American miners available. Miners were

It is stated that the miners union, by its rule of "one man, one job" has raised the number of workers who handle the coal, as distinguished from those who do the actual cutting. The coal is cut by contract, while the handling is paid for by day wages, the result of the union's policy being that a larger force of day workers is necessary to do the work. This statement, if it is supplemented by one other, will explain the reduced rate of production per capita. There is a definite shortage of men employed in digging coal.

The following statement shows approximately what may be taken as a typical arrangement of the working forces at Nova Scotia Collieries before the heavy enlistments for war service and at this time:

	Preceding		Present Time	
	P.C. of	Tons	P.C. of	Tons
	per		per	
	Employ. Man	Employ. Man	Employ. Man	Employ. Man
Surface Labour	12%	20.4	18%	10.3
Underground Labour..	41%	6.2	47%	4.0
Mining Coal	47%	5.4	35%	5.4
	100%	2.5	100%	1.9

Inspection of these figures will disclose that there is now a total of 65 per cent of non-productive labor employed at the collieries, compared with the total of 53 per cent in the previous period. The average daily production of the mining coal class has not decreased, nor could it very well, seeing that these men's earnings are dependent on the amount of coal they dig, but there are too few men in the mining coal class, and too many in the non-productive class. There has been a reduction of 40 per cent in the numbers of the men mining coal, and there has been a reduction of 40 per cent in the production of coal. A replacement of the shortage of men in the mining coal class would necessarily cause an increase in output proportional to the number of men so replaced, and if they were all replaced the output would be restored to the former figure.

The reduction in coal production in Nova Scotia dates from the heavy enlistment of 1916. Between 1915 and 1916 alone the Dominion Coal Company lost by enlistment the labor of 1,300 unmarried men between the ages of 19 and 35, or 30 percent of this class, and lost also 50 percent of the boys under 19 year of age. Ninety-five percent of the enlistments were from amongst the underground workers. It is this gap that has never been filled.

The re-alignment of working forces and the new sub-division of work amongst those who remained behind has, unfortunately, come to be regarded as a permanent arrangement, and the chief blame for the continued small rate of coal production should be laid, not upon the individual coal producer, but upon that policy of the union which is opposed to any importations of new men, or to any policy that is designed to transfer men from the non-productive class where they are now found, to the productive class, where they were formerly employed.

"Will you tell us how to get some more revenue?", was a question put to the General Manager of the Trail Plant by Sir Henry Drayton at a Tariff Enquiry session. "Tax the farmer" suggested Mr. Warren, "especially the 'smoke farmer'". Not at all a bad idea.

British Columbia Letter

THE METAL MINES.

Stewart, B. C.

It is reported from the Alaska side of the Salmon river section, Portland Canal, that considerable interest now is being taken in the development of mining properties in this locality. It is likely that at least three properties will be working all winter. The New Alaska is to be opened up and a diamond drill is being used in exploration work on the property of the Fitzgerald brothers. This property is located on Fish Creek. On another group of mineral claims, controlled by the Fish Creek Mining Company, a promising vein of ore has been encountered, and it is hoped that it will be possible to ship ore this winter. There also are properties on Texas Creek of which much is expected.

Trail, B. C.

Ore receipts at the Trail smelter during the week ending September 14th totalled 8,869 tons, bringing the total for the year to date to 230,181 tons. The Ruth and the Redress of Sandon, and the Silver Glimpse of Geigerich, added their names to the limit of Slocan shippers, while the Voight of Similkameen also was a contributor.

Nelson, B. C.

A galena property has been located at Nakusp on the Arrow lakes. The claim is known as the Luck Rose and is especially interesting for the reason that this section has not hitherto been considered as possessing mineral possibilities. Already a lead has been uncovered for 300 feet and the assays are reported to give returns of from 49.1 ounces in silver, and \$1.80 in gold.

Kaslo, B. C.

Hon. John Keen, speaker for the Provincial Legislature, has just returned after a trip through the Lardeau district. He visited the Lardo, Trout lake, Ferguson and other points. Mining he says is rather quiet. The Triune, True Fissure and other claims look well, while the leasers on the Silver Cup and Nettie L have made good progress and have ore ready to ship. The Gold Cure and other claims are promising.

Speaker Keen observed that Trout lake mining was not as brisk as it might be, but that operators there are looking forward to the future optimistically.

As to the labor situation he said that it was showing marked improvements, men were going back to the camps seeking employment and the indications were that in a short time the trouble which has been experienced during the past several months would be settled.

Greenwood, B. C.

The Lightning Peak mining section is being opened up by the construction of a trail, under the terms of the "Mineral Survey and Development Act." The Provincial Government has been busy on this for a large part of the past season, and the work now is reported to be practically completed. Lightning Peak has an elevation of about 7,500 feet. In that locality are situated a number of mining properties which give promise of developing into im-

portance. Among these is the Waterloo Mine in which Greenwood people are interested. With the completion of the trail it will be possible to make the trip with pack horses from Greenwood to the peak in four days.

The Rampallo group of mineral claims located near Edgewood is being opened up by a considerable force of men. When in about 40 feet from the mouth of the tunnel a ledge about one foot wide was cut. It carried gold and silver. To reach the main ledge there is still a distance of 250 feet to go. This main ledge shows an average of \$10.00 in gold and 250 ounces in silver at a depth of about 20 feet.

Ore is being shipped from the Waterloo mineral claims and there are about 800 sacks of high grade ore ready to bring out.

On the Killarney a new tunnel is being driven, and the ledge has been struck at about 75 feet. This ledge is about six feet wide.

Victoria, B. C.

A small force of men has been employed since last March on the Gabbro Copper Mines, Ltd., situated at Jordan River, Vancouver Island. Several large open cuts have been made with a view to ascertaining the grade and continuity of the ore bodies. Some good ore has been taken from a tunnel driven on Sinn Fein Creek, but the most promising showings were found on the Sunlock Cave Zone where it crosses the Jordan River into the Gabbro group. The open cuts referred to have established a width of from 5 to 25 feet of mineralized material having a length of between 300 and 400 feet. The grade of the ore is exceptionally good, there being considerable body averaging 3 per cent or better, which is the best surface showing as yet found in the Jordan River Section. The zones on the Gabbro group are in basalts of Eocene age, which have been intruded by a stock of gabbro. There has been much shearing of the basalts, due probably in part to the shrinkage of the gabbro mass when cooling, and also to regional stresses.

There has also been some shearing and ore deposition in the gabbro. Continuity of the ore at depth in these shear zones is shown by the tunnels on the adjoining Sunlock property, which give a vertical depth of over 500 feet. The Sunlock is one of the very few mines in this province that has had no serious set back since the beginning of mining operations on it in 1917.

The Collieries.

The report that the fuel control system was to be re-introduced was apparently incorrect, but in such an event it is unlikely to affect British Columbia. This Province is a little differently placed, as is recognized by the fact that the embargo against the exportation of coal from other sections of Canada is not made to apply to it. It would seem from this that the Canadian authorities realize that the collieries of the Province may be depended to look after the domestic necessities before undertaking to meet outside demands for fuel. If therefore it is considering that British Columbia is able to look after herself in this respect, it surely will not be thought necessary to introduce legislation covering the distribution of coal within the Provincial borders.

While the British Columbia collieries are working

to capacity, or rather to as near capacity as the available labor renders, there are reports of pending labor troubles from a number of coal fields. One of the most imminent of these appears to be threatening the coal mines of Washington State. There the miners threatened to walk out to enforce demands that a recently established wage scale be made retroactive to August 16th. The operators have announced that in the event of this happening the mines will be kept open for the employment of all men who wish to remain at work. This promised strike was set to occur a day or two after the time of writing, and as it is said to have had the sanction of the United Mine Workers of America, it no doubt has since developed. All but two mines in the States are affected and 3,000 coal miners approximately will leave their work. In an effort to provide against the coal shortage anticipated considerable orders are being placed in British Columbia by consumers in the State of Washington.

New workings are to be opened up on Vancouver Island by the Granby Mining and Smelting Company. This company's operations on the island have been somewhat interfered with by a recent rule of the Supreme Court which decided that rights in two leases of coal lands being exploited by the Company really were owned by the E. and N. Railway Co. Pending an appeal, however, the Granby Company is permitted to mine up to 100,000 tons of coal. While this latitude is permitted the operating company no doubt feels its restrictions, and proposes to proceed with the development of other of its coal lands over which there is no dispute.

In the course of a few weeks the British Columbians will decide through a plebiscite whether they are in favor of a wet or a dry condition as to the liquor traffic. An interesting sidelight on the attitude that the residents of at least one of the coal mining centres of this Province may be expected to take on this question is furnished by a vote which was taken at Cassidy a few days ago. Cassidy is the island mining town of the Granby Company Mining and Smelting Company. There was a general meeting at which arguments pro and con regarding prohibition were advanced. A vote followed and a large majority enthusiastically endorsed government control in preference to the present Prohibition Act.

August Coal Output in British Columbia.

The coal output of the collieries of British Columbia for the month of August was as follows:

Vancouver Island Field.

	Tons.
Canadian Western Fuel Co., Nanaimo	34,381
Canadian Collieries (D) Ltd., Comox	38,015
Canadian Collieries (D) Ltd., S. Wellington	7,943
Canadian Collieries (D) Ltd., Extension	14,732
Pacific Coast Coal Mines	8,110
Nanoose-Wellington Collieries, Nanoose	4,683
Granby Consolidated Mng. Smeltg., & P. Co., Cassidy	9,330
Total	117,194

Nicola-Princeton Field.

Middlesboro Collieries, Middlesboro	7,341
Fleming Coal Co., Merritt	2,197
Coalmont Coal Co., Coalmont	2,056

Princeton Coal Co., Princeton	1,633
Total	13,227

Crow's Nest Pass Field.

Crow's Nest Pass Coal Co., Coal Creek	37,628
Crow's Nest Pass Coal Co., Michel	23,355
Corbin Coal and Coke Co., Corbin	15,342
Total	76,325

GRAND TOTAL 206,746

TORONTO MINING STOCKS.

Closing Quotations on Standard Stock Exchange, October 6th.

<i>Silver</i>	<i>Asked</i>	<i>Bid</i>
Adanac	3	
Bailey	5	4½
Beaver	40½	39
Chambers-Ferland	7	5½
Cobalt	47¾	46½
Coniagas		2.50
Crown Reserve		27½
Foster		2½
Gifford		1¼
Hargraves	2½	2½
Kerr Lake	3.40	3.25
La Rose		32
Lorrain	5	
Mc Kinley-Darragh	55	
Mining Corporation	1.63	1.61
Nipissing	9.50	9.25
Ophir	3	
Peterson Lake	15	14
Right of Way	2	
Silver Leaf	3	
Timiskaming		34
Trethewey	25½	25
<i>Gold.</i>		
Apex	2	17/8
Atlas	15	11
Boston Creek		15
Dome Extension	40	38½
Dome Lake	5	4½
Dome Mine	12.50	12
Gold Reef	37/8	3½
Hollinger	5.75	5.70
Hunton	12	
Keora	18	17½
Kirkland Lake	48	46½
Lake Shore	1.12	1.09
McIntyre	2.06	2.05
Moneta	12½	11
Newray	8	7
Porcupine Crown	26	24
Porcupine V.N.T.	25	24
Preston	2½	1
Schumacher	21¼	21
Teck-Hughes	10	
Thompson-Krist	10	
W. Dome	7	6½
Westree	5½	5
Wasapika		9
<i>Miscellaneous.</i>		
Rockwood	4½	2½
Vac. Gas	26	25

METAL QUOTATIONS

Fair prices for Ingot Metals in Montreal, Oct. 6th, 1920. (In less than carload lots).

	Cents per lb.
Copper, electro	23
Copper casting	22½
Tin	52
Lead	8½
Zinc	9½
Aluminum	35
Antimony	8½

INTERNATIONAL MAGNESITE CO. OF QUEBEC ON SIX PER CENT DIVIDEND BASIS.

The International Magnesite Company, Limited, has declared a further dividend of one and a half per cent. payable October 1, for the quarter ending September 30 last. This is the second declaration for the year of a like amount.

The stock of this company has been placed on a six per cent. basis—earnings for the current year being satisfactory and future prospects bright.

The company operates in Argenteuil County in the Province of Quebec, about fifteen miles north of Grenville, where their extensive quarries and plants are located.

Officers of the company are: E. W. Whiting, president; J. R. Colby, vice president; C. F. Gamble, general manager, and R. Thouret, secretary-treasurer. The sales manager is H. Percival Ross.

PRICE OF LEAD AGAIN REDUCED.

American Smelting & Refining Co. reduction in its New York price for lead from 8 to 7¾ cents is the third in 16 days, and is due to considerable importations from Europe. Sept. 13 the company reduced from 9 to 8½ cents and on Sept. 23 from 8½ to 8 cents. Weakness of exchange is encouraging importation in spite of 25% ad valorem duty upon lead, and with continued weakness in exchange a further decline in the domestic price can be expected. At present the price is the same as it was Jan. 1, 1920.

For the last six months United States consumption of lead has been much larger than production and a considerable importation has been necessary to meet demand. The main cause of the expansion in our lead requirements, and of the rise in lead, has been demand for metallic lead as well as lead oxide for storage battery use. Pigment consumption has also increased, as we are today not only supplying our own market but exporting much lead-paint to South America and the Orient, taking much of the business formerly done by Germany and England. A certain amount of lead must therefore be expected to come in for many months. Domestic price, however, must be such as not to encourage too great importation.

One mining man called attention to efforts of American Smelting & Refining Co. to stabilize lead consumption by keeping the price at proper level. In this aim, it follows a policy similar to that of United States Steel in the steel industry. "Boston News Bureau."

By error, the statement was made on page 808 of the "Journal" in the last issue, that there was a demand for low-grade asbestos cloth for renewal of brake linings on "freight cars". This, of course should have read "motor cars."

Northern Ontario Letter

THE SILVER MINES

The Cobalt Area

What appears to be one of the most important surface discoveries made in recent years had been made on the Kerr Lake mine, where a series of three veins have been opened up. The "Journal" reported the discovery of the first of these veins last week, at which time no great importance was attached to the find. Later on, however, when blasted into, this vein was found to contain considerable high grade ore, \$2,000 being taken out in two rounds of holes. As stated last week, the first vein was found during the course of excavating for a foundation for the installation of a crusher with which to prepare dump-ore for shipment.

The second high-grade vein on the Kerr Lake was found while extending the excavation work so as to make room for a conveyor, while the third was found while clearing off a place for a foundation for a motor which is to drive the conveyor and crusher.

All three veins occur within a few feet of each other, and are in conglomerate formation which at this point is about 100 feet thick. The strike of the veins is south-east straight into the Kerr Lake, and North-west toward the Crown Reserve, the boundary of the latter property being only ninety feet from the point where the find has been made.

On the strength of the probability of being able to pick up these veins, the Crown Reserve is driving a cross-cut into that part of its property lying close to the Kerr Lake and in line of the strike of the veins. It seems highly probable that these veins will be picked up, although the question as to what values they will contain at that point will be left for the actual work to determine.

The Mining Corporation is re-treating from 300 to 350 tons of tailings daily from the bed of Cobalt Lake. This is somewhat lower than earlier estimates, and with well over 300,000 tons still remaining, about 2½ or 3 years would be required to handle them at the present rate. As regards the silver content, no official announcement has been made, but it is believed the output from this source may reach upwards of 40,000 ounces monthly.

The Peterson Lake is shipping low grade ore at the rate of about 20 tons daily. Also, this company is receiving a moderate amount of revenue from the re-treatment of the large tailings pile. The income is believed to be sufficient to cover the cost of the underground exploration work now being done. Opinion seems to be that the hope of realizing any very large amount of profit rests with the development work underground, and certain interests connected with the Peterson Lake are confident that this old property may still contain some favorable surprises.

Labor is still scarce in the Cobalt district. The chief cause of the present shortage appears to be the high wages being paid by the large pulp mills under construction in various part of the north. It is believed this shortage will be only temporary, and that within the next sixty days the situation may adjust itself. In the meantime, production is not hampered to any serious extent.

The price of dressed cobalt-metal has recently increased to about \$6 a pound. In the rough it is quoted at from \$3 to \$4 a pound. The added revenue

to the silver producing companies which turn out cobalt as a by-product is quite considerable, it not being uncommon for the cobalt content to increase a single car of ore some \$1,200 or more in value. The smelters pay the mines for cobalt when the content of a shipment amounts to over 4 p. c. For example, a shipment containing 5 p. c. cobalt is paid for at the rate of 2 cents per unit, or 10 cents a pound, and adds \$10 a ton to the value of the shipment. For shipments containing a higher percentage the per unit price is graded up to as much as 4 cents. However, as a further example, and dealing with shipments containing 10 p.e. cobalt, the price per pound at 2 cents per unit would be 20 cents and would amount to \$40 extra for each ton, thus placing a value of about \$400 per ton on a full ton of cobalt. As compared with this, the smelters after separating the cobalt are in line to receive from \$3 to \$4 a pound for it or actually from \$6,000 to \$8,000 a ton.

Information from the Cane township section of the Lake district would indicate that about three tons of ore has been bagged from open cuts on the Cane Silver Mines, and that a small shipment will be made before the end of the year. Among the interests involved in the proposition are J. Houston of Haileybury, and R. S. Potter, of Matheson. It was reported some time ago that interests unidentified with the Abitibi Power and Paper Company were involved in the operation, but this appears to have been erroneous and to have arisen as a result of Mr. Potter's name having been used in a wrong connection, and by an official of the Cane Silver Mines.

The O'Brien mine of Cobalt has had a scout in the field, inquiring into the possibilities of properties lying in the vicinity of the Cane group.

From information available in connection with the property at Gowganda, the question of installing a small mill may be considered before the end of the coming winter. Underground work continues to be encouraging, although not spectacular as many early reports would tend to indicate.

Tenders are being called for continuing the main shaft of the Silver Bullion property at Leroy Lake, from its present depth of 45 feet to a depth of 145 feet, at which point it is planned to carry out about 200 feet of lateral work. The property has recently been equipped with a steam-driven mining plant consisting of a 100-h. p. boiler, together with a 5-drill compressor and other corresponding equipment. A few bags of high grade ore have been sorted out from the small dump at the 45-ft shaft.

A deal is being negotiated for the Haileybury Frontier property in South Lorrain, and plans are to be made to carry on work at an early date.

The analysis of gas found at Paradis Bay a few mile south from Haileybury on the west shore of Lake Temiskaming has been found to show a fairly high percentage of methane, and is believed to indicate an oil deposit. Leases have been secured from land owners, and arrangements will be made to commence boring as soon as rigging can be secured.

THE GOLD MINES

The Porcupine Field

Relief in the way of labor supply has not yet materialized in the gold mining districts of Northern Ontario. The gold mining companies are obviously determined not to enter into competition with the

companies which are constructing pulp mills in various parts of the country, and will undoubtedly bide their time, content to operate at the present rate of about two-thirds capacity until such time as labor shall be attracted by present wage scales at the mines.

On account of the great depth to which developments are being carried on by the Hollinger Consolidated at the McIntyre-Porcupine, the attention of mining men is gradually being attracted with greater interest to adjacent properties upon which these deposits may reasonably extend, and the belief is expressed that as in the case of the Moneta property as well as the Inspiration, both of which lie immediately west and south-west of the Hollinger it would not come as a surprise were one large concern to make a bid for an opportunity to gain their control and undertake operations on a big scale. In this connection, it was reported last spring that the Hollinger would consider the Moneta control at the rate of 25 cents a share, and the stock which was then quoted at around 8 cents a share moved quickly up to close to 20 cents a share. It has since declined to around 11 at the time of writing, although bids at this price fail to bring out any stock.

As regard the Inspiration, the "Journal" secured an interview with an official and was informed that the leading interests are content to await events, believing the property will steadily take on increased potential value as a result of work on the adjoining mines. This official declared the company was completely out of debt, and was in the happy position of having about 800,000 shares of stock in its treasury with which future work could be financed. He also pointed out that as a result of previous diamond-drill work, the formation was found to be favorable and that one vein was cut in which very encouraging gold values occurs.

The McIntyre-Porcupine is making good progress in the operation of the Blue Diamond coal mine which was recently acquired in Alberta. About 150 men are employed on the property, and the enterprise is said to be on a profit-earning basis. The question of whether the Temikaming Mining Company is to join the McIntyre in the venture is to be determined at a meeting of the shareholders of that company to be held on October 7th. In the meantime, every effort appears to be exerted to make as favorable a showing as possible before that date.

Although the Hollinger and the Dome mines each conducted exhaustive tests with low-grade cyanide secured from the American Cyanamid Company at Niagara Falls it is significant to note these companies continue to use the high-grade article secured from the Cassel Cyanide Company, of Glasgow, Scotland. No official announcement has so far been made as to the measure of encouragement met with as a result of the tests and experiments with the low grade article.

The Porcupine V. N. T. is gradually getting a staff together, among the latest additions being Wm. Gowans, as mine captain, as well as Mr. J. B. McArthur, who is connected with the Associated Gold Mines of Western Australia and has arrived here. He will act in a consulting capacity with Major J. McIntosh Bell, the manager.

The Kirkland Lake Field.

Sinking operations have commenced on the Granby-Kirkland property, on a vein ranging from 4 to 5 feet in width, assays of which range from \$1 to \$15 a ton over the width of the vein. Five highly mine-

ralized veins have been trenched on surface, and parallel each other. It is planned to cross-cut these veins at a depth of about 200 feet.

Work has been resumed on the Mofatt-Hall property. In addition to carrying on underground work, arrangements are being made to employ a diamond drill to make a deep test of formation and veins.

The assessment work on the Crystal Lake property has been completed and an endeavor is now being made to secure finances with which to launch out into an aggressive exploration campaign.

According to the regular monthly report of manager R. C. Coffey to the President and directors, the Lake Shore mine of Kirkland Lake treated 1,281 tons of ore during August and recovered \$35,261.27, as compared with over 1,800 tons and \$52,424.45 produced in July. The lower tonnage was caused by delays due to breaking a ball-mill clutch and relining the mill.

One feature in connection with the statement is that the Lake Shore mine has now past its first million dollar mark in point of production, the total up to the end of August amounting to \$1,011,580. Another feature is that while during the early months after opening its mill on March 8th, 1918, the average recovery was about \$24 to the ton and considered by outsiders to be too high to last, the reports for recent months actually show a higher average, that for the month just closed being \$27.52, while for July the average amounted to over \$28 to the ton.

A leading feature in connection with development is contained in the official statement as of August 31st, that station timbering has been completed at the 400-foot level, as well as a bin for waste rock provided, and a hoist has been installed and the work of deepening the shaft was under way, being then down 17½ feet below that level. The objective is a depth of 800 feet, with main levels to be opened up at the 600 and 800-ft levels.

About 60 men are employed at the Argonaut Gold Mines at Beaverhouse Lake, and the results achieved continue to be highly encouraging.

Work has been suspended on the Nelson group of claims at Fort Matachewan, known as the Thesaurus Gold Mines. Arrangements are being made to take advantage of the better transportation after the freeze-up, and to then resume operations.

Within the next week or two, a crew of miners will leave for the Lightning River district to commence work on the Lightning River Gold Mines. More extended reference will be made to this property in the next issue.

Personals.

Mr. P. B. McArthur, of London, is visiting the Porcupine gold district.

Mr. A. A. Cole is back at his office at Cobalt.

Mr. D. Keeley, of the McIntyre staff, has returned to the mine after a month's holiday.

GYPSUM EXPORTS RESUMED FROM CAPE BRETON.

The Iona Gypsum Company, whose quarries are at Iona, Cape Breton Island, is making the first shipment of gypsum since operations were resumed after the war. A cargo of 2,500 tons is being loaded for Philadelphia, where before the war, Cape Breton gypsum was in much demand.

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THE DOER.

Make the best of the worst of things, is the attitude of he who would be wise. The optimist insists on cheerfulness. He needs it mentally as the system needs oxygen. A fake optimist is a bubble, bright and brilliant in sunshine, but when touched with rough stuff bursts. The read hard-rock optimist is a tonic and a jewel. He is an expander. The world is too small for him. Incidentally, he is the man with the pick and shovel who starts the movement to new locations. The Yukoners know him well. Many a time they have seen him strike out for the hills with his pack and dog and gun, an independent fellow, earnest, a bit of a fatalist, adapting himself readily to circumstances. He will tackle a raging river on a few logs bound together with willows. If he goes under, no one may ever know the how or when of it. If he wins, thinking nothing of it, he follows his course. If he is out for placer gold, he has an eye for rimrock and gravel banks in creeks and gulches; if a quartz man, he looks for "float" along the bars and fringes of the waterway. Patiently he will dog a likely prospect to its lair in the virgin rock. When the "float" is increasing he knows that he is drawing near the source.

He may find no more than a small piece or two in a whole day's tramp, but he is experienced as well as hopeful. A change in the water course, an eddy, a current, has its effect. He studies nature instructively. The good prospector is a born naturalist and observer. He knows his rock as thoroughly as Faber does his spider or the blind wood borer. When the "float" ends abruptly, there the prospector camps. The glow of his fire lights the darkness, the crackle of burning logs break the stillness. A bit of canvas on a couple of poles, a blanket spread on spruce boughs, a piece of bacon in the pan, a biscuit, a pot of tea, a pipe, and your optimist feels like a lord. If he has luck, a Keno Hill or Mayo boom may result.

And what follows? Look over the history of mining throughout the world. In the glow of his camp-fire on river or mountain did the prospector see a railway reaching across the wilds? Did he see towns, cities? Hear the hammer of the worker, feel the throb of industry? No, likely not. But he made all these things.

His name may never be known outside his own small circle of cronies, but his works ring round the earth.—From Dawson "Weekly News".

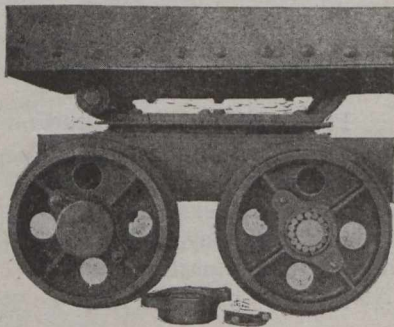
Washington reports state that iron ore has been found in the Philippines, on the Island of Mindanao, in very large deposits, up to 500,000,000 tons of ore having been ascertained to exist within easy transportation distance of Dajkin Bay, a fine natural harbor. The United States was not unblest with iron ore when it had not acquired outside territories, but if the foregoing is approximately correct, the new find, added to the known Cuban deposits and the domestic iron ores, should relieve the United States steelmakers of any pressing anxiety for iron ores in the years to come.

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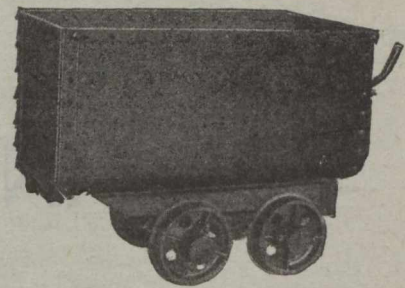
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COAL QUOTATIONS.

Toronto, Oct. 8—Coal during the past week has been a little easier in the Toronto market, but the car supply for the past week has been very meagre which will mean a considerable curtailment of receipts in the course of two or three weeks. Hard coal is still quoted at from \$8.00 to \$16.00 gross tons at the mines, American funds. Mine run is quoted at \$13.85 to \$14.25 f.o.b. Toronto and smokeless rules at from \$14.00 to \$15.00.

Montreal: Spot bituminous is obtainable at about \$8.00 per ton, American funds at mines. The price delivered to domestic consumers in the City is now about \$17.000 compared with \$18.00 a few weeks ago. Lower quotations on New York funds and better deliveries at the mines are assisting in lowering the price of soft coal. Some deliveries have been made by the mines on contract coal at the lower prices at which these contracts were made, which is an indication that the demand is easier.

No coal is coming to Montreal and district from the Nova Scotia collieries, and none is likely to come this year. For the first time in memory, householders in Nova Scotia are being restricted in their coal purchases, and actually the coal being mined in the Maritime Provinces is insufficient for the local needs, including Newfoundland.

The discovery of a new vein on the surface which excavating for installation of a rock crusher, has given new interest to the possibilities of making other finds by intensive surface prospecting. Silver mines of the Cobalt district die hard, for rich veins are often encountered as work proceeds. It is never safe to predict the end of the life of one of these mines.

UNDER LICENSE FROM "UNCLE SAM".

The Canadian people heave a sigh of relief at the report that enough coal will be available for another winter. The essential supply comes from the United States.

Until Canada develops her own rich coal deposits, the Dominion will operate every winter under license procured from Uncle Sam. Before a Canadian representative is installed at Washington our relations with the United States should be placed on a self-respecting basis.—"Montreal Star".

CONSOLIDATED M. & S. CO. COMPLETE TRANSMISSION LINE TO COPPER MOUNTAIN

The West Kootenay Power and Light Company (which is owned by the Consolidated Mining and Smelting Company) has completed the power line extension to Copper Mountain.

The railway company has completed its spur into the property and is now ready to transport the output of the Canada Copper Company to the Smelter at Trail, where the ores will be treated. The power company have contracted to supply 5,000 h.p. to be used in connection with the mining operations at Copper Mountain.

NATURAL GAS SHORTAGE IN ONTARIO

The Natural Gas & Fuel Co. of Hamilton has cut off supplies of natural gas to manufacturers, and has warned householders and others that natural gas must be reserved for lighting and cooking in domestic establishments, and next for cooking in public establishments. No gas is to be used for heating purposes unless there is a surplus over the first-named requirements.

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.

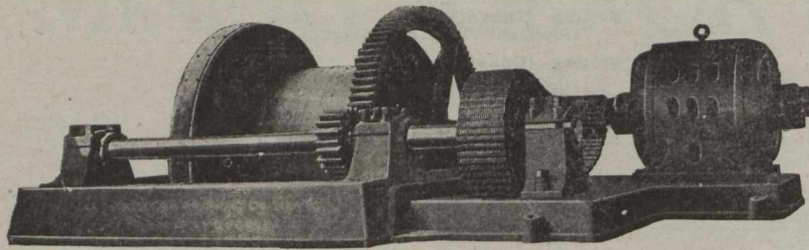
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Diamond Drill Carbon Co.
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- Crane Ropes:**
Allan Whyte & Co.
Canada Wire & Cable Co.
Greening, B., Wire Co., Ltd.
- Crucibles:**
Canadian Fairbanks-Morse Co., Ltd.
The Mine & Smelter Supply Co.
- 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.
Lymans, Ltd.
Mussens, Limited

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Manufacturers of

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Bar Silver—Electrically Refined

Arsenic—White and Metallic

Cobalt Oxide and Metal

Nickel, Oxide and Metal

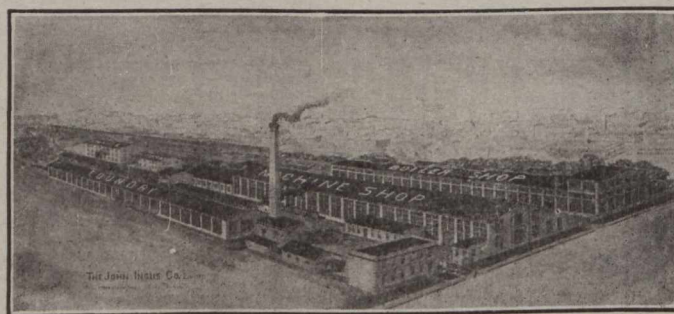
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Canadian Miners' Buying Directory.—(Continued)

- The Mine & Smelter Supply Co.
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.
- Derricks:**
Smart-Turner Machine Co.
Canadian Mead-Morrison Co., Limited.
Marsh Engineering Works
R. T. Gilman & Co.
Canadian Fairbanks-Morse Co., Ltd.
Mussens, Limited
- Diamond Drill Contractors:**
Diamond Drill Contracting Co.
E. J. Longyear Company
Smith & Travers
Sullivan Machinery Co.
- Diamond Tools:**
Diamond Drill Carbon Co.
- Diamond Importers:**
Diamond Drill Carbon Co.
- Digesters:**
Canadian Chicago Bridge and Iron Works
- Dies:**
Canada Foundries & Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Dredger Pins:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
The Electric Steel & Metals Co.
Hadfields, Limited
- Dredging Machinery:**
Canadian Steel Foundries, Ltd.
Canadian Mead-Morrison Co., Limited.
Hadfields, Limited
Hull Iron & Steel Foundries, Ltd.
R. T. Gilman & Co.
- Dredging Ropes:**
Allan, Whyte & Co.
Greening, B., Wire Co., Ltd.
R. T. Gilman & Co.
- Drills, Air and Hammer:**
Canadian Ingersoll-Rand Co., Ltd.
Canadian Rock Drill Co.
Denver Rock Drill Mfg. Co., Ltd.
Sullivan Machinery Co.
Northern Canada Supply Co.
Osborn, Sam'l (Canada) Limited.
The Mine & Smelter Supply Co.
Mussens, Limited
- Drills—Core:**
Canadian Ingersoll-Rand Co., Ltd.
E. J. Longyear Company
Standard Diamond Drill Co.
Sullivan Machinery Co.
- Drills—Diamond:**
Sullivan Machinery Co.
Northern Canada Supply Co.
E. J. Longyear Company
- Drill Steel—Mining:**
H. A. Drury Co., Ltd.
Hadfields, Limited
International High Speed Steel Co., Rockaway
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—Stationery:**
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.
- Flourspar:**
The Consolidated Mining & Smelting Co.
Everitt & Co.
- Forges:**
Canadian Fairbanks-Morse Co., Ltd.
Northern Canada Supply Co.
- Forging:**
Canadian Mead-Morrison Co., Limited.
Canadian Foundries and Forgings, Ltd.
Hull Iron & Steel Foundries, Ltd.
Smart-Turner Machine Co.
Hadfields, Limited
Fraser & Chalmers of Canada, Ltd.
- Frogs:**
Canadian Steel Foundries, Ltd.
Hull Iron & Steel Foundries, Ltd.
John J. Gartshore
- Frequency Changers:**
MacGovern & Co., Inc.
- Furnaces—Assay:**
Canadian Fairbanks-Morse Co., Ltd.
Lymans, Limited
Mine & Smelter Supply Co.
- Fuse:**
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—Miners:**
Canada Carbide Company, Limited
Canadian Fairbanks-Morse Co., Ltd.
Dewar Manufacturing Co., Inc.
Northern Electric Co., Ltd.
Mussens, Limited
- Lamps:**
Dewar Manufacturing Co., Inc.
- Lanterns—Electric:**
Spielman Agencies, Regd.
- Lead (Pig):**
The Canada Metal Co., Ltd.
Consolidated Mining & Smelting Co.
Hoyt Metal Company.
- Levels:**
C. L. Berger & Sons
- Locomotives (Steam, Compressed Air and Storage Stee**
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.
Coniagas 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 Dorr Co.
- Metallurgical Machinery:**
General Engineering Co., New York
The Dorr Co.
The Mine & Smelter Supply Co.
- Metal Work, Heavy Plates:**
Canada Chicago Bridge & Iron Works
- Mica:**
Everitt & Co.
Diamond Drill Carbon Co.
- Mining Engineers:**
Hersey, M. Co., Ltd.
- Mining Drill Steel:**
H. A. Drury Co., Ltd.
Osborn, Sam'l (Canada) Limited
International High Speed Steel Co., Rockaway, N
- Mining Requisites:**
Canadian Steel Foundries, Ltd.
Dominion Wire Rope Co., Ltd.
Hadfields, Limited.
Osborn, Sam'l (Canada) Limited.
Hull Iron & Steel Foundries, Ltd.
Fraser & Chalmers of Canada, Ltd.
The Electric Steel & Metals Co.
The Wabi Iron Works
- Mining Ropes:**
Dominion Wire Rope Co., Ltd
- Mine Surveying Instruments:**
C. L. Berger & Sons
- Molybdenite:**
Everitt & Co
- Monel Metal (Wire, Rod, Sheet and Foundry Metal):**
International Nickel Co
- Motors:**
Canadian Fairbanks-Morse Co., Ltd.
R. T. Gilman & Co.
MacGovern & Co.
The Mine & Smelter Supply Co.
The Wabi Iron Works

Canadian Miners' Buying Directory.—(Continued)

- Motor Generator Sets—A.C. and D.C.**
MacGovern & Co.
- Nails:**
Canada Metal Co.
- Nickel:**
International Nickel Co.
Coniagas Reduction Co.
The Mond Nickel Co., Ltd.
- Nickel Anodes:**
The Mond Nickel Co., Ltd.
- Nickel Salts:**
The Mond Nickel Co., Ltd.
- Nickel Sheets:**
The International Nickel Co. of Canada
The Mond Nickel Co., Ltd.
- Nickel Wire:**
The Mond Nickel Co., Ltd.
The International Nickel Co. of Canada
- Oil Analysts:**
Constant, C. L. Co.
- Ore Handling Equipment:**
Canadian Mead-Morrison Co., Limited.
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 Ingalls 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.
- Rails:**
Hadfields, Limited
John J. Gartshore
R. T. Gilman & Co.
Mussens, Limited
- Railway Supplies:**
Canadian Fairbanks-Morse Co., Ltd.
- Refiners:**
Goldsmith Bros.
- Riddles:**
Hendrick Mfg. Co.
- 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.
Canada Wire & Cable Co.
Dominion Wire Rope Co., Ltd.
Greening, B. Wire Co.
Northern Canada Supply Co.
Mussens, Limited

Rolls—Crushing

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

Samplers:

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

Scales—(all kinds):

Canadian Fairbanks-Morse Co., Ltd.

Screens:

Greening, B. Wire Co.
Hendrick Mfg. Co.
Mine & Smelter Supply Co.
Canada Wire and Iron Goods Company.
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.
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.)

Siline:

Coniagas Reduction Co.

Saline Refiners:

Goldsmith Bros.

Smelters:

Goldsmith Bros.

Sledges:

Canada Foundries & Forgings, Ltd.

Smoke Stacks:

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

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.
Canadian Ingersoll-Rand Co., Ltd.
Mussens, Limited
Swedish Steel & Importing Co., Ltd.

Steel Drums:

Smart-Turner Machine Co.

Steel—Tool:

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

Structural Steel Work (Light):

Hendrick Mfg. Co.

Stone Breakers:

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

Sulphate of Copper:

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

Sulphate of Nickel:

The Mond Nickel Co., Ltd.

Surveying Instruments:

C. L. Berger

Switches and Switch Stand:

Canadian Steel Foundries, Ltd.
Mussens, Limited.

Switches and Turntables:

John J. Gartshore

Tables—Concentrating:

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

Tanks:

R. T. Gilman & Co.

Tanks—Acid:

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

Tanks (Wooden):

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

Tanks—Cyanide, Etc.:

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

Tanks—Steel:

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

Tanks—Oil Storage:

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

Tanks (water) and Steel Towers:

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

Tires—Auto, Truck and Bicycle:

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Hadfields, Limited
- Transits:**
C. L. Berger & Sons
- Transformers:**
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R. T. Gilman & Co.
Northern Electric Co., Ltd.
- Transmission Appliances:**
Jones & Glassco (Regd.)
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Hans Renold of Canada, Limited, Montreal, Que.
Jones & Glassco (Regd.)
- Troughs (Conveyor):**
Hendrick Manufacturing Co.
- Trucks—Electric:**
Canadian Fairbanks-Morse Co., Ltd.
- Trucks—Hand:**
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- Trucks:**
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- Tubs:**
Hadfields, Limited
- Tube Mills:**
The Electric Steel & Metals Co.
Fraser & Chalmers of Canada, Ltd.
Hardinge Conical Mill Co.
- Tube Mill Balls:**
Canada Foundries & Forgings, Ltd.
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Tube Mill Liners:**
Burnett & Crampton
Fraser & Chalmers of Canada, Ltd.
Hull Iron & Steel Foundries, Ltd.
- Turbines—Water Wheel:**
MacGovern & Co.
- Turbines—Steam:**
Fraser & Chalmers of Canada, Ltd.
MacGovern & Co.
- Twincones:**
Canada Foundries & Forgings, Ltd.
- Uranium:**
Everitt & Co.
- Weighing Larries:**
Canadian Mead-Morrison Co., Limited.
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Prest-O-Lite Co. of Canada, Ltd.
Imperial Brass Mfg. Co.
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Canadian Fairbanks-Morse Co., Ltd.
Imperial Brass Mfg. Co.
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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
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The Electric Steel & Metals Co.
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- Wire—Bare and Insulated:**
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Dominion Wire Rope Co., Ltd.
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Canada Wire & Cable Co.
- Wire Cloth:**
Northern Canada Supply Co.
Greening, B. Wire Co.
Canada Wire & Iron Goods Company
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Northern Electric Co., Ltd.
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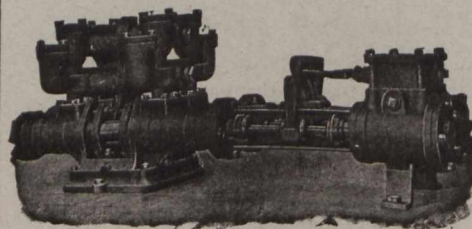
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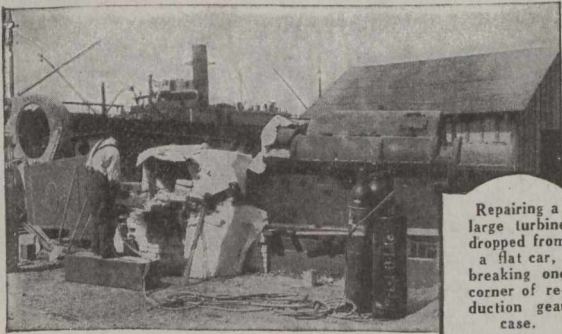
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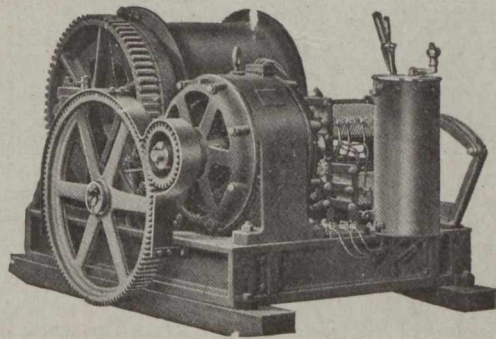
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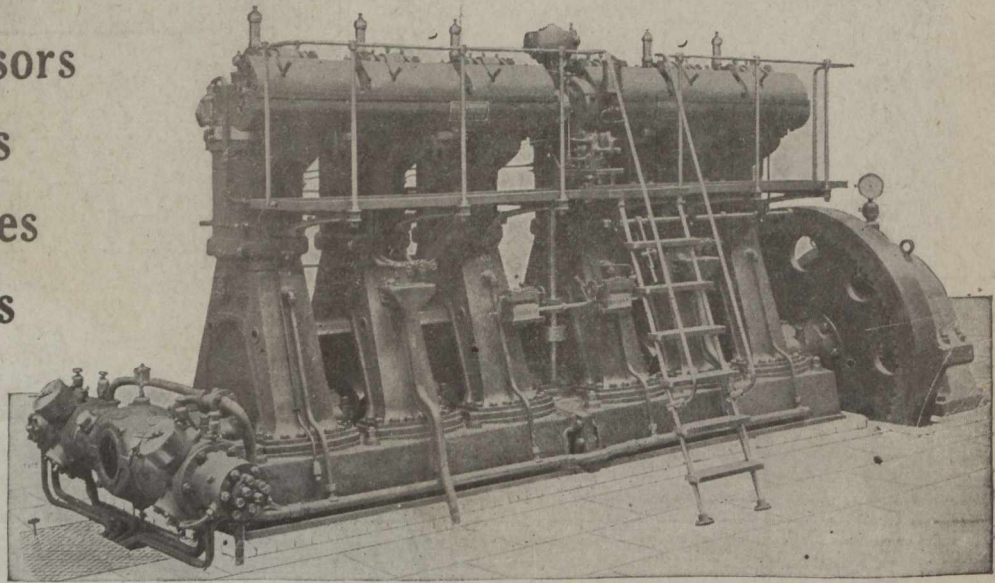
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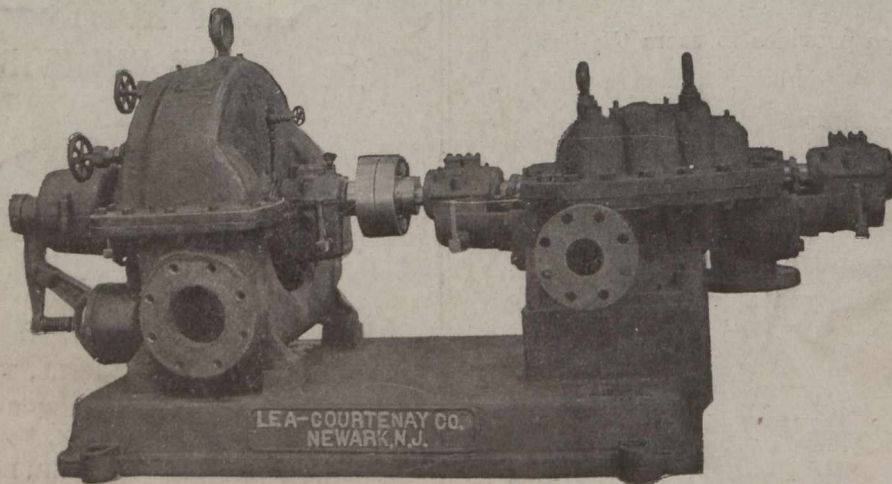
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