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CANADIAN MANUFACTURER AND INDUSTRIAL WORLD

DEVOTED TO THE MANUFACTURING INTEREST OF THE DOMINION.

VOL. 54. TORONTO, JANUARY 4, 1907. No. 1.

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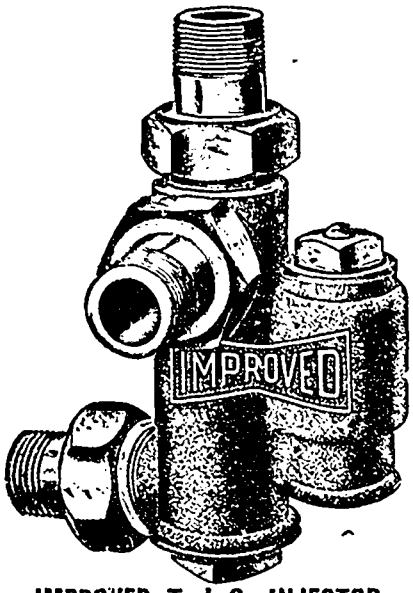

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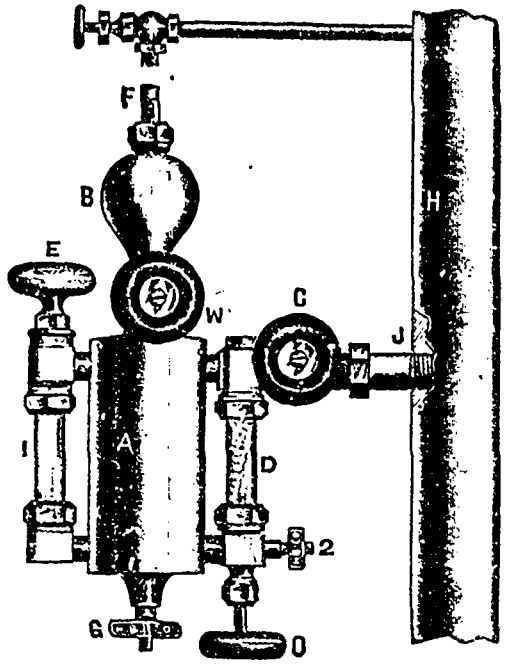

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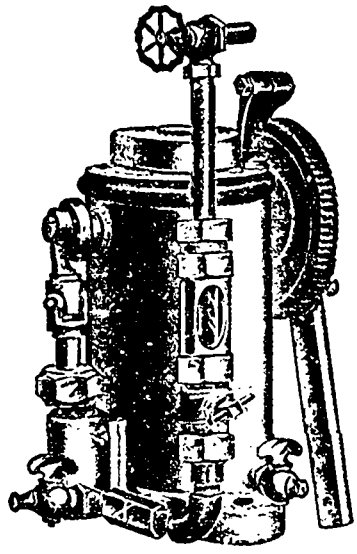

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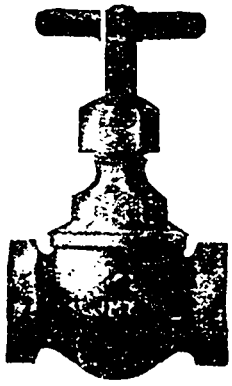

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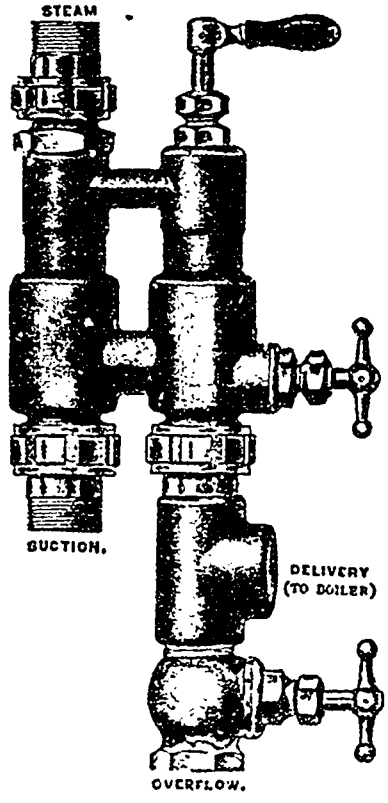

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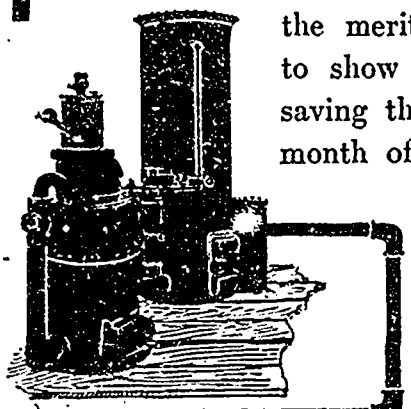

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POSSIBILITIES OF BRITISH TRADE IN CANADA.

A most interesting current event is the awakening of British manufacturers to the possibilities of British trade with Canada. Canada, as an exporter of her home products, and as an importer of the products of other countries, particularly in the last decade, shows remarkable progress In 1896 her total exports were valued at $121,013,852, and the value of goods entered for home consumption at $110,587,480, the inward and outward trade amounting to $231,601,330. In that year the aggregate trade with Great Britain amounted to $99,670,030, and with the United States, $103,022,434. Ten years later, in 1906, the last fiscal year, the exports of Canadian products were valued at $256,586,630, and value of goods entered for consumption at $290,360,807, the total trade amounting to $546,947,437, the total trade with Great Britain being $202,289,527, and with the United States, $273,668,593. In 1896 the value of dutiable goods imported amounted to $74,259,940, and free goods to $38,527,249, while in 1906 the imports of dutiable goods were valued at $176,790,352, and of free goods, $110,417,080. These figures show the remarkable increase in Canada's foreign and British trade in the past ten years.

Alluding to the engineering trade of Great Britain with Canada, in the December number of "Canada," a weekly journal published in London, Sir Charles McLaren, M.P., speaks of Canada being "a great field for British enterprise." Discussing the engineering trade Sir Charles says:

The growing demand all over the world for pig iron and manufactured iron and steel of every kind is exceeding the productive capacity of every country outside the British Islands. Already the United States and Germany are drawing heavily upon British output and British stocks. And so far as the immediate outlook goes, American iron and steel firms will have more than enough to do to supply the wants of their own country. In these circumstances the position of Canada as a customer for British iron, steel, machinery and other metallurgical products, is one of growing importance. Not many years ago the Canadian market was practically neglected by English firms. The idea prevailed, and perhaps there was some truth in it, that she got, and that nature intended her to get, all her supplies from the United States. The Board of Trade returns, presented monthly and annually to the House of Commons, simply classed Canada under the heading "Other Countries," and, while according personal recognition to Australia, New Zealand and the West Indies, gave no individual information about the Dominion. Of late years, however, the progress of Canada in population, in the growth of cities, in the construction of railroads and factories, and in the development of her agricultural lands, has made it in some respects the most active and promising of the Empire markets. In railroads alone it is estimated that fully a million tons of steel rails will be required during the next five years for projected lines, as well as great quantities of structural steel for bridges and buildings. The Canadian Pacific, the Canadian Northern, the Grand Trunk Pacific, the Grand Trunk and the Northern Pacific and their extensions are all pushing ahead, which will involve the purchase of rolling stock, heavy machinery and engineering appliances of every kind, and simultaneously with this railway development, the growth of Western towns and Eastern seaports must create a demand of a varied character for British iron and steel manufactures. The subsidized steel works of Canada are totally inadequate to provide for her coming requirements, and the condition of trade in the United States makes it highly improbable that relief to any large extent will come from that country, ... The superstition so sedulously fostered some twenty years ago by American manufacturers that British iron and steel plants were out of date has given place to a truer appreciation of the immense capacity of British plants for turning out cheaply the very best products that the most exacting tests can demand. It may have been true that twenty years ago we were behind the United States and Germany in modern appliances, but this is not true to-day. . . We have set our house in order and put ourselves in the position of producing iron, steel and machinery of better quality and at a lower price than any other country in the world.

It is therefore clear that Canada is likely to be in the immediate future one of our largest customers. She has already given us a preference in her tariff. The Imperial connection ought to count for a good deal, and the greater enterprise of British firms in keeping travellers and agents at work will help to develop this trade. . . No doubt there is some justification for Canadian complaints that British firms fail to deliver goods within the contract period. That complaint, however, under present conditions, will have but little weight, inasmuch as the United States and Germany, who, in all these trades are our rivals, are ceasing to deliver or sell abroad at all.

Sir Charles had said that the trades that were so overworked included iron and steel plants that are now engaged up to their full capacity, and that if the experience of the last two years in the locomotive engine building and heavy machine trades is to be repeated, orders to Great Britain may not be executed without considerable delay.

"It is well known," says Sir Charles, "that the trade in tramway materials and electric appliances, which in

England some years ago was monopolized by Belgium, Germany and the United States, is reverting to British manufacturers, and there is no reason to suppose that coming Canadian demand cannot and will not be satisfied in Great Britain."

CANADIAN SHIPBUILDING.

The Dominion Government has under consideration a proposition to aid by a tonnage bounty ship building in Canada At one time the maritime provinces were the great shipbuilding countries of the world. The conditions for shipbuilding there a generation ago were such as to make the industry one of unchecked progress and development. A hundred towns grew up within sight of the sea, each possessing shipyards and a population employed in either building, repairing, outfitting, owning or sailing vessels. The Canadian flag became known in all seas, and Canada assumed a place as one of the four great ship owning countries of the world. It was the advent of steel shipbuilding that struck a fatal blow at this source of wealth and prosperity. The increase in the size of vessels from 2,000 to 20,000 tons transferred the business to British yards, where iron, coal, skilled labor and capital were cheaper than in any other country. The loss of business, capital, income and employment, in which, at least, one fourth of the people were interested, is one from which Eastern Canada has not yet recovered.

The two countries possessing the most extensive and highly developed transportation systems are Great Britain and the United States. Natural products of the soil, sea, mine and forest can only be made valuable by adequate transportation facilities. The inland trade of the United States, and the water borne trade of Britain owe their existence to the fostering and protecting care of their respective governments. Britain pays over £1,000,000 a year in subventions to steamship lines. When the Cunard 25-knot liner will be on the Atlantic, the total payments by Great Britain will reach £1,127,145 sterling. Of this sum £860,000 is for mail service, £200,- for admiralty subventions and £40,000 to encourage the fruit trade In the United States, during the last fiscal year, the gross tonnage of ships built was 418,745. These comprised three seaboard steamers, ten for river and bay service and 40 for the Great Lakes.

Instead of being, as formerly, the fourth ship owning country, Canada is now eleventh. The registered tonnage has decreased from 1,335,015 tons in 1878 to 672,838 tons in 1904, notwithstanding the wonderful expansion of our trade The tonnage built decreased from 183,090 tons in 1874 to 33,192 tons in 1904. Of the 15,800,000 sea going tonnage in and out, Canada could claim less than 2,000,000 of tons, or only about 12 per cent. The United States has 75 per cent. more than Canada possesses of her own trade. The Canadian traffic on the Great Lakes is about equally divided between the two countries.

It was hoped that in the new tariff some generous provision would have been made for the encouragement of the Canadian shipbuilding industry, but such was not the case. Within the last few years several shipyards have been established in Ontario from which quite a number of ships of different character have been launched every one of which has been of the very best description and well suited for the purposes for which it was built. No finer passenger steamer floats on any water than the Cayuga, which is intended to ply on the route between Toronto and the Niagara River ports, and the Midland Prince of 10,000 tons carrying capacity, built at Collingwood is the equal in every respect of any of the large steamers built in American yards for traffic in the great upper lakes.

Unfortunately Canadian shipbuilders are badly handicapped by reason of the fact that much of the material which they require has to be imported and duty paid thereon, in most cases, the amount of drawbacks being small. The chief offset to the duty is a bounty of $1.. per ton, which in the case of a 10,000 ton Midland Prince would only amount to $11,500, while, on the other hand, the duties paid upon material entering into the construction of the vessel would range all the way from $25,000 to $30,000.

In addition to this handicap, the Canadian shipbuilding industry has to contend with the competition of British shipbuilders, whose vessels come into Canada free. The extent of the competition may be gauged by the fact that at the present time there are 170 British built vessels plying on the Great Lakes. There is no other such industrial anomaly existing in Canada. Canadian builders have to pay duty on nearly all the material that enters into the industry. For instance, if they manufacture engines, boilers, or other accessories, they have to pay duty on raw materials, and again, if they import finished engines or boilers, they also have to pay duty.

The same applies to everything included in fittings and furnishings, such as furniture, table ware, cutlery, glassware, and in fact, every detail of a ship. On the other hand, if a ship is imported from Great Britain, with furnishings complete, it is allowed to enter Canada absolutely free of duty.

The Globe, speaking of the launching of the Midland Prince, says that it is something for general congratulation. That part of the transportation on the great lakes which can be performed only by Canadian vessels has grown so rapidly that more than once its volume has been greater than the capacity of vessels available to handle it, and the cry has gone up from owners of freight for a temporary abrogation of our coasting laws to the extent of allowing grain to be carried in American bottoms from Port Arthur and Fort William. The mere suggestion of such a thing is unwelcome, but the necessity of moving the Western crop is so imperative that whatever threatened to hinder it would scarcely be allowed to stand in the way. Every addition to the Canadian fleet must therefore be welcome.

If the proclivities of the Globe were of a protective rather than a free trade character, it would not suggest that the necessities of Canadian commerce should be met by an abrogation of our coasting laws. The suggestion of such a thing is indeed unwelcome, and if the Dominion Government were to show as much interest in the prosperity of the Canadian shipbuilding industry as

does in giving free trade in British ships, all Canadian water bourne trade would be carried on in Canadian built ships.

CANADIAN-BUILT WAR SHIPS.

The following resolution was adopted by the Executive Committee of the Toronto branch of the Navy League at a meeting held some days ago:

"That it is not consistent with the true interests of Canada, either from a political or from an economic point of view, that we should continue to neglect all preparation to take part in our naval defence of the British Empire, and that it is a duty we owe to ourselves, to our floating commerce, and to the empire that we should lay the foundations of a broad national maritime policy, in which naval preparation will go hand-in-hand with the development of a Canadian mercantile marine, with the encouragement of the Canadian shipbuilding industry, and with securing for Canada her fair share of the world's maritime transportation."

The Toronto branch of the Navy League, and a great many other Canadians, particularly those of Imperialistic tendencies, entertain the idea that Canada is under some sort of obligation to Great Britain, a liquidation of which should be met by contributions of a financial character, and the Navy League makes a close guess at the way it might or should be done by laying the foundations of a broad national maritime policy in which naval preparation will go hand in hand with the development of a Canadian mercantile marine and the encouragement of the Canadian shipbuilding industry. Good. This is a most excellent suggestion which should have the endorsement and co-operation of every true Canadian.

There is wide divergence of opinion as to whether Canada should do anything or nothing with regard to sharing Imperial burdens, and some very wild propositions have been made in this direction, but until the suggestion of the Toronto branch of the Navy League was presented, no propositions have been made that seem at all feasable. We can be assured of one thing, and that is that if Canada is ever called upon to contribute, in case of necessity, to the defence of the Empire, she will do her full share, as was done in South Africa, but she will not advance money to pay for war ships to be built in Great Britain.

As far as Canada is concerned, Great Britain would do a great deal in providing for both offensive and defensive armament by employing Canadian shipbuilders to construct numbers of small craft such as torpedo boats and torpedo boat destroyers, submarine boats, etc., in Canada. A large battleship could not at this time be constructed in Canada, but the cost of one such ship would be sufficient to pay for the construction of quite a number of torpedo boats, and we already have the equipment in a half dozen or more yards already established that could be used to good advantage for such purpose. With a number of small war vessels on our fresh water lakes, there would be a wide scope for the activities of the Navy League. Such ships would constitute schools for the training of young men as seamen who would be invaluable in British war ships of any description in any part of the world: and if Britain should at any time have necessity for these Canadian built ships, they could reach their desired destination in as quick time as from any dock yard in the United Kingdom.

It might be urged that under the treaty of 1817 between Great Britain and the United States, Canada could not build or maintain war vessels on the Great Lakes. At present this is true, but it is also true that the United States desire to have that feature of the treaty abolished to the end that American shipyards on the lakes might participate in the building of war vessels for that country. Should that feature of the treaty be abolished, no doubt a generous share of the building of torpedo boats and the smaller classes of ships for the American navy would be built in lake ports, but they could only reach salt water by the St Lawrence route. In case of war between Great Britain and the United States, in which Canada would inevitably be embroiled, American ships would become at once bottled up above the Welland Canal, but Canadian lake ports would also come under their guns, unless there were similar British ships in the same waters to test conclusions with them. Even at this time in case of rupture between the two countries there are large numbers of American merchant ships that could at short notice be converted into formidable war vessels before the guns of which Canada would be helpless. If the United States clamors for the abrogation of that feature of the treaty, Great Britain, with her usual complaisance, would no doubt quite willingly consent; but in the meantime it would be wisdom on the part of Great Britain, and of Canada also, to do all that can be done to foster and encourage the Canadian shipbuilding industry.

THE TARIFF.

They are dirty birds that foul their own nests.

A few days ago The Toronto Globe displayed the following telegram from Ottawa in double column on its front page, under the headlines, "The West and the Tariff."

Ottawa, December 13.—The numerous demands for increases of duty made by manufacturers since the new tariff was introduced, amounting in some cases to as much as 10 per cent., have aroused the Liberal members from the three Provinces of Manitoba, Saskatchewan and Alberta, and to-day they took the opportunity of informing the Minister of Finance where they stand in regard to the Government's fiscal policy. These gentlemen, who are in complete accord with each other, represented to Mr Fielding that while they could have wished that the new tariff had done more for the farming community, nevertheless they accepted the schedules now before the House as a fair compromise. They pointed out that in urging the raising of duties the manufacturers were not considering their own interests, in view of the importance to them of the Western market and its rapid expansion.

It was asserted that in many instances the Canadian manufacturer is unable to supply the domestic market, and the statement was even made that in some classes of goods that are essential to the West, the Canadian goods are inferior to the same articles imported from abroad. Such being the case, the Western men affirmed, they could see no special reason for granting protection to inferior manufactures They declared in the most positive manner that any increase in the tariff would be

resented by the farming community in the three Provinces represented by them. Furthermore, it would have the effect of promoting the purchase of goods from abroad rather than Canadian goods, because of the feeling of resentment that would be aroused. Finally, the Western men desired to know why the Canadian manufacturers should wish to do anything to antagonize their customers in the very best market in Canada, and one which is as yet in its infancy.

Mr. Fielding received the Western men with the utmost courtesy, and listened most attentively to their representations. They are hopeful that their views will have due weight with the Finance Minister.

In the same issue of The Globe was an editorial having reference to the visit of the Liberal members from the Western Provinces to the Minister of Finance in which it emphasized their contention that the present tariff is essentially a compromise between the manufacturers on the one hand and the agriculturalists on the other, and that the proposed tariff now under consideration in the House of Commons is of the same general character, and that, as such, these Western members are willing for their constituents to accept it, though some of the proposed rates of duty on imports are disappointingly high, and that any increases as requested by the manufacturers would be resented by the farmers of Manitoba, Saskatchewan and Alberta. The Globe volunteers the statement that the information laid before Mr. Fielding as to the state of opinion among the agriculturists of the prairie provinces on the tariff question is correct. "Nowhere," it says, "can the agriculturalists be benefitted by high duties on imports while their produce has to compete in the European markets with that of other countries not less favorably situated for the production of the raw materials of food and clothing. It need occasion no surprise if the example set by the Liberal members from the Western Provinces is followed soon by their fellow-Liberals representing rural districts in the east." It says, also, that it is difficult for it to understand what the manufacturers hope to gain by keeping up the agitation for tariff increase, that they see that whatever scale of duties may be adopted now, it will almost certainly remain in force for many years to come because the idea of permanence of tariff has become deeply rooted in the public mind. Naturally, it says, the manufacturers have come to the conclusion that unless they secure increases now they are not likely to obtain them at all for a generation. It is quite certain that their continued agitation will be futile so far as the motive is concerned, though it does not at all follow that it will be without other results. "On the contrary," it threatens, "it may lead to a counter movement to effect reductions in the tariff schedules, a movement quite as hopeful as their own. This seems to be a good time to let sleeping dogs lie."

The reason for this outbreak of venom on the part of a few "Liberal" members of Parliament from some of the western provinces, and the endorsement by The Globe is not far to seek. It is no new thing for manufacturers, agriculturalists, and those interested in all sorts of industrial enterprises, to go to Ottawa as they have a right to do, when proposed changes in the tariff are under discussion, to present their respective, although frequently divergent views to the Government, and until now the sacred right of petition has never been challenged or denied under any representative government.

The Globe finds it difficult to understand why the manufacturers go to Ottawa, and what they hope to gain by asking the Government to correct inequalities and unfairnesses in the tariff which so vitally effect them. As it says they presume that when the details of the schedules are finally passed upon and adopted they will, under the present regime, remain in force for many years, the idea being that, like the laws of the Medes and Persians, they will be of such permanent character that they can never be changed. It is the proposition of The Globe and its friends, that, if the tariff is now made to suit them, it will be like Tennyson's brook—it will run on forever although men may come and men may go, and circumstances may change and vast and important Canadian industries may wither and decay, so long as free trade be accomplished The manufacturers must remain at home and feel satisfied that whatever the Government says must be so must be so, whether wrong or right. They must not make wry faces, nor must they make protests, for if they do, it will lead to counter movements which will inevitably result in making their future condition worse than it is now—for this is, according to The Globe, "a good time to let sleeping dogs lie."

Most unfortunately for the manufacturing industries of Canada, a few self-seeking ones among them, professing to represent the general sentiment, have for several years takes a most remarkable position. They have in season and out of season demanded a general and thorough revision of the tariff when manufacturers in general desired no such revision. There were rough places and incongruities that required to be smoothed down, but under the tariff just now gone out of operation, the manufacturing industries were in most flourishing condition. For years past no up to date factory nor work shop nor industrial establishment in Canada but has been worked to its utmost capacity in an endeavor to supply the wants of the people, and how far have they fallen short of doing this the Blue Books tell. Why not have been satisfied? With upturned pious eyes they have thanked God and congratulated themselves that the tariff had ceased to be a political question, which blinded and deceived not but themselves, we were about to say, but in fact at the very time this deceptive announcement was being made they were organizing a very large fund, by more or less enforced contributions, to be used for educational purposes, and which, until this day, has never been satisfactorily accounted for, except the issue of a couple of gum stickers of post stamp size—the legend upon one being "Keep your money in circulation at home by buying goods made in Canada," the other saying, "When you can't get what you want at home, buy within the British Empire." Of course these brochures are hoarded in stamp albums, and the children, some of the little ones yet cry for them, but it is questionable if the contributors of many thousands of dollars are quite satisfied that the grafters rendered quid pro quo. Nero fiddled while Rome

burned; and while The Globe and Liberal members of the Dominion Parliament patted their patriotic followers on the back they were laying traps into which the guileless ones were hurrying head-long.

Another dismal and unfortunate feature of the swell-headism that possessed this cotene of would be leaders of thought and directors of public sentiment in Canada regarding tariff requirements, was the interference in politics in Great Britain. Why should Canadian manufacturers as a class take any part in British politics? The clique had declared that all politicians, political parties and every one else in Canada were harmoniously agreed that tariff protection to Canadian manufacturing industries had become a fundamental law of the land. No doubt about that, and at every annual convention and convival gathering the sentiment was most industriously proclaimed. Of course the patting on the back was most cordially administered, but we see how it is now. Having no political business to attend to in Canada, no favorable tariff sentiment to create or stimulate, the excursion season being at hand, and favorable rates for travel being available; and a fight being on in the old country between the free traders and the Chamberlainites, and the probability that the King would, at some period of the festivities, be present and do the back-patting, the excursion of Canadian meddlers in British politics eventuated. Anything to divert the mind of the manufacturers from a contemplation of an adverse change in the tariff.

For years the demand had been made, in season and out, that there should be a revision of the tariff, and now we have it, and such a revision. And what a blundering and bungling by the clique that undertook to look after the interests of the manufacturers during the process. And what a funk the clique fell into when the revised tariff was announced; and, as advised by it, it became a scramble of individuals to get to Ottawa, every man for himself, and it is because of this hurrying of individual manufacturers to Ottawa that The Globe tells them at this time they should let sleeping dogs lie, and not meddle with the programme or to talk out in meeting.

Of course the Liberal members at Ottawa from the Provinces of Manitoba, Saskatchewan and Alberta were stirred up by the free trade element surrounding them to interview the Government and say where they stand in regard to the tariff, and it is possible that what they said expressed their individual views, but it is not true that they expressed the views of the majority of the people in these provinces. As we have here shown, Canadian manufacturers have never claimed that they were able to fully supply the domestic market, for if they were there would be no necessity for the importation of foreign products to the value of many millions of dollars annually, and it is childish for these gentlemen to utter such rot, and for The Globe to publish it. It is viciousness, however, for them to say that in some classes, or in any class of goods, those of Canadian make are inferior to similar imported articles. They are dirty birds that foul their own nests. Why should the farming community in the provinces which they claim to represent, or in any other provinces, resent any increase of the tariff necessary to give the manufacturers adequate tariff protection. That is all they ask for. If they have it, they will prosper and be able to supply the wants of the country, and be home market consumers of the products of the farm. If adequate protection is denied them, their industries must of course dwindle down and disappear, and the farm products that found quick and remunerative sale so close at hand, have, of necessity, to be sent abroad to be sold at competitive prices in the markets of the world. It i a childish and ridiculous proposition that should adequate tariff protection be given to the manufacturers, it would have the effect of promoting the purchase of goods from abroad rather than Canadian made goods because of the feeling of resentment that would be aroused, and that is the sort of stuff that these Western members evacuated, and The Globe published. Our estimate of the Finance Minister would be much depreciated if it should be that such stuff had any weight with him.

EDITORIAL NOTES.

Consul-General J. G. Foster, of Ottawa, reports that the number of immigrants entering Canada during the fiscal year 1906 was 189,064, an increase of 42,798 over 1905. The immigrants from the United States numbered 57,919, or 14,267 more than in 1905. Canada has for years pursued the policy of inducing immigration by extensive advertising and paying bonuses to immigratior companies. It is said that each British immigrant costs Canada $13, and agriculturists and servants from the continent of Europe costs the government $5 each.

The homestead entries for 1905 amounted to 34,645 in Manitoba and the North-West. The so-called fertile belt in this section of the Dominion contains 90,000,000 acres suitable for settlement, of which 67,250,000 acres have been granted to railroads, homesteaders, etc., leaving 22,750,000 acres for new homesteads. The average price per acre received for land by the Canadian Pacific Railway Co was $5.32, but the land companies have placed their prices at $8 and $10.

The first result of the British Revenue Act, 1906, which has just come into force, has been the formation of a convention among makers of methylated spirits, states a writer in the London Times, who says.

"The revenue act provided for the use by manufacturers of a special methylated spirit on which the board of inland revenue grants a rebate of 5d. (10 cents) per gallon The makers of this spirit, however, are only quoting at 4d per gallon below the old price, instead of 5d. as anticipated The price of methylated spirit, of the kind which could be used for motor cars if it were cheap enough, remains unchanged for the present In Germany, where the use of duty-free alcohol for manufacturing and motive purposes has been allowed for many years, the spirit industry has also come into the hands of a trust, with the result that the advantages which should accrue from the use of an untaxed spirit are becoming smaller. Had competition in the English market in industrial alcohol continued there was every possibility of our manufacturers being able to produce certain articles as cheaply as the Germans, but there are distinct signs that competition is at an end."

The Toronto Globe says that there is no such thing as a convention among manufacturers in free trade Great Britain, but such combines exist there nevertheless.

THE EXPANSION OF CANADA.

The greatest event in the British Empire to-day is the expansion of Canada.—The London Times.

It is a wise custom to spend at this time of the year a few hours, or a few days if need be, to have stock-taking, and make an inventory, so that one can have a definite conception of the progress made during the past year so as to be in a better position to lay plans for the activities of the year just begun.

It is trite to add, the expression of the truism that the Canadian merchant or manufacturer who has not advanced, and whose business has not expanded, during these years of prosperity and progress, has retrograded, and gone backwards.

True, there have been years in Canada's history, years of storm and stress, years of fears and failures, years of disappointment and despair, years when earnest, energetic business men saw their hopes fail, the foundations of their enterprise swept from under their feet by the force of business contraction and lessened faith resulting from a succession of poor crops or general business depression.

In such a year, to weather the storm without actual loss, is to make substantial progress.

But 1906 was not such a year. It was a twelvemonth of unexampled progress and expansion, a year of prosperity in every province and in every branch of industry. To merely earn a normal dividend in such a year was to stand still while the country advanced, and thus be left behind.

The present generation of Canadians is one of nation builders. And during 1906 their work, the breadth of it, the purpose of it, the success of it, has been made apparent as never before, not merely to ourselves but to all the world.

We have talked of the awakening of Japan, the rejuvenation of Egypt, the commercial aggressiveness of Germany, yet within our own borders is an awakening to national life quite as far-reaching as that in Japan. In our Western lands, by irrigation and by the tilling of virgin soil, we are "making to blossom as the rose" an area greater than that of all Egypt. By our aggressive immigration policy we are attracting to the wheat lands of our West and to the factories of our East the choicest farm hands and artizans of Europe and America and by our aggressive tariff policy we are compelling the establishment in Canada of branch factories in every line of industry, thus adding to the general prosperity of our country.

Truly, we need not look beyond our own borders for national awakening, rejuvenation or aggressiveness.

A few years ago our Imperial aspirations were given new impulse, by the suggestion of a British railroad from Cairo to the Cape. At the same time two typical Canadian nation builders were laying the foundation for a second railway line across Canada from the Atlantic to the Pacific, and were working so silently, so swiftly, so successfully that they had built or acquired 4,000 miles of railway and had their plans fully matured for their line from coast to coast, not to mention scores of "feeders," before we really *realized the purpose of their magnificent undertaking*—the Canadian Northern. And we accept placidly, almost with indifference, the construction of a third transcontinental by the Grand Trunk and the demonstration by the Canadian Pacific that their line across a continent and two oceans is the quickest, shortest route from Europe to the Orient.

IMMIGRATION, NOT EXODUS.

A few years ago the national spirit was weakened and the industrial and commercial life of Canada was drained of its best blood, bone and sinew by a steady stream of its most vigorous, its most ambitious young manhood to the Eastern cities and the Western farms of the United States. To-day the tide has turned and the farms of the Canadian West and the new factories of Ontario and Quebec are not only providing ample scope for the ambitions of Canadian youth, but are attracting a constant stream of sturdy, virile manhood from the United States and Europe, a stream that each year increases in volume and improves in quality.

AN INDUSTRIAL NATION.

A few years ago we wondered at the industrial greatness and wonderful growth of the United States. Some of us not only believed but endeavored to establish as a political principle that Canada was destined to be merely an agricultural country. To-day we understand our country better and appreciate its resources more thoroughly. We have taken stock of our mines, of our timber areas, our fisheries, our waterfalls, of our genius as artificers and artizans, of our ability as tradesmen and financiers and our ambitions have enlarged and our horizon has broadened. To-day we are determined to be counted among the great manufacturing nations of the world.

BRANCH PLANTS IN CANADA.

Recognizing this determination, and ever alert to meet the wishes of customers, manufacturer after manufacturer in the United States have put branch plants in Canada until now according to conservative estimate there is over $200,000,000 of United States capital invested in manufacturing in Canada. Now the more deliberate, though not less ambitious manufacturers of Great Britain have realized the possibilities of this market and already some of them have decided to establish branches here.

THIS IS CANADA'S CENTURY.

Well may the London Times, the conservative, though ever aggressive mouthpiece of the British people, exclaim "The greatest event in the British Empire to-day is the expansion of Canada."

Well may Canadians unite in accepting as their watchword the happy phrase of Sir Wilfrid Laurier: "The Twentieth Century is Canada's Century!"

Much has been accomplished in the first half dozen years of this century—easily as much as in any previous dozen years. But we are at but the threshold, the beginning. What Canada wants is not only the investment of foreign capital, though that is welcomed The greater need of the country is a more pronounced national spirit, more faith, more courage.

We have already grown away from the narrow horizon of a generation ago. Instead of supplying his own locality or even a province, a Canadian manufacturing concern has open to it the purchasing power of the big half of a continent. To cope with such a market, to grow with the expansion of trade over such an area should be the aim and object of every Canadian worthy of the name of manufacturer.

REVIEW THE SITUATION.

For this reason, if for no other, each manufacturer should spend sufficient time for a full survey of the conditions affecting commerce and industry in all parts of Canada. It is well to assure ourselves that the spirit of optimism and enthusiasm which is so prevalent to-day is well founded, and warranted by the conditions.

Happily, the more comprehensive the survey of the field the more reasonable and warranted is the conviction that we are well into an era of steady progress and expansion throughout Canada, which is bound to continue for many years.

RAILWAY CONSTRUCTION IN CANADA.

Take railway construction, for instance. During the last year, it is estimated, that $62,000,000 was spent in railway construction and equipment in Canada, $48,000,000 being spent in construction and $14,000,000 in equipment. This total does not include erection of new and extension of old electric lines. It need hardly be added that this expenditure is but a beginning, that the extensions in prospect are on a much greater scale than even the activity of the last year.

THE GRAND TRUNK PACIFIC.

The big project in Canadian railroad construction, at the moment, is the Grand Trunk Pacific, from Prince Rupert on the Pacific Coast, through Edmonton and Winnipeg to Quebec and finally to the Atlantic coast, with important feeders to Fort William, Toronto and Montreal. This line alone will be over 4,000 miles in length and will, of necessity, occupy at least five or six years in building.

Meanwhile the Grand Trunk Railway, in addition to acting as sponsor for the new transcontinental road are giving much time and attention to improvement of roadbed and equipment in Ontario, Quebec and other parts of the country. During the past year they have, according to their own estimate, spent over $5,000,000 in double tracking, improving grades and adding to equipment.

THE CANADIAN NORTHERN.

Hardly less conspicuous and far reaching are the activities of Mackenzie and Mann, the promoters of the Canadian Northern enterprises. As mentioned above this firm started but ten years ago but have gone forward so restlessly and so relentlessly that in the decade they have built or acquired more than 4,000 miles of railway and have franchises covering a line from the Pacific to the Atlantic, in addition to providing a net work of lines in Manitoba and throughout Ontario. The building of their line from Winnipeg to Edmonton, which was completed during the year, is typical of the far-reaching benefits to the country resulting from this railroad building Along the entire distance from these two centres in the West towns have sprung into existence within the year. Each of these towns has become a virtual hopper through which the grain of fertile areas pours along the new line to Fort William and thence to the millers of the world. At the same time each town gathers its quota of stores, schools, churches and homes, being in a sense a distributing centre of ideals and impulses toward true Canadianism as well as distributing points for dry goods, groceries, farm implements, etc.

THE CANADIAN PACIFIC.

The Canadian Pacific is not idle while its Western domain is entered so energetically by its rivals. During the past year it has spent more than either of the other roads and there seems every likelihood of a continuance of such a policy of expansion and improvement for some years to come. Its plans include a line from Toronto (now well under construction) to connect with its transcontinental line at Sudbury; double tracking of its line from Montreal to Toronto; the construction of numerous branch lines or feeders in the West and a steady improvement of roadbed and equipment all along the line. This, in addition to the maintenance of two fleets of fast steamers, one on the Pacific and the other on the Atlantic, to a standard which will enable the company to sustain its proud boast of possessing the shortest and quickest route from Europe to the Orient. It provides activity large enough for the greatest of corporations and is ample assurance that the expenditures in Canada by the Canadian Pacific Railway will continue to grow rather than to diminish.

It is worthy of note that the abounding prosperity of the country is reflected to a remarkable degree in the incomes of these railways and the rapid increase in their stock values.

THE HILL LINES.

It is probable that in all the United States there is not a shrewder and more successful railway builder and manager than the Canadian master spirit of the Northern Pacific and the Great Northern. He has expressed his confidence in the stability of Canadian development not only in speeches before the business men of Chicago and St Paul but in the entrance to the Canadian field by the construction of short lines in British Columbia and Alberta, and also by the statement that in the near future he intends to enter the Canadian field by extensive construction throughout the West.

THE INTERCOLONIAL.

Even the Canadian Government line, the Intercolonial Railway, from Quebec to St. John and Halifax, seems to be in touch with the expansive spirit of the times and is improving its equipment and its services in many ways.

IMPROVING HARBOR FACILITIES.

Concurrent with the activity in land transportation there has been, and will continue to be, a steady growth of facilities for handling freight on our great fresh water lakes and connections as well as from our ocean ports. This entails heavy expenditures on the part of the Canadian Government for harbor improvements, wharves, dredging, etc., and this is one of the great factors—which makes necessary an appropriation by the Canadian Parliament of $105,689,519 in the fiscal year, 1907-08. At the same time Canadian shipyards are finding the demand for shipping so great that in addition to the construction of modern shipyards on the Niagara River, new turning basin and shops at Welland, Ont., the yards at Toronto have been compelled to steadily increase their productive facilities.

INFLUENCES TOWARD STABILITY.

All these influences contribute towards stability throughout the Dominion in times of depression in other countries than Canada and to increase their prosperity and progress here when there is general prosperity throughout the world.

Another influence toward stability and national expansion is the prestige Canada has won as a flourishing and wealthy young country. Not only are Canadian securities in popular favor with investors generally, but there is a steadily growing stream of immigration to this country which contributes first to the productive power of its industries and later to the purchasing power of its people, a combination which is the great essential to the success of manufacturing in any country.

Attention has been directed to the wonderful growth of small communities along the line of the Canadian Northern. This is equally true of development along the line of all the other railways in the West.

EXPANSION IN THE EAST.

At the same time in the East, particularly in Montreal, Toronto, Hamilton and other industrial centres in Ontario and Quebec, there is a development just as vital to the national life and future of Canada. Such has been the demand for products of Canadian factories and such is the confidence in the stability of manufacturing in this country that in every city and in almost every town, that in the last five years have witnessed an era of factory and mill building such as had never before been experienced and had not been even anticipated. To-day the feeling seems to be that there is no limit to the possibility of manufacturing in Canada and we are convinced that in addition to getting the lion's share of the domestic market, Canadians have every reason to look forward to doing a large export trade in many lines of manufactures.

This era of factory building is not merely the natural expansion of Canadian plants resulting from the growth of the country but is due in large measure to the recognition by manufacturers in the United States of the value of the Canadian market and their decision to establish branches here so as to get into closer touch with the market and at the same time avoid the payment of duties on their products.

To-day we have Canadian branches of many important United States firms making locomotives, electrical machinery, agricultural implements, special forgings, malleable castings, grinding and crushing machinery, machine tools, oil tanks, wire fencing, stoves, office furniture, pneumatic tools, graphite, pulleys, shafting, gas and gasoline engines, chemicals, varnishes and paints, cement, cement block machinery, steel cars, etc., ad infinitum.

The establishment of these branches has in no small measure contributed to the activity and the extension of existing plants for there seems to be a general disposition on the part of these firms to buy as much of their equipment as possible in Canada.

Have we reached the end of this era of expansion? Not by any means! We have merely emerged from the smallness of provincialism to the larger things consequent upon a better appreciation of the resources of the country and a fuller recognition of the reward that is ever yielded to honest, aggressive endeavor in a fertile, prosperous young country.

We have had our Cobalt boom in 1906 consequent upon the opening of new country by the Temiskaming Railroad. Already we are promised the development of rich iron ore areas by the Canadian Northern in Ontario and the erection of another large smelter to utilize these ores. Many United States firms are saving duties by the erection of Canadian plants, yet the importations from the United States continues to expand year after year. This means increased purchasing power and as the market grows in value more and more branch plants will be erected north of the Great Lakes.

Then as the skill of the Canadian artizan and the abundance of our natural resources is more fully recognized these branch plants will be commissioned to take care not merely of the Canadian demand but will cater to a steadily enlarged share of the export trade. This is now done by several branches of United States houses and the habit will become general.

Another cause for general satisfaction to Canadian manufacturers lies in the fact that finance and commerce minister to their needs in satisfactory manner. The excellence of the Canadian banking system, with the branches of large institutions scattered throughout every province, and with the far-sighted precautions to safeguard investors and depositors from loss, has been referred to many times in these columns and is to-day recognized throughout the world. Among the merchants, both wholesale and retail, of Canada, there is such a general spirit of commercial integrity and enterprise, that business friction and loss has been reduced to a minimum.

Under such conditions the Canadian manufacturer has every reason to look into the future with faith and courage. There will be no lack of demand. The t

dangers of such a condition which should be easily safeguarded against, are going forward in improving equipment and plant without full provision for financing such extensions and increasing output without due regard to the cost of production.

The manufacturer who presses forward energetically and courageously, yet ever with full regard for the financing of his enterprise and with ample attention to the costs of production, will find 1907 the most prolific, the most satisfactory year in his own history, as it will be in Canada's history.

AN INWARD FEVER.

The regular annual dinner of the Home Market Club, held in Boston in November, according to The Protectionist, was a notable affair. There was a gathering of manufacturers of many leading industries of New England and other parts of the United States, there being more than 300 guests, presided over by Mr. G. W. Wells, president of the Club. In welcoming his guests Mr. Wells said, "Our Club never instructs its speakers, and they are here to speak their own minds. We are solid for the great national policy of tariff protection, and we do not like to see it disturbed for slight causes or to please its opponents, but we always welcome light and tolerate differences that do not endanger the cause we serve."

Lieutenant-Governor Draper, of Massachusetts, was a prominent speaker He is connected with a large concern in the manufacture of textile machinery. In his speech he referred to the time some twenty years ago at the request of his father, Mr. George Draper, he sent out invitations to about 25 other manufacturers to lunch with him to consider the formation of a club which should advocate and do what they could to forward the principle of tariff protection. The Home Market Club was the result of that conference, and from that small beginning it has grown into the great club it now is, which has had a tremendous influence in the education of the people. "The Club," he said, "was not organized as a political club, and it had never been one. It was, however, organized to favor the principles embodied in protective tariffs, but it has always welcomed to its membership any man, republican or democrat, who honestly believed in the protective policy, and was willing to help forward that cause." "I believe," said he, "in the policy of protection as a cardinal principal of the republican party, and if any changes are to be made in our fiscal policy, or in the schedules of the tariff, it must be on the basis of the principle of protection, if the prosperity of the United States as a nation, is to continue in anything like the proportions in the future that it has in the past. Never, in the history of the world, has a country been so prosperous as is the United States at the present time, and that prosperity has come while the Dingley tariff has been and is the law."

The speaker pointed out that New England States have had their share of the prosperity that has extended over all the country, and the great manufacturing industries of Massachusetts have flourished as never before. This was shown in the three great industries during the last five years, boots and shoes, cotton goods, and woolen and worsted goods. Taking these three industries together there are 8,000 more persons employed in them in 1905 than there were in 1900. The prosperity in Massachusetts shown in these three industries is shown in every other branch of business in the State, and applies equally to the business of all sections of the country.

In presenting Mr. J. W. Van Cleave, the president said that the National Association of Manufacturers of the United States is the largest organization of its kind in the world, and that its president, Mr. Van Cleave, of St. Louis, is a big broad guage man of the boundless West.

Alluding to the recent elections in a number of the States, in which the Republicans were so generally victorious, Mr. Van Cleave in his address, made a number of statements, some of which we reproduce. He said:

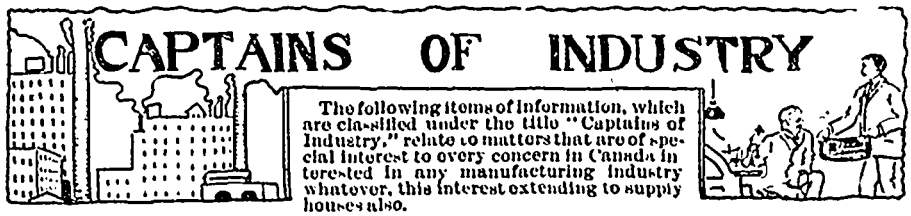
"One of the ideas which won in those elections is that the protective system is to remain, and it is to be shaped by its friends and not by its enemies. . . The tariff, like all other questions, changes its phases from time to time. . . . Some republicans in the West, like some in Massachusetts, and other parts in the East, want to revise the tariff immediately. . . . We must keep the tariff out of politics as far as we can—we must deal with it on business lines."

Asking that the proposed revision be deferred until after the general elections in 1908, Mr. Van Cleave said: "The task of reshaping the tariff takes up more time than many realize. Take the case of the McKinley Act. The republicans were anxious to revise the tariff after Harrison's election, and they thought they could do it quickly and safely in the regular session of Congress. That session began on December 2, 1889, and as soon as possible, Mr McKinley, chairman of the Ways and Means Committee, started out on his work of revision, but did not have his bill ready to report to the House until April 16, 1890, and it was not signed till October 1.

The next tariff act was that of 1894, which was passed by a Democratic Congress. President Cleveland's extra session of Congress met on August 7, 1893, and Mr. Wilson was made chairman of the Ways and Means Committee, but his bill was not reported to the House until December 19, and it did not become law until August 27, 1894.

The Republicans, under President Harrison, who succeeded Cleveland, were ten months in framing and enacting their tariff law.

The argument of Mr. Van Cleave is, that it would be impossible to effect a revision at the present session of Congress, and impolitic to attempt it, although he is a strong advocate for a revision as being in the best interests of the country. The Republican party, he says, cannot safely postpone tariff revision much longer. Conditions in many industries have changed since 1897. By 1909, when the next president is inaugurated, the Dingley tariff will have lasted twelve years, and that is a longer time than any tariff in all our history has remained unchanged. No tariff that could be devised could meet all reasonable demands forever.



H. G. Brown, of New York, with a party of 28 capitalists, of the same city, will visit Fort William, Ont., on January 16, for the purpose of locating large car works there. There is a shortage of rolling stock of all kinds on all railways throughout the North-West. As a new smelter is to be started at Fort William and as all the railways will make Fort William their lake port, the locality suggested is likely to be chosen.

City Engineer Rust, of Toronto, will ask for an appropriation of $250,000 for a new pump at the station at the foot of John Street. This request was refused a year ago but during the last year there has been at times shortage of water supply and the appropriation may now be made. This outlay would give an additional supply of 15,000,000 gallons a day.

The Simonds Canada Saw Co., Limited, Montreal, have removed their office and factory in Toronto from 265 King Street West to 105 Adelaide Street West.

The Harris-Maxwell Gold Mining Co., Toronto, have been incorporated with a capital of $100,000, to carry on a mining, milling and reduction business. The provisional directors include J. R. Maxwell, R. Polley, Toronto, and W. R. Wakefield, Toronto Junction, Ont.

Dr. T. A. Slocum, Limited, Toronto, have been incorporated with a capital of $125,000, to manufacture drugs, medicines, etc. The provisional directors include L. S. Levee, S. Stewart and D. N. Sinclair, Toronto.

The Century Silver Mining Co., Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include S. Sager, J. C. Haskell and V. Hayden, Buffalo, N.Y.

The Lake Abittibi Gold Mining Co., Toronto, have been incorporated with a capital of $200,000, to carry on a mining, milling and reduction business. The provisional directors include J. R. Meredith, M. C. Cameron and R. S. Waldie, Toronto.

The Pontiac & Nipissing Exploration Co., New Liskeard, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include L. C. Thomson, J. H. Cassidy, New Liskeard, and P. Davis, Windsor, Ont.

The National Cobalt Silver Mining Co., Ottawa, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. W. Smith, C. J. R. Bethune and G. B. Greene, Ottawa.

The Book Supply Co., Toronto, have been incorporated with a capital of $40,000, to carry on a printing and publishing business. The provisional directors include W. J Elliott, R. D. Hume and H. P. Cooke, Toronto.

The Pennsylvania Cobalt Silver Mines, Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include E. Van Portway, J. G. Adair and E. C. Spereman, Toronto.

The St. Catharines Drilling Co., St. Catharines, Ont., have been incorporated with a capital of $40,000, to manufacture oil, gas, petroleum, etc. The provisional directors include P. I. Price, H. H. Collier and B. Carty, St. Catharines, Ont.

The Consolidated Cobalt Mines, Toronto, have been incorporated with a capital of $2,000,000, to carry on a mining, milling and reduction business. The provisional directors include A. T. Struthers, W. H. Syms and H. Armstrong, Toronto.

The Cobalt Silver Crown, Limited, Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. W. McDonald, R. S. D. Hartrick and T. Brown, Toronto.

The Casey Cobalt Silver Mining Co., Haileybury, Ont., have been incorporated with a capital of $100,000, to carry on a mining, milling and reduction business. The provisional directors include F. Pottage, G. Henry and W. C. MacKay, Toronto.

The Standard Cobalt Mines, Toronto, have been incorporated with a capital of $2,000,000, to carry on a mining, milling and reduction business. The provisional directors include A Fasken, G. H. Sedgewick and A. T. Struthers, Toronto.

The Lumsden Mining Co., Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business The provisional directors include J. I. MacCracken, Ottawa, A. H. Beaton and E. E. Gallagher, Toronto.

The Collingwood Shipping Co., Collingwood, Ont., have been incorporated with a capital of $90,000, to construct elevators, wharves, docks, warehouses, etc. The provisional directors include W. T. Allan, M. Brophy and W. A. Hogg, Collingwood, Ont.

The Banner Cobalt Mining Co., Windsor, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include M. L. Rice, I. W. Green and W. R. Thompson, Detroit, Mich.

The White Lily Mining & Milling Co., Fort William, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. H. Buxton, H. W. Robinson and A. D. Stewart, Fort William, Ont.

United Editors, Limited, Toronto, have been incorporated with a capital of $20,000, to carry on a printing and publishing business. The provisional directors include J. C. Hopkins, R. P. Glasgow and M. G. Thompson, Toronto.

A school building will be erected at C balt, Ont., at a cost of about $8,000.

The Glen Miller Paper Mills, Trenton, On will erect a reinforced concrete build there.

F. B. Wood & Co., Hamilton, Ont., w erect a large addition to their factor

J. Logan, Niagara Falls, Ont., will er two story office building

The International Block, St. Catharin Ont., will be improved.

The American Clay Machinery Co., W loughby, Ohio, will erect a sand brick mak plant at London, Ont.

An hotel will be erected at Kenora, On at a cost of about $100,000. C. E. Delrid Kenora, Ont., is interested.

The ratepayers of Chatham, Ont., will v on a by-law to extend the electric light s stem.

A new court house and city hall will erected at London, Ont., at a cost of ab $100,000.

The Ontario Government have under c sideration the removal of the Toronto Cent Prison, Toronto, to an outside space wh farming space can be provided.

A new intake pipe will be installed in P broke, Ont., at a cost of about $50,000.

The waterworks system will be instal at Port Arthur, Ont., at a cost of ab $50,000.

A trunk sewer will be constructed at Str ford, Ont., at a cost of about $16,000.

The ratepayers of Tweed, Ont., will v on a by-law to raise $10,000, for the c struction of a trunk sewer.

It is stated the Canadian Pacific Rail Co. will extend their line to Sarnia, Ont

The ratepayers of Fort William, Ont., v vote on a by-law to install an electric st railway at a cost of about $82,000.

The offices of the Ingersoll Packing Ingersoll, Ont., were destroyed by December 13.

The steamer "Monarch" of the North Navigation Co. was wrecked off Port Arth Ont., recently.

The wholesale warehouse of Messrs. H rison & Barry, Ottawa, was damaged by to the extent of about $1,000.

The Dominion Dash Co., Walkerville, O will erect a new building there.

Messrs. Jones Bros. & Co., Toronto, ma facturers of show cases, etc., have incre their capital from $60,000 to $200,000

The Massey-Harris Co., Toronto, will e a one story addition to their factory a cost of about $3,000.

The Toronto Carpet Co., Toronto, v erect a dye works building at a cost of ab $9,000.

A new fire station will be erected in Br ford, Ont.

W. G. Harris, Toronto, has purchased Toronto Baseball grounds for the sum $28,000, and he will install a plant for manufacture of metals, etc.

Muirhead & Black, Fort William, O are erecting a new elevator at a cost of ab $10,000.

A. Grob, Hespeler, Ont., will erect th two story blocks there.

The Ontario Wind Engine & Pump Co., Toronto, have been awarded the contract for the erection of a 30,000 gallon sprinkler tank on a 130 foot steel tower for fire protection purposes by the Lake of the Woods Milling Co., Keewatin, Ont.

Messrs. McKeown & Co., Pittsburg, Pa., have taken an option on the McGovern and Wilcox copper mines, near Parry Sound, Ont., and are making preparations to begin operations on them at once.

T. Lindsay, of the T. Lindsay Co., Ottawa, has purchased the factory of the Caldwell Woolen Co., Hull, Que., which has been closed for some time, and will begin manufacturing shortly.

The Gordon Mackay Co., Toronto, will erect a new five story factory on the corner of Queen and Crawford Streets, at a cost of about $60,000.

The Queen City Manufacturers, Toronto, have been incorporated with a capital of $40,000, to manufacture goods, wares, merchandise, etc. The provisional directors include A. F. Tero, B. J. Markle and D. E. Hooker, Toronto.

The Schultz Mfg. Co., Hamilton, Ont., have been incorporated with a capital of $50,000, to manufacture lamps, lanterns, wire goods, castings, etc. The provisional directors include E. P. Schultz, E. A. Schultz and E. L. G. Whately, Hamilton, Ont.

The John Kay Co., Toronto, have been incorporated with a capital of $1,000,000, to manufacture carpets, curtains, furniture, furnishings, etc. The provisional directors include W. T. Bradshaw, D. K. Ridout and W. Fenton, Toronto.

The Campbell-Crawford Cobalt Silver Mining Co., Cobalt, Ont., have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include D. Crawford, H. Campbell, New Liskeard, Ont., and H. H. Lang, Cobalt, Ont.

The Craig Harness Co., Ottawa, have been incorporated with a capital of $100,000, to manufacture harness, saddlery, leather goods, etc. The provisional directors include R. Craig, W. J. Lee and N. J. Lanthier, Ottawa.

The Way Muffler Co., London, Ont., have been incorporated with a capital of $40,000, to manufacture woolen and knitted goods, etc. The provisional directors include P. M. Millman, A. McPherson and G. M. Millar, London, Ont.

The Cobalt Power Co., Toronto, have been incorporated with a capital of $500,000, to produce electricity for the purposes of light, heat and power, etc. The provisional directors include B. C. Beach, Haileybury, Ont., A. Broder, Morrisburg, Ont., and C. A. Beach, Winchester, Ont.

Messrs. Ney, Camp & Co., Stratford, Ont., have been incorporated with a capital of $40,000, to manufacture furniture, etc. The provisional directors include W. J. Ney, N. W. Camp and J. H. Bamber, Stratford, Ont.

The Standard Concrete Construction Co., Toronto, have been incorporated with a capital of $100,000, to carry on a general building and constructing business. The provisional directors include F. Rielly, J. B. Bartram and E. A. Scott, Toronto.

St. Anthony Cobalt Mining Co., Haileybury, Ont., have been incorporated with a capital of $100,000, to carry on a mining, milling and reduction business. The provisional directors include R. J. Rowell, W. P. Wilkins and W. J. Quinn, Haileybury, Ont.

The United Mines of Cobalt, Toronto, have been incorporated with a capital of $1,000,000, to carry on a mining, milling and reduction business. The provisional directors include C. L. Dunbar, Guelph, Ont., H. T. Smith and I. S. Fairty, Toronto.

The Trout Lake Cobalt Mining Co., Ottawa, have been incorporated with a capital of $3,000,000, to carry on a mining, milling and reduction business. The provisional directors include A. C. Brown, B. Burland and J. R. Wright, Montreal.

The Big Six Silver Cobalt Mines, Cobalt, Ont., have been incorporated with a capital of $1 750,000, to carry on a mining, milling and reduction business. The provisional directors include W. H. Gates, W. D. Gregory and H. F. Gooderham, Toronto.

The Imperial Raincoat & Cloak Co., Toronto, have been incorporated with a capital of $50,000, to manufacture raincoats, rubber clothing, coats, mantles, etc. The provisional directors include W. G. Keddie, H. R. Wellington and C. G. Keddie, Toronto.

The Brooks Hudson Silver Mining Co., New Liskeard, Ont., have been incorporated with a capital of $500,000, to carry on a mining, milling and reduction business. The provisional directors include T. H. Brooks, C. H. Fullerton and F. W. Haynes, New Liskeard, Ont.

The congregation of Knox church, Stratford, Ont., will erect a new Sunday school building at a cost of about $13,000.

An addition will be erected to the Askin Street Methodist church, London, Ont., at a cost of about $15,000.

The new cement roundhouse for the Grand Trunk Railway Co., Brantford, Ont., has just been completed.

The Nipissing Copper & Silver Co., Toronto, have been incorporated with a capital of $1,500,000, to carry on a mining, milling and reduction business. The provisional directors include F. A. Hall, A. S. Anderson, and S. H. Bradford, Toronto.

The Dardanelles Gold Mines, Toronto, have been incorporated with a capital of $250,000, to carry on a mining, milling and reduction business. The provisional directors include H. Stanyon, F. Pottage and F. N. Tennant, Toronto.

The Penn Cobalt Mining Co., Toronto, have been incorporated with a capital of $500,000, to carry on a mining, milling and reduction business. The provisional directors include J. E. Day, E. V. O'Sullivan and H. Jewell, Toronto.

The Hamilton & Lewitt Knitting Co., Arnprior, Ont., have been incorporated with a capital of $40,000, to manufacture hosiery, woolens, etc. The provisional directors include H. J. B. Hamilton, Montreal, T. Hamilton, Saginaw, Mich., and J. E. Lewitt, Goderich, Ont.

The Alder Street Natural Gas Co., Dunnville, Ont., have been incorporated with a capital of $20,000, to manufacture gas, etc. The provisional directors include M. Dohn, J. Moble, and R. Newman, Dunnville, Ont.

Purdy, Mansell & Co., Limited, steamfitters, etc., Toronto, are erecting a five story office and warehouse, 117x71 feet on Albert Street, Toronto. They will occupy two floors and sub-let the three top floors. The building is of modern construction, equipped with sprinklers, freight elevator, heating and plumbing.

Messrs. Robert Fair & Co., Peterborough, Ont., have been incorporated with a capital of $75,000, to carry on a wholesale and retail mercantile business. The provisional directors include R. Fair, G. R. Browning and J. F. Moore, Peterborough, Ont.

The John King Co., Port William, Ont., will erect a three story warehouse and cold storage building.

Donald Fraser & Sons, Fredericton, N.B., will rebuild their mill at Whitworth, near River du Loup, Que. The capacity will be about 5,000,000 feet per season.

The new waterworks intake pipe, Hull, Que., will be extended.

The premises of the Dominion Shoe Co., Quebec, Que., were destroyed by fire January 1 Loss about $60,000.

The Canadian Pacific Railway Co. will build a large freight steamer with a capacity of 1,000 tons.

The Bricanam Remedy Co., Montreal, have been incorporated with a capital of $100,000, to manufacture drugs, medicines, etc. The charter members include T. B. Mothersill, F. G. Robinson and S. Dore, Montreal.

The W. G. Browne Co., Montreal, have been incorporated with a capital of $20,000, to manufacture wall paper, borders, mouldings, etc. The charter members include W. G. Browne, J. W. Blair and E. J. Lynch, Montreal.

J. O. Landrey and X. F. Berube, Fraserville, Que., will establish a foundry and machine shop there.

The Boston Last Co., Richmond, Que., may erect new buildings and install new power machinery.

An addition will be erected to the convent, Coaticook, Que.

Messrs. A. C. Leslie & Co., Limited, Montreal, have been incorporated with a capital of $250,000, to manufacture iron, steel, chemicals, oil, glass, etc. The charter members include W. S. Leslie, A. H. Campbell and F. B. Leslie, Montreal.

Messrs. Charles Gurd & Co., Montreal, have been incorporated with a capital of $75,000, to manufacture bottles, jars, casks, boxes, baskets, mineral waters, syrups, etc. The charter members include C. Gurd, W. R. Gurd, Montreal, and A. M. Murphy, Westmount, Que.

The spice mill of Messrs. T. Lefebvre & Co., Montreal, was damaged by fire December 16. Loss about $30,000.

G. Fraser, late of the Nova Scotia Steel & Coal Co., New Glasgow, N.S., has purchased a site near Longue Point, Que., for the sum of $65,000, and will erect an establishment for the manufacture of car wheels.

The North Shore Transportation & Wreckage Co., Quebec, Que., have been incorporated with a capital of $250,000, to manufacture vessels, steamboats, machinery, etc., and to construct wharves, piers, warehouses, etc. The charter members include J. A. Fafard, O. C. Bernier and A. Gegnon, Quebec, Que.

The Montreal Waterproof Clothing Co.,

Montreal, have been incorporated with a capital of $400,000, to manufacture waterproof garments, clothing, etc. The charter members include W. J. Henderson, A. C. Calder and E. F. Casey, Montreal.

The Dominion Car & Foundry Co., Montreal, have been incorporated with a capital of $5,000,000, to manufacture cars, railway appliances, machinery, etc. The charter members include A. H. Chave, J. A. Lamont, Montreal, and W. V. Kelley, Chicago, Ill.

A new post office and custom house will be erected at Glace Bay, N.S., at a cost of about $20,000.

J. H. McKay, Amherst, N.S., has been awarded the contract for the construction of the station for the Intercolonial Railway Co., at Pugwash, N.S.

The Sydney Cement Co., Sydney, N.S., purpose operating their plant during the winter months.

A new hockey and skating rink is being erected in Stellarton, N.S., at a cost of about $8,000.

The Dominion Carriage Co., Truro, N.S., recently organized with a capital of $250,000, will erect new buildings in the spring.

The Street Committee, Truro, N.S., have recommended the purchase of a steam roller and stone crusher.

The Public Works Department, Ottawa, invite tenders up to January 11 for the construction of a wharf at Middle County Harbor, Guysborough County, N.S., also for a wharf at Baddeck, Victoria County, N.S.

A city market building may be erected at Halifax, N.S.

The Dartmouth Rolling Mills, Dartmouth, N.S., are establishing a plant for the manufacture of wire nails.

Public Works Department, Ottawa, invite tenders up to January 7, for the construction of a wharf at Point Prim Island, Queen's County, P.E.I.

The Lethbridge Collieries Co., Winnipeg, Man., have been incorporated with a capital of $500,000, to manufacture coal, coke, oil, metals, etc. The provisional directors include J. S. Hough, T. A. Burrows and C. H. Campbell, Winnipeg, Man.

The premises of the Modern Plumbing Co., Winnipeg, Man., were damaged by fire recently.

The premises of the Lake of the Woods Milling Co., Winnipeg, Man., were damaged by fire recently. Loss about $10,000

F. Nation, Brandon, Man., will erect a block, 150x120 feet.

The Sun Plating & Mfg. Co., Winnipeg, Man., have been incorporated with a capital of $20,000, to manufacture gold, silver, brass, clocks, watches, jewellery, etc. The provisional directors include E. D. Martin, F. B. Jewell and H. Ormond, Winnipeg, Man.

The W. R. Watson Co., Winnipeg, Man., have been incorporated with a capital of $20,000, to manufacture paper, envelopes, photographic materials, etc., and to carry on a printing and engraving business The provisional directors include W. R. Watson, W. A. Hurley, and D. W McKerchar, Winnipeg, Man.

The Brandon & Robertson Mfg. Co., Brandon, Man., have been incorporated with a capital of $75,000, to manufacture implements, machinery, etc. The provisional directors include W. Brandon, J. A. Robertson and R. J. Brandon, Brandon, Man.

Messrs. Ashdown & Bossons, Swan River, Man., have been incorporated with a capital of $100,000, to manufacture timber, lumber, builders' supplies, etc. The provisional directors include A. L. Ashdown, J. H. Bossons, Swan River, Man., and E. J. Russell, Winnipeg, Man.

The Winnipeg Envelope Co., Winnipeg, Man., have been incorporated with a capital of $20,000, to manufacture stationery, envelopes, boxes, etc. The provisional directors include C. A. Butler, R. G. Ingram, and J. D. Pratt, Winnipeg, Man.

A new Y.M.C.A. building will be erected at Winnipeg, Man., or the present building will be enlarged.

J Bernhardt, Winnipeg, Man., has purchased the John Leslie block for the sum of $125,000, and will alter it for hotel purposes.

A school building will be erected at Ninga, Man., at a cost of about $10,000.

Mr. Irish, Winnipeg, Man., has purchased property on the corner of Notre Dame Avenue and Princess Street, for the sum of $80,000, and will erect a large block.

The Transcontinental Railway Commission, Ottawa, are negotiating for the purchase of a large tract of land near Winnipeg, Man., where they will erect a workshop at a cost of about $200,000.

A new wing will be erected to the Hotel Waldorf, Boundry Park, near Winnipeg Beach, Man.

J. Robinson & Co., Winnipeg, Man., will increase their capital from $250,000 to $500,000.

J. & D. Brown, Portage la Prairie, Man., have purchased a site and will erect a large office building.

The Yukon Block, Brandon, Man., was destroyed by fire recently. Loss about $25,000.

Public Works Department, Winnipeg, Man., invite tenders up to January 15 for the supply of 50,000 telephone poles.

The planing mill of Lalonde & Milloy, Winnipeg, Man., was destroyed by fire recently.

D. Douglas and T. H. Morris, Winnipeg, Man., have secured lots in Brandon, Man., and will erect an opera house at a cost of about $50,000.

Mr. Smith, of Smith & Ferguson, Regina, Sask., will erect a large block.

The Public Works Department of the Alberta Government are making arrangements for the construction of a telephone line between Edmonton and Lloydminster, Alta. Another line will also be constructed from Edmonton to Athabasca Landing, Alta.

The congregation of the Presbyterian church, Lacombe, Alta., will erect an edifice at a cost of about $12,000.

A new school building will be erected at Smtaluta, Sask.

The Imperial Oil Co., Winnipeg Man., are erecting a warehouse in Moosomin, Sask.

The Beaver Lumber Co., Winnipeg, Man., have purchased the mills of the Porto Rico Lumber Co., Moose Jaw, Sask., for the sum of $250,000. The properties include the planing mill and factory in Moose Jaw, Sask. and the lumber mills at Moyie and Ymir, B.C.

A new school house will be erected at Prince Albert, Sask.

The Winnipeg Oil Co., Winnipeg, Man are seeking a site in Regina, Sask., where they will erect a large warehouse.

The Eureka Coal & Brick Co., Estevan Sask., have increased their capital from $50,000, to $200,000. Since this company was formed about four years, the business has steadily increased and is now among the best in the West.

The Hamilton Bridge Co., Hamilton, Ont. have been awarded the contract for the construction of the new bridge at Lethbridge Alta., for the Canadian Pacific Railway Co.

The town of Davidson, Sask., invites tenders up to January 15 for the erection of a school building.

The ratepayers of Edmonton, Alta., voted favorably on three by-laws, one to expend $121,000 for paving, another $119,000 for rails for the street railway and $45,000 for an incinerator.

The G. W. Stockton Co., Carlyle, Sask have purchased a lot adjoining their present premises and will erect a two story block 120x50 feet.

A school building will be erected at Innisfail, Alta., at a cost of about $23,000.

Messrs. Bullock & Bulloc' Moose Jaw Sask., will erect large warehouses there.

J. L. Brown, Medicine Hat, Alta., invites tenders for the brick work and foundation of the new Great Northern hotel.

L. H. Shepley, Winnipeg, Man., is considering the establishment of a green house plant at Medicine Hat, Alta., at a cost of about $50,000.

A new post office, 40x20 feet, will be erected at Carlyle, Sask.

The Vancouver Portland Cement Co operating at Tod Inlet, B.C., are enlarging their plant.

John Hadden, Cloverdale, B.C., has erected a milling plant at Elgin, B.C., capable of cutting 20,000 feet of lumber per day.

The lumber mill of the British Columbia Tie & Lumber Co., Prince Rupert, B.C., will have a capacity of 70,000 feet of lumber per day.

The Schaake Machine Works, New Westminster, B.C., will erect new machine shops at a cost of about $50,000.

The Canadian Pacific Railway Co. will erect additional shops at Revelstoke, B.C., at a cost of about $20,000.

The King Edward Hotel, Vancouver, B.C. will be enlarged at a cost of about $15,000.

The congregation of the Methodist church Chilliwack, B.C., will erect a new edifice

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B. Greening Wire Co. Calendar.—Similar in many respects to last year's calendar, is the one for 1907 which this firm are sending out. The art design is a view of the works in four colors, also likenesses of the founder and the present president of the company The figures on the calendar pad are over 2 inch deep, making it a valuable wall calendar for office or works. The B. Greening Wire Co., Limited, Hamilton, Ont.

FINANCIAL.

The Bank of Toronto have opened a branch at Bradford, Ont., also one at Hastings, Ont.

The corner stone of the new Royal Bank of Canada building, St. John, N.B., was laid some days ago.

The Bank of Montreal will erect a branch building at the corner of Peel Street and Burnside Place, Montreal.

The Royal Bank of Canada will erect a new branch building in Montreal.

A large bank building will be erected at Victoria, B.C., by the Royal Bank of Canada.

The Bank of Nova Scotia have purchased property on King Street, Toronto, and will erect a bank building.

The Merchants Bank of Canada have opened a branch in Victoria, B.C.

The Royal Bank of Canada have opened branches at Cienfuegos, Cuba; Lipton, Sask.; Montreal, and Edmonton, Alta.

A branch of the Canadian Bank of Commerce has recently been opened at Innisfail, Sask., and Stony Plain, Alta.

The Molsons Bank are making arrangements to open a branch in Richmond, Que.

The premises of the Bank of British North America, Duck Lake, Sask., were destroyed by fire, December 26.

The Home Bank of Canada have decided to open a branch in Portage la Prairie, Man.

A branch has been opened in Plumas, Man., by the Royal Bank of Canada.

PUBLICATIONS.

The publishers of The Canadian Manufacturer solicit in advance, if possible, catalogues, circulars, and other industrial publications issued by manufacturers. We wish to review such literature, and bring the principal points to the attention of our readers.

Canadian Fairbanks Calendar.—The 1907 calendar sent out by the Canadian Fairbanks Co. is one of the most useful we have seen. Each month is given on a large sheet which permit such size in the figures that they can be easily read across an office or warehouse. The Canadian Fairbanks Co., Montreal.

A British Navy Calendar.—The calendar sent out by the London & Petrolea Barrel Co., has for its central figures two boys hoisting the Union Jack aboard ship. The boys are aloft, so that in the background is a view of the boundless sea. The London & Petrolea Barrel Co., London, Ont.

Childhood and Old Age.—Such is the combination of figures, a white-haired veteran and his granddaughter, in the calendar sent out by T. M. McOuat & Son, founders and machinists, Lachute, Que.

Pneumatic Tools and Appliances.—A 44-page, illustrated catalogue of pneumatic tools and appliances manufactured by Sir W. G. Armstrong, Whitworth & Co., Limited, Newcastle-upon-Tyne, for The Globe Pneumatic Engineering Co., Limited, 150 Queen Victoria Street, London, E.C., England.

Foundry Supplies.—A 200-page catalogue giving full information with illustrations covering the brushes and brooms, foundry supplies and hardware specialties manufactured by the Osborn Mfg. Co., Cleveland, Ohio.

"Imperial" Motor Hoists.—A four-page circular giving illustrations, dimensions, etc., regarding this line of hoists now handled, by the Canadian Rand Drill Co., Sherbrooke, Que.

Morris Machine Works Calendar.—A combination that will be desired by many readers, a beautiful design above a calendar pad with figures about an inch high so that they can be read across a room. The Morris Machine Works, Baldwinsville, N.Y.

IN THE TRADERS BANK BUILDING.

One result of the construction of Toronto's new skyscraper, the Traders Bank Building, has been the grouping of many engineering and machinery supply houses under one roof.

Among the firms who have already taken space in this building are :

The Otis-Fensom Elevator Co., Rooms 1401–1409.

The Parry Sound Lumber Co., Rooms 1315–1320.

The Standard Inspection Bureau, Room 1314.

Sunbeam Incandescent Lamp Co. of Canada, Limited, Rooms 1310–1313.

Canada Process Co., Rooms 1307–1309.

Lake Erie Boiler Compound Co., Limited, Room 1228.

Imperial Lumber Co., Limited., Rooms 1212–1220.

Canadian Westinghouse Co., Limited, Rooms 1207–1211.

London Machine Tool Co., Limited, Room 1206.

Murphy Iron Works, Room 1203.

Babcock & Wilcox, Limited, Rooms 1201–1202.

Cataract Refining Co., Limited, Room 1106.

Canadian Rand Drill Co., Limited, Rooms 1104–1105.

K. L. Aitken, Room 1003.

Page-Hersey Iron & Tube Co., Limited, Rooms 813–820.

Crescent Coal & Coke Co., Rooms 710–711.

Coleman Development Co., Rooms 704–705.

Electrical Development Co., Limited, Rooms 411–420.

CANADA METAL CO. TO EXPAND.

During the past fortnight W. G. Harris, president of the Canada Metal Co., Toronto, purchased the baseball grounds, Fraser Ave. and Liberty St., to provide facilities for the expansion of the company's business.

The Canada Metal Co. is, like many Toronto manufacturing concerns, a steady outgrowth from small beginnings. Starting as a dealer in metals, Mr. Harris has added department after department until now the concern is probably the largest of its kind in Canada. In addition to handling ingot metals from aluminum to pig lead, the firm now manufacture solder, babbit, lead pipe and traps, block tin and tin lined pipe, brass and bronze castings, stereotype and machine metals and battery zincs. They also have galvanizing and tinning plants and have just installed rolls for rolling sheet copper, sheet lead, etc.

As the business has been the growth of years, it has been necessary to enlarge old and erect new buildings and to build furnaces machinery, etc., in locations not as satisfactory as desirable.

Consequent on the expansion of market and the extension of the business into new lines, further enlargements to the plant are necessary and it was decided that the large grounds now acquired would give ample room for the erection of a modern plant with each department so located as to reduce operating expenses to a minimum.

It is not intended to start construction until late in the fall. Then, according to present plans, two fireproof, concrete buildings 40x 50 feet wide and 500 feet long will be erected. Many economies will be possible in such premises. For instance one large chimney will be used instead of several. This will make possible the use of waste heat from the furnaces for heating the premises. Electric power will probably be used throughout.

It is anticipated that most of the present machinery and equipment, which is modern throughout, will be used in the new premises, yet considerable outlay for new plant will be necessary. For instance the number of melting pots for babbit metal and the brass furnaces will be practically doubled, while the galvanizing plant will be made at least twice its present size. Recently set rolls for rolling sheet block tin, britannia metal and sheet lead were installed. This will be made a feature of.

Another advantage of the new premises are that they will have railway tracks to the door. This, in view of the heavy receipts of raw materials, coal, tin, antimony, lead and copper, and the heavy shipments of manufactured product and stock from warehouse is a consideration growing more important every year.

Plans for the new premises are now being prepared.

GAS PRODUCER PLANTS FREE.

It is indeed an exceptional proposition which the Producers Gas Co., 10 Front Street East, Toronto, are making in this issue.

This firm have studied the power problem in Canada at great length and with much care and have reached the conviction that the type of power plant they handle will effect such an economy over many existing plants that they can well afford to give a few plants away free and to take as interest on this investment a share in the saving effected.

To the power user this is a proposition which might never be offered him again. He has the opportunity to get free one of the best gas producer plants in the world and at the same time to participate in the saving from its use.

It is probable that many readers of this paper will fill in the blank on page 18 of this issue, so we would suggest that those particularly interested do so at the earliest moment.

THE SOUTHERN CALIFORNIA NEW TRAIN.—BEST ROUTE.

The Los Angeles Limited, electric lighted, new from the Pullman shops, with all latest innovations for travel comfort, leaves Chicago 10.05 p.m. daily, arrives Los Angeles 4.45 p.m. third day via Chicago, Union Pacific & North-Western Line and The Salt Lake Route. Pullman drawing room and tourist sleeping cars, composite observation car, dining cars, a la carte service. For rates, sleeping car reservations and full particulars, apply to your nearest agent or address B. H. Bennett, 2 East King St., Toronto.

The Canadian Clayworkers' Convention.

HELD IN TORONTO, DECEMBER 12, 13 AND 14, 1906.

In many respects the fifth annual convention of the Canadian Clay Products Manufacturers' Association, held in the Rossin House, Toronto, December 12 to 14, proved the most successful meeting of the association. Several of the papers read were especially valuable, the attendance was well up to the average, the discussions showed keen interest and the visits to the brick yards near Toronto gave many new ideas to the visitors.

The following delegates and visitors registered:

Toronto—John Russell, D. A. Lochrie, F. J. Sullivan, John B. Millar, Chas. Sawden, Fred Millar, Anton Berg, John Berg, Severn Berg, A. M. Wickens, D. B. Greig, George Angus, Isaac Price, F. S. Keith, J. H. Morrison, John McBain, John Maloney, James Pears, William Pears, D. Scott, R. F. Kearney and D. O. McKinnon of the CANADIAN MANUFACTURER.

Toronto Junction—James H. Lamson and L. B. Lamson.

Hamilton—R. F. Ollman, George Frid, Wm. Hancock, John Crawford, Ed. New and Frank Crawford.

Waterloo—B. E. Bechtel, C. H. Bechtel, C. E. Whyard.

Berlin—I. E. Shantz, V. O. Phillips, J. F. Ollman, Conrad Ott and Michael Ott.

Lindsay—S. J. Fox.

Drew, Ont.—Robert Holton.

Cowal, Ont.—Alex. Smith and Milton Smith.

Parkhill, Ont.—Oliver Baird, R. J. Davenport, J. F. Wilson, F. J. Hutchins, Neil McFee and C. A. Gibbs.

Alliston, Ont.—C. E. Norton.

Portage La Prairie, Man.—A. Snyder, C. A. Snyder, and J. W. Snyder.

Renfrew, Ont.—T. Henderson.

St. Catharines, Ont.—Harry A. Cozzens, Wm. Roberts and J. M. Carter.

Brockville—W. H. Wood.

Seeley's Bay—Albert Heal and E. J. Heal.

Chatham, Ont.—James Cornhill, Harry Cornhill and Fred Cornhill.

Glenannan, Ont.—Wm. H. Elliott and Wm. Elliott.

Harboard, Ont.—T. M. Mulligan

Thedford, Ont.—Jonas Cornell.

Barrie, Ont.—Wm. Freek and H. E. Reid.

Milton, Ont.—J. S. McCannell.

Highgate, Ont.—G. W. Moody

Stratford, Ont.—George Close and C. W. Close.

Fort Frances, Ont.—A. Dowker

Welland, Ont.—E. Hooker

Lyons, Ont.—W. McCredie

Bracebridge, Ont.—John Watson

Kincardine, Ont.—Samuel Wright

Carlton West—George A. Norton and Y. W. Norton.

Proton, Ont.—J. C. Wright

Norwich, Ont.—James Irwin & Sons. Alfred Doller and Hugh R. Irwin

Walkerton, Ont.—William Adamson

Bowmanville, Ont.—R. H. Hamley

Swansea, Ont.—Thomas Kennedy.

Hamburg, Ont.—George Schæfer

Strathroy, Ont.—C. G. Frank.

Weston, Ont.—G. W. Packham.

Mt. Denis, Ont.—E. J. Brown, Joseph W. Brown, Joseph Brown, Sr.

Thamesville, Ont.—D. Martin.

Mimico, Ont.—A. W. Wright, and J. W. Ball.

Meaford, Ont.—James M. Scott.

Kingston, Ont.—John Mouldey.

Napanee, Ont.—G. Whittington.

Casselman, Ont.—A. H. Merkley.

Fredericton, N.B.—M. Ryan.

Waterford, Ont.—J. R. Irwin.

Tillsonburg, Ont.—L. H. Sinden.

Ottawa, Ont.—A. W. E. Hellyer.

London, Ont.—J. A. Lamond.

Winthrop, Ont.—J. M. Govenlock.

Trenton, Ont.—R. G. Way.

Windsor, Ont.—J. R. Milner.

Brantford, Ont.—W. H. Freeborn,

Beamsville, Ont.—George Grain.

Montreal—W. Baillie.

Peterboro, Ont.—Charles Curtis.

Brampton, Ont.—W. J. Packham.

Gladstone, Man.—M. Wilson.

Portage, Que.—H. Stevens.

The first session of the convention was called to order at 2.45 by President S. J. Fox, Lindsay, Ont.

Alderman Graham, on behalf of the mayor of Toronto, gave the delegates a warm welcome. After announcing that the city desired the delegates to be its guests, and would provide them with rigs for a drive round the city, Ald. Graham expressed his belief that the brick pavement was the best made. The first brick pavement had been laid in Toronto eighteen years ago and had not caused any outlay for repairs to date.

President Fox then addressed the convention briefly, emphasizing that the purpose of the meeting was the interchanging of ideas for the improvement of methods of manufacturing brick and other burned clay products.

Mr. Chas. H. Bechtel, the Secretary-Treasurer then presented his report:

SECRETARY'S ANNUAL REPORT.

To members of the C. C. P. M.:

Gentlemen.—The last convention of the Canadian Clay Products Manufacturers was held in the city of Hamilton, on December 11 and 12, 1905. The meeting was a successful one, the membership having increased from 69 firms to 101 firms, with 168 gentlemen present. A printed report, embodying the complete proceedings, was mailed you some time ago.

At the suggestion of Mr. Fox, the President of the Association, the following members of the Association met in Toronto during the month of February, for the purpose of asking the government to add a clayworking branch to one of the provincial schools. There were present Messrs. S. J. Fox, J. S. McCannell, J. B. Miller, Wm. Hancock, Wm. McCredie and C. H. Bechtel. They waited upon the Hon. Dr. Pyne and the Hon. Mr. Cochrane, and stated their views. The honorable gentlemen replied that the matter would be taken into consideration.

A meeting of the executive committee was held at the Rossin House on November 11, 1906. There were present the President, the first and third Vice-Presidents, Wm. McCredie of Lyons, Mr. B. E. Bechtel of Waterloo, Mr. H. de Joannis of Chicago and the Secretary. The committee added Mr. Jos. Russell, of Toronto, to their list and that gentleman was present.

It was decided to hold a three-day convention on December 12, 13 and 14. The program was drafted. The Secretary was empowered to write Prof. Ed. Orton, of Ohio State University, Columbus, Ohio, asking him to deliver an address before the Association at this Convention, and stating that the Association would be glad to pay his travelling expenses. Mr. Orton accepted and will deliver the address as per the program. Respectfully submitted, C. H. BECHTEL

FINANCIAL STATEMENT.

Receipts—		
Membership fees		$198
Advertising in reports		75
Copies stenographer's report		10
Disbursements—		
Deficit from last year	$31 20	
Stenographer's report	46 00	
Printing reports, etc.	86 25	
Postage, stenographers time, expenses, and envelopes	28 82	
Bad debts—O. W. Shipman's "ad" in 1904 report	5 00	
Travelling expenses—C. H. Bechtel, $24.22; Wm. Hancock, $2.00; Wm. McCredie, $5.00.	31 22	
One-half amount for badges 1906 convention	13 70	
By balance	40 81	
Total	$283 00	$283
By balance		40

Prof. Coleman, of the School of Practical Science, Toronto, followed with an address of the geological features of Toronto and throughout other portions of Ontario, giving the geological history of the different formations by clayworkers. That the country around Toronto was some thousands of years ago a sea bottom, was proved by the fossils found in the shale near that city. Some of the fossils found in the Don valley were of ancient marine animals now extinct. That the sea was shallow was proved by the ripple markings. The fact that this country was twice covered by ice and snow for years, probably centuries, as the polar regions are to-day, was proved by the presence of boulder clay, or sole boulders, near the shale. The period between these two ice ages had laid clays with organic matter throughout. At a later date the fresh water deposit or lake

NOTE—The papers by Mr. Millar, Prof. Baker, Prof. Orton, jr. and Mr. Wickens are held for publication later.

where Ontario was is more than 150 feet deeper than at present. During this period in the bays of this lake deposits of clay were formed, which are now being used. Such deposits were noted at St. Catharines, Hamilton, Toronto and other centres.

W. McCredie, Lyons, Ont., opened an interesting discussion by asking the cause of the appearance of a white sweat on brick after it had been placed in the wall.

The discussion brought out a great diversity of opinion and the meeting readily adopted the suggestion of Prof. Coleman that any brick-maker having such trouble with his brick should send specimens to him, whereupon he would analyze same, with view of discovering the cause.

A vote of thanks to Prof. Coleman was enthusiastically passed.

Mr. J. S. McCannell, of the Milton Pressed Brick Co., Milton, Ont., followed with the following paper :

MINING AND PREPARATION OF MATERIAL.

In dealing with a subject of this description, it is not our intention to do more than mention a few of the many ways in which clay and like products are handled and prepared for manufacture. Hardly any two plants have the same way of preparing material, owing to the different formations and locations of the raw product.

In some European countries the material is taken from the beds of rivers. We read of the London brickmakers obtaining their supply of sand from the bottom of the river Thames, where it is raised into boats made for the purpose.

The Dutch clinkers or paving bricks, which have been famous for centuries, are manufactured from the slime deposited by the river on its shores and at the bottom. This is collected by men in boats, who have long poles with a cutting circle of iron at the end, also a bag net with which they draw up the slime. This is mixed with sand to make the pavers.

The manner of taking material for brickmaking from the bottom of rivers and lakes with poles is not of modern origin, as will appear from the following inscription which stood upon the brick pyramid near Cairo, the translation of being as follows. "Do not undervalue me by comparing me with the pyramids of stone, for I am better than they, as Jove exceeds the other Dieties. I am made of brick, from clay brought up from the bottom of the lake adhering to poles." So we see that the ancients realized that clay brick was then, as it is now, the best and most durable building material.

In getting the material out in its raw state a great deal depends upon its location as to how it can best be handled. A great deal of the best clay must be dug out with a spade and handled in with horse and carts, if the bank is close, or if the distance is great, a track is usually laid and cars holding from a yard to a yard and a quarter are used. These may be hauled by a horse, or a cable line is used, attaching it to a drum and hauling the cars up by use of power from the engine. Electricity may also be used for pulling up cars by means of a storage battery. This kind of power will no doubt, be used extensively in the near future when we get our lines hitched on to Niagara Falls, or use water power in our own counties.

The material is hard enough to blast, dynamite is used for blowing out the clay or shale, which is loaded on cars or carts by hand, or by means of a steam shovel.

In mining clay it is very important, if possible, to get natural drainage, so as to avoid the necessity of pumping out water in the wet season.

As you all know, in the treatment of clays there is a great deal of difference in the preparation for the machine. Some clays will go direct to the pug mill and others, having stones and impurities, must be put through separate machines for the removal of these impurities. In the case of our own material, which is almost all a shale, we put everything through our dry pans, which are five in number, before the clay is ready to go to the hoppers. In the case of the stiff mud bricks, we feed the dry clay, which has been first put

J. B. MILLAR, Don Valley Brick Works, President C. C. P. M. A.

through the dry pan, to our pug mill, where it is tempered to the proper stiffness before being made into bricks. With our dry press brick, the clay is tempered in the dry pan ready for going to the brick machines, by means of a small spray of water.

Another means by which the material is frequently brought in from the clay pit is by means of the aerial wire rope tramway. The system is used in several large plants. The wire rope over which the tramway buckets travel is supported by wooden towers. The buckets make a complete circuit of the tramway, the loaded buckets traveling from loading terminal to discharging terminal upon the wire cable, and after discharging its load the bucket continues around a terminal sheave wheel and proceeds upon a second track on the other side until near the loading sation, where it is automatically detached from the traction rope by means of the automatic clip arrangement, and this clip passes on to the bucket just ahead, which has just been loaded, and picks this bucket up and carries it on in the same way as the preceding one.

A great deal has been said and written about weathering clay before it will make a good brick. This is something that actual tests alone can determine. Of course, some materials must be dried out before they can be ground up. Our own experience with our shale is that we can make a better brick direct from the bank than by any other way, owing to the fact that the moisture is more uniform when the clay is fresh than if it were partly dried out.

A steam drill is used in many plants for drilling the holes into which the dynamite charges are placed for blowing out the shale or clay. In our plant we use hand drills, which makes holes to the bottom of the beds which we wish to blow out. A dozen or more of these holes are exploded at once by means of an electric battery, and this will supply clay for several days' run.

We might add that while in tempering and preparing the raw material it is very important to have the water and clays mixed in the right proportions; this will not necessarily make good bricks. It requires to have mixed with it an experience and skill which is acquired only after using a good deal of that gray matter called "brains."

Mr. A. Berg, Toronto, then submitted the following paper :

PRESSED BRICK AS A BUILDING MATERIAL.

It is said that the first man to discover the art of brickmaking was the nude savage of Bismayra, who, while poking among the ashes of his old camp fire, found that the moist clay beneath was baked. The first bricks were made from chunks of clay, roughly formed by the hands without a mould, and laid upon the ground without being baked. Thus, they were flat upon the bottom with low edges, rounded corners and a high convexed upper surface. To adopt a wooden mould resembling a bottomless box of the desired size, and to mix the clay with straw, was the next step. The only means in those days of distinguishing the different manufactures of brick were by putting grooves in the brick in different directions, each manufacturer having his own particular form.

In the present and future ages, we have and will continue to have a high grade of pressed brick for building purposes. It is oftentimes said that such and such a brick must be imported from the United States, because it is impossible to manufacture it here in this country. The allegation that the material is not here is nonsense; it is here in abundance. The clay deposits of this country are undoubtedly among the most extensive in the world. To take the best advantage of this, we must have the best knowledge of our resources and of their adaptabilities. The money is here, the brain is here, and the people with the highest grade of brick machinery are here, and we are convinced from our experience, that we can manufacture and produce as high grade of brick in this country as can be produced by any other nation in the world.

The writer has visited the most popular and modern brick plants throughout the world, and is thoroughly convinced that we have here every facility for making a high grade of pressed brick, with the most modern and successful brick machinery that can be obtained in this country; therefore, we do not hesitate to affirm that there is a future success for a high grade of pressed brick in Canada, which we venture to say comes from most of our plants without a peer in the pressed brick market, as we have strived

to accomplish this end, together with the most brilliant fellow brickmakers.

Shale is exceptionally well adapted for a high grade of pressed brick; also adapted to allow the plant to be operated winter and summer, wet and dry weather, thus enabling us to keep our machinery in a condition that is unsurpassed for the manufacture of brick. This benefit accrues chiefly, or rather directly, to the using the "Berg" equipment, of course, ha-ha, ha.

Pressed brick can be made from many different kinds of clay, in many cases more easily in summer and dry weather than from shale, but when desirous of operating a pressed brick plant continually –dry and wet weather, winter and summer—we advise a storage shed, with ample capacity for supplies for the inclement weather. In many cases the clay agglomerated under a shed will be benefited through the so-called "sweating process," and be more eligible for the manufacture of brick.

Pressed brick are dense with an even texture, without granulated centers, with a face as even as a straight edge, and are also uniform in size and quality, and will stand up to 7,000 pounds pressure per square inch before crushing.

We have now reached a scientific age with equipment, knowledge, and with a future before us for pressed brick, as at this date are being built, and will continue to be built, churches, fine residences, ornamental libraries, office buildings from six to fifteen stories high, and often vast building operations. The articles we refer to are remarkable and elicit many expressions of approval from the building public having expert knowledge of a building brick.

In these days of fierce competition, when every manufacturer is pushing his product into the market with all the energy at his command, there is often a temptation to sacrifice an element of excellency by reaching a reduction in the cost by purchasing an inferior quality of machinery. Complaints are heard regarding some inferior makes of face brick now on the market, being sold as first-class; also of the fact that many do not seem to keep up with the times in the matter of equipping their plants, and we feel we are doing a practical service to our patrons by recommending our really meritorious make of brick machinery, which can be relied upon.

As we maintain this essay on the principle of furnishing our patrons with accurate advice, we have decided to go into the matter with great care. We are aware, of course, that the buyer is at a disadvantage; he can not depend on the statements of the sellers, as each thinks that which he represents is the best in the art of brickmaking machinery.

We have decided to make a thorough examination, and as a result we can give a decided and reliable answer. We have considered every point carefully, and have made every effort to improve the brick, and as a result we are prepared to state that there is no make of machinery on the market to-day in any of the qualities which are made that will manufacture brick excelling those made by our dry press process.

We will mention episodes in the past and future annals of business operations. The brick manufacturers are of different opinions as to the manufacture of building material. Some take the clay, mix it with water and mould it into brick form; it is then taken and burned slightly; that is manufacturing by the stiff or soft mud process. Such bricks are used yet a great deal for inside work.

This scientific age has thoroughly convinced us that this is an inferior material for structures of any description, and it is deteriorating very rapidly; although such material has been ameliorated considerably in comparison with the time when clay and straw were used, mixed together and formed into different shapes for building purposes. All kinds of straws, hays and hairs were used for bonding. Here a great many paragraphs could be added; but it is to be considered entirely with the ancients.

After the conclusion of this session the delegates had an opportunity to examine the exhibits of clay-working machinery in the hotel corridor.

A. Berg & Son, Toronto, had a model of their Berg press, together with illustrations showing its plants and others showing it as installed throughout Canada.

Bechtels, Limited, Waterloo, displayed their automatic cutting table. W. B. Bechtel C. H. Bechtel and C. E. Whyard represented the company.

The H. C. Baird Co. were represented by C. Baird and Y. I. Hutchins.

The Twin City Oil Co., represented by V. O. Phillips, had a display of oils.

Mr. George B. Drennan looked after the interest of the J. D. Fate Co., Plymouth, Ohio.

The most comprehensive exhibit was that of the American Clay Machinery Co., Bucyrus, Ohio, who had a model plant showing press, cutting tables, etc., operated by electricity. S. J. Heafield was in charge of the exhibit.

Thursday Session.

Thursday morning was spent at the Don Valley Brick Works where under the guidance of the superintendent, Mr. John B. Millar, the delegates were shown the features of this splendid plant.

In the afternoon Mr. Millar followed up this visit with a paper on "The Comparative Economy in Construction and Operation of Down Draft and Continuous Kilns."

The discussion which followed caused a tilt between Mr. Jonas Cornell, Thedford, Ont., and Mr. William Hancock, of Hamilton. Mr. Cornell expressed his preference for down draft kilns. Mr. Hancock replied by putting forth the arguments in favor of up draft kilns, claiming that by the use of such kilns he was burning his brick for $1.25 per thousand. Mr. Cornell came back with the assertion that by the use of up draft kilns Mr. Hancock was losing a large quantity of heat by allowing it to escape before it had done its full duty, and that if he burned his brick in a down draft kiln, where all the heat was utilized, he ought to be able to burn his brick for seventy-five cents a thousand.

Prof. M. B. Baker, of the Ontario School of Mining, Kingston, Ont., read a valuable paper on "Grogs." Twenty-five per cent. of the sand in clay, said Prof. Baker, was not detrimental, but that on the contrary, such clay would make excellent brick, having the highest possible crushing and tensile strength, and without effecting the color of the product. He also discussed the addition of combustible grogs, such as sawdust and coal screenings, to clay for the manufacture of terra cotta, making a high grade ware, owing to the fact that the grog aids in the burnings and permits of high porosity in the ware, and making the ware lighter and better adapted to wall construction.

Prof. Edward Orton, jr. of the Ohio State University, California, then read a paper on "Technical Education in its Relation to the Clay Industries."

The Annual Banquet.

The social event of the Convention, the annual banquet, was given Thursday evening by the Toronto members of the association. The menu was enticing, the room cheery and bright and everyone in the proper spirit of good fellowship.

Mr. W. Pears, of Toronto, acted as toastmaster.

After Ald. Graham had renewed the civic welcome to the delegates, toasts were responded to as follows:

The Ontario Legislature—Hon. Mr. St. John and Hon. Dr. Pyne.

Municipal Institutions—Controllers Shaw, Hubbard and Jones.

Our Guests—President S. J. Fox, Lindsay, Ont., Prof. Edward Orton, Columbus, O., H. de Joannes, Chicago.

Our Builders—Mr. Aldrich.

Our Architects—Messrs. Edmund Burke and Robt. Davies, Toronto.

The Ladies—Messrs. W. McCredie, Lyons, Ont., and J. S. McCannell, Milton, Ont.

Our Manufacturers—A. Berg, Toronto, and W. B. Bechtel, Waterloo.

Friday Sessions.

The big feature of the Friday sessions was the election of officers which resulted as follows:

President—John B. Millar, Toronto.

First Vice-Pres.—J. S. McCannell, Milton, Ont.

Second Vice-Pres.—Charles Curtis, Peterboro, Ont.

Third Vice-Pres.—James Cornhill, Chatham, Ont.

Sec.-Treas.—C. H. Bechtel, Waterloo.

Executive Committee—S. J. Fox, Lindsay, Ont.; T. M. Mulligan, Harbord, Ont., James McCredie, Lyons, Ont., and Joseph Russell, Toronto.

Ottawa was selected for the convention in 1907.

Following up a suggestion made by President Pyne, at the banquet, Messrs. Justice, Russell, Wm. Pears, C. P. Lochrie and A. E. Wright were appointed a committee to confer on Principal Galbraith of the School of Practical Science, Toronto, to interest him in technical education for clayworkers.

Wm. Baillie, of the Laprairie Brick Co., read an interesting paper on "Waste Heat System," advocating the utilization of waste heat from continuous kilns, describing in detail the system in use by his firm, which he stated had proved very satisfactory.

A. M. Wickens, Toronto, concluded the convention with a paper on "The Use of Exhaust Steam in a Brick Plant."

The Canadian Government have secured premises at 73, Basinghall Street, London, E.C., where an office has been opened under the designation of "Canadian Government City Trade Branch," for the convenience of the commercial community. In due course it is intended to equip and maintain a display room, illustrating the products, resources and manufactures of the Dominion. In the meantime, a Canadian representative attends daily to deal with enquiries and applications in connection with Canadian import and export trade, and to supply information about Canadian matters generally.

The Testing of Coal.

By A. Bement, M.W.S.E., in The Industrial World.

The purchase of coal under specification stipulating its composition, and the analysis of the fuel delivered under such specification, has become an important feature of the coal business, and while the practice is of comparatively recent origin in this general locality, experience has demonstrated that there are certain features of specifications and analytical methods which may be corrected and improved. This applies particularly to the business transactions between the dealer who sells the coal and the purchaser who burns it. Another phase of the problem concerns the work being done at the coal testing plant of the United States Geological Survey at St. Louis, the Illinois Geological Survey and the Engineering Experiment Station of the University of Illinois. The work of these institutions may be considered as that of research, to distinguish it from the inspection service.

It is the principal object of this paper to emphasize the necessity for improving the practice governing specifications and inspection, and also to suggest certain lines along which the research should proceed, and it is fuel from the Eastern Interior coal basin that is more particularly considered.

The improvements and corrections which concern terms of specifications, and the inspection service, require that determination of the following be abandoned:

Moisture, volatile matter, fixed carbon, sulphur, evaporative power of the coal.

Every essential requirement of the purchaser may be fulfilled by confining specifications and tests to the three following characteristics; in fact, these three features alone will insure a greater protection to the purchaser than obtainable under present general practice:

Per cent. of ash in the dry coal, size of the coal, heating power of the pure coal.

The latter, according to prevailing practice, would preferably, of course, be expressed in British thermal units.

The reasons for the above recommendations are given under the following captions:

Moisture.

Moisture is a great and uncertain variable. It not only differs in various coal seams as the coal lies in the ground, but is affected in fuel as received in shipment, by conditions of weather, temperature, and time the coal may be in transit. It is approximately correct, however, to say that each coal seam has a characteristic moisture content of its own, which is uniform over at least very considerable areas, but the after influences above mentioned changes it, so that there is assurance of what it may be except under specially defined conditions.

Therefore, the producer or coal dealer can exercise no control over moisture, and as the object of fuel inspection service is to insure that the customer is served to the best ability of the dealer, specifications and tests of moisture in coal delivery can offer no protection to the purchaser. As before mentioned moisture varies in different coal seams; for this reason it might appear that its determination would indicate the seam from which the coal came. This is not true, however, for reasons above mentioned. If tests are expected to identify the seam which produced the coal other means must necessarily be employed.

However, in coal inspection service, moisture has been found to be very high in cases where delivery is by wagon, which, owing to lack of sufficient explanation of phenomena at the time, may have led to the opinion that the dealer wetted the coal for purpose of increasing its weight at the time of loading. If this is the practice, it necessarily complicates the problem, but the writer has had cause to visit every coal yard in Chicago, and never observed any wetting of coal or any appliances for such purpose. It would be a difficult and expensive matter to wet fuel as loaded, and require water pipes located along team tracks, which in some cases extend for several hundred feet, and with the finer sizes of coal it would necessitate a man stationed at each wagon to supply water as fast as the coal was loaded, otherwise it would be impossible to add any great amount, because simply flooding the top of a wagon load of screenings, for example, would only insure the upper surface being wetted as the water would not penetrate the mass. A further study of this matter has made it appear to the author, that this high moisture in wagon delivered coal, is due to the practice of wetting coal while it is being unloaded, very often done for the purpose of allaying dust, and to the water which is commonly added in the fire room for various reasons, both prior to the time of sampling.

This matter of moisture also complicates the problem as far as the inspection service is concerned, because it is impracticable for the inspecting company to have its sampler present when a wagon load of coal arrives, as it would entail an expense which the service could not bear. Also, sampling attempted at the time of unloading could not be properly performed, as the sampler would be unable to gather from a wagon at the sidewalk and prepare a sample as it should be done. Thus, it appears, that the determination of moisture, even in wagon delivered coal, serves no useful purpose. With fuel received in cars, there could, of course, be no opportunity for adding water.

Volatile Matter.

No fuel coal of this locality is purchased for the purpose of making gas or for use in by-product recovery plants, therefore tests for this constituent are unnecessary, unless there be a great difference in the coal. "Volatile matter" is not very well understood. The best conclusion is that coal is a complicated hydrocarbon which breaks down in distillation into various fractions, depending upon temperature and duration of heating period, and that the difference in coal of this basin is not greater than that due to the varying effect produced by the volatilization test itself; or, in other words, the variation may be used by the test rather than by the composition of the coal. Thus the volatile matter test is not sufficiently accurate to be of service in this case. It is, of course, true, that it would distinguish between bituminous, semi-bituminous and anthracite coal, but one may do this merely by inspection without any test whatever.

All coal of this basin is high in "volatile matter;" all will make smoke if burned in sufficiently bad furnaces, and all will make smokeless combustion and good efficiency in good furnaces.

Fixed Carbon.

In coal analysis the disposition is to follow precedent. Coal mining became an important industry in the East long before it did in this locality. Much coal in the Appalachian basin is suited to the manufacture of a high grade of coke, and the amount of residue, or, in other words, the coke obtained under the conditions of the process is a matter of first importance. This had had the effect of emphasizing the importance of "fixed carbon," so that it has been looked upon in many quarters as of more moment than any other characteristic of coal, and these ideas, extending to our locality, have to a considerable extent, influenced opinion regarding fuel. The same remarks regarding the uncertainty of the determination of volatile matter apply to that of fixed carbon, because the test for the former is the one giving data for the latter. If coke was made from coal of this locality, it would be possible under certain conditions, to make a useful application of the test for fixed carbon; inasmuch, however, as it is not the case, this constituent is only a troublesome and misleading feature of analysis.

Sulphur.

Sulphur has been in a measure treated in the past the same as fixed carbon. In metallurgical work it is of extreme importance, and in this connection has received more attention than with fuel coal. This has given a prominence to the sulphur determination which it would not otherwise possess, and upon the assumption that sulphur is in the form of pyrites or very largely so, the conclusion has been accepted that the amount of sulphur is an indication of the tendency of the ash in the coal to clinker. This is true, however, to only a slight extent; in fact, may not even be considered as a working hypothesis in this coal basin, because some of the seams which are the highest in sulphur produce the least clinking, therefore conclusions regarding the behaviour of the ash in this respect, are not justified by the amount of sulphur in the coal.

Evaporative Power.

This is something which should never, under any circumstances, become a feature of specifications or guarantees, for several very important reasons. In general, too many variable factors enter into the problem. For example, boilers differ, some being more efficient than others, absorbing greater or less amounts of heat from the coal for reasons due to their individual superiority or inferiority. Then furnaces differ; in some cases all of the volatile matter may be burned; in others, a large portion be wasted. Again, fire grates differ in like measure, causing varying losses of fuel which falls into the ash pits, and the combination of grate and furnace has an important influence on the excess of air which necessarily enters, and for this latter reason, also, the useful result obtained from the coal is affected to a marked extent.

The above refers to the characteristics of the apparatus itself, but at this point another and most serious variable must be considered, that of the personal equation of the fireman or furnace operator, therefore it is apparent that in such a test, one may be unable to discover whether the result is due to the fuel, the peculiarities of the apparatus or its manipulation. In the case of a coal purchaser who does not realize these facts, the result is always attributed to the object in view, which is, in such instance, to determine the value of the coal. If he had wished to discover whether he employed a good fireman or not, the experiment would have been precisely the same, and he would have then considered the result due to manipulation. It is not only the above features which have an important influence, but the character of the load on the plant is a matter of great moment. In a works where boilers run steadily for 24 hours, the result secured, everything being equal, will be much better than in one where the work is necessarily interrupted by stoppages at noontime, shutting down at night, or peaks of load as in electric railway service. Any one of the foregoing causes may exercise a greater influence on the evaporative result secured than that due to variation in fuel.

It is not intended in the above to imply that coal burning experiments are not useful, because there are some things which may be settled as affecting certain plants; for example, fuel high in ash generally costs less per ton than that containing less ash, and it might be a question which would be the most economical to use; or, the matter of the most desirable size of fuel may be in question. These two are the only features which can be settled by burning coal under a boiler, and they should not be made part of a specification or guarantee, but used entirely for the guidance of the fuel user in selecting the best grade.

The behaviour of coal under boilers is a problem very little understood, because it is the result of many variable influences, and for this reason it is often felt that the calorimetric test is unreliable, which, however, is not true, because the calorimeter does its work very accurately as far as the coal itself is concerned, its efficient utilization in service is influenced only by the amount and fusibility of the ash associated with it and the size of the pieces of the fuel. This matter has been extensively treated elsewhere.

It is well in this connection to direct attention to the fact that there is a feeling, more or less prevalent, that coal from different localities or seams, may possess some undefinable peculiarity in its chemical combination, which causes it to behave differently under a boiler than it would in a calorimeter. Such conclusion is untenable, because the process is identical in each case, that of combination of oxygen with the carbon, hydrogen and sulphur of the coal, and this combination cannot be any different under the boiler than in the calorimeter, unless certain influences, due to the peculiarity of the boiler apparatus and its manipulation assert themselves, and it is the disposition as far as the coal is concerned, to blame it for effects which are due to the causes other than its chemical composition. It is well in this connection, to call attention to the fact that the heating power of the coal proper, or, in other words, the pure coal in Illinois, only ranges from 14,000 as a minimum, to 14,750 British thermal units as a maximum, and that about 80 per cent. of the fuel produced ranges between 14,000 and 14,500 British thermal units per pound. Thus the enormous variation found in service under boilers, as far as the amount of water evaporated per pound of coal is concerned, is mostly due to the characteristics of the apparatus, its manipulation, and to the size of the coal and the amount of ash associated with it.

Thus it is very clear that specifications or guarantees covering amount of evaporation per pound of fuel or per cent. efficiency, are not only useless, but troublesome to the purchaser and dealer.

The three approved tests may now be considered, and while in the above classification they are presented in the order of greatest importance, it will be convenient to change their arrangement.

Pure Coal.

For better understanding, it is desirable to consider coal as the chemical combination of certain elements which are principally heat producing. The association of ash and moisture with these, results in an aggregation which may be designated as fuel, although generally called coal, which, from this standpoint, however, is not correct, because neither ash nor moisture produce heat. The expression, pure coal, is the equivalent of what has erroneously been called combustible, the pure coal containing all of the combustible matter, and some water of composition and nitrogen which are not combustible, but as these two ingredients are associated chemically with the combustible, the ultimate conception of coal is covered by this term, pure coal. Thus, in the heating power determination, it is more to the point to base results on the pure coal than on any of the fuel mixtures, illustrated as follows: Let it be assumed that in one case the b. t. u. per pound of dry coal is 13,250, and in another 12,450, from which it would appear that the two lots of fuel were different, but if the percentage of ash content in each is known, and the first sample contained 7 per cent. and the latter 12 per cent., it appears that each sample has a pure b. t. u. of 14,250, or, in other words, that the coal is the same in each, there simply being more ash associated with it in one case than the other. Basing the heating power determination on pure coal has another very important advantage, as it enables one to judge of the accuracy of analysis, because when the heating power and the source from which the coal comes is known, there is evidence indicating whether or not the analysis has been correctly performed, because, if it has not been, it will be shown by the b. t. u.

Ash.

An important reason why ash should always be considered as a percentage of the dry coal instead of the moist fuel, is, that like the b. t. u. determination, unless it is placed on some common basis, proper comparison cannot be made on different lots of fuel, for example, in two samples, the moisture may be 8 and 13 per cent., and ash in the dry coal 10 per cent. in each, but expressed on the moist coal basis, it appears that one has 8.7 and the other 9.2 per cent. of ash, and it would seem that one of the fuels contained more than the other. In this connection the fact should be borne in mind, that when one burns moist coal, the moisture is evaporated and passes away; in fact, dry coal is not burned, the ash remaining; it being the pure coal which enters into the process of making fire.

Size of Coal.

As a general proposition, the value of fuel increases with the size of the pieces, so that a very fine "duff" is of little use, but as the pieces become larger, the actual value increases in a greater ratio than does the heating power, and this continues to egg size and lump. Thus smaller pieces contain the same amount of heat per pound as large ones, are of less value than the larger coal.

The size of the pieces of coal exercises an important influence, not only on the capacity, which may be produced by a boiler but on the resulting efficiency, and the best size to be used in a given case is dependent upon many conditions, such as the strength of draft, kind of stoker or grates, method of firing, etc., and the selection of the proper size of fuel or the method of utilizing the available size, often affords an opportunity to effect important economies.

Sampling.

One feature of the matter, referring especially to coal inspection service, is proper and reliable sampling. In very many cases the coal inspection service is rendered for a company, which, while acting as the purchaser's representative, is dependent upon to furnish the seller with reliable reports concerning the composition of coal supplied. Under such conditions, it is absolutely necessary that not only shall the inspecting chemist be both competent and reliable, but that he shall be as fully responsible for the collection of the samples as he is for the analytical report, and it is also absolutely essential that the purchaser or his employe will not be allowed to sample any coal or assist in the sampling, because, under such conditions, the chemist may not know whether the report which he makes is correct or not, and it is well to emphasize the fact that the sampling is of as great importance as the analysis itself.

Referring to the branch of the subject before mentioned as that of research, there has been in operation for some years, at St. Louis, what has been designated as a fuel testing plant, under the direction of the United States Geological Survey. Its principal published work so far, however, has been largely confined to "tests" under boilers, which have been thought to show the "real steaming value" of the fuel. The author's remarks above regarding testing coal under boilers, will refer to this branch of the work.

Probably the reference to coal in the plural has done much to cause confusion, because it has led people to believe that there are very many "kinds" of coal. For example, fuel from Herrin and Carterville, in this State, would, according to this, be considered as different "coals," when, as a matter of fact, they are from the same seam, and the most exact analytical tests, so far made, do not indicate a difference. The amount of ash associated with the coal may or may not vary, but the coal is the same, and it is coal and not coals, otherwise, every mine would produce a different kind of coal, notwith-

standing the fact seams in Illinois sometimes run through an entire county without it being possible to detect any variation in the quality; therefore, the expression, kinds of coal, which has been used frequently in connection with coal testing work, should not only be better defined, but limited in its application to those cases where there is a real difference, which, as is well known, does exist; for example, it must be conceded that anthracite and bituminous are different kinds of coal, but the most liberal application to the coal basin would allow only two kinds, which are the black coal of Indiana, all the remainder being bituminous, the latter also including what is known as semi-block of Indiana.

The State of Illinois has made an appropriation covering cost of investigations to be conducted by the Engineering Experiment Station of the University of Illinois, and there is certain important work which it is hoped will be undertaken, having a bearing on the values of fuel, studies tending to define the laws controlling the influence due to the size when burned with some different kinds of stokers or grates, and similar studies to ascertain corresponding effect, due to varying amounts of ash in coal, also degree of fusibility of such ash.

The recently established State Geological Survey will present by all means a very much better coal report than has so far been published by any State, and it will be a great help to the purchasers and producers of coal, if certain values as affecting heating power, ash and moisture are authoritatively presented. As before mentioned, the three essential items are heating power of the pure coal, percentage of ash in the dry coal and moisture. The b. t. u. values would be the simplest of the three, as these results would apply to pure coal, and which is, no doubt, practically a constant for a particular locality of a seam, therefore, once determined, it will not be necessary to repeat tests. Establishing ash values would be a more difficult matter, because it would not only involve ash in seams as the coal lies in the ground, but the various grades of coal shipped from those seams. Ash, however, at the mine, would be the same in quantity as when received by the consumer. Securing moisture values would be a far more complicated problem, because of greater variations, due to temperature, weather conditions and time in transit. For these reasons, it is difficult to arrive at any conclusion regarding the amount of work which may be justified in the establishment of such values. Some idea of the complication may be illustrated; for example —the washed and sized coal shipped so extensively from Williamson county has a characteristic moisture content, due to the difference in the size of the pieces, the larger ones being dried, and these moisture contents vary over wide ranges between summer and winter, and also according to the length of haul; thus, at least, average moisture values would be needed for each size at the city where the coal was received.

A recent expression which has come into use, is that of "air-dried coal," which is based upon allowing the sample to become dried in the open air of the laboratory, the idea being that this shows the fuel as it would reach the consumer. No standard conditions, however, appear to be employed in this air-drying, and if there were, the values obtained thereby do not indicate the amount of moisture in coal when it reaches the consumer. Some samples of air-drying on Illinois coal have shown the moisture as being between 5 and 6 per cent., when, as a matter of fact, the same coal is never received with less than 7, and in the winter time it is very much more This moisture value should be abandoned, as it serves no useful purpose, tending only to increase existing confusion and misunderstanding.

Electric Motor Drive.

Of recent years engineers have discussed the power lost in shafting and belting, the great amount of space taken up by the same, the high cost of maintenance, the liability of break-downs and the inflexibility of belt-driven machinery.

It is the purpose of this article to give a short comparison between belt-driven and motor driven machinery, and also to give the advantages of the latter.

With the advent of the electric motor there came a probable solution for belt drive. Up to 1900 few manufacturers had adopted motor drive and its use was not advocated. At the present time, however, the motor has reached a high state of perfection and is vastly superior and much cheaper than it was several years ago. Since 1900 practically all large manufacturers have adopted it.

The question which first concerns the manufacturer is: What advantage is there in the use of the electric motor, and what is the cost of its installation as compared with shafting and belting? and I will consider the operating expenses under each class of drive, viz., motor and belt.

This depends on the efficiency of transmitting power to the machines. The average loss of power in belt and shaft transmission for about 50 shops, half in France and half in the United States, was 40 per cent. of the power generated, making the efficiency 60 per cent. On the other hand, with electric drive, allowing 93 per cent. efficiency for the generator, 80 per cent. for the motors, 95 per cent. for transmission or loss in line (which are quite low), we get an efficiency of 70 per cent This means an increase of 10 per cent. over belt drive and consequently a reduction in the fuel bill of 10 per cent.

It is a well-known fact that belting must be adjusted about once a month and the shafting be cleaned weekly. With a motor one oiling lasts from two to three months and no attendance is required except a man to start and stop it, and the man in charge of the machine does this. This makes the cost of attendance of the motor almost negligible.

With an engine and intermediate gearing, bearings must be renewed, the shafting inspected and the belting repaired of renewed frequency. On the other hand, with motor drive, having an engine coupled to a generator, we avoid this trouble and expense. As far as the motors are concerned the repairs are negligible. Here is an instance: In the shop of the Allgemeine Electricitats Gesellschaft, where 500 motors are installed at the present time, only 39 had to be repaired in 30 months

A breakdown in any shop results in a loss, and the larger the shop the greater the loss. With motor drive breakdowns are reduced 75 per cent.

In a modern shop the greatest item of expense is the wages. On an average three men are employed per horse power. Anything which will increase the output per horsepower without increasing the wage item is of the greatest importance. The question as to the advantage of electric drive hinges chiefly upon the effect on the output of the product per man per machine. This in turn depends on:

1. The general arrangement of machinery to facilitate the handling of work. With shafting the machines must be placed with regard to the line shaft. Motor-driven machines can be placed in any convenient position.

2. Clear headroom for use of electric cranes and small hoists. With belt driven machines, traveling cranes and small hoists are at a great disadvantage.

3. Light and cleanliness. The output or work per man greatly depends upon his surroundings. The lighter and cleaner his surroundings, the more pleasant will be his disposition.

4. Speed control. It is absolutely necessary that the speed of a machine be under perfect control, and that the speed be capable of variation over a large range. The control of speed is accomplished more quickly and at less expense with the motor than by any other method.

5. Use of electricity for other purposes than power. Besides running machinery we can use electricity for lighting, welding, brazing, soldering, etc. This varied usefulness tends to foster these different operations and thus increase the scope of work in any one shop.

Another advantage is that for a given horse power of engine more machines can be used with electric drive than with belt drive. This follows from the fact that a certain number of machines are idle all the time, but their shafts and belts are continuously running and therefore absorbing power. With the electric drive this power can be used to drive extra machines.

Experience has shown that the average load on the generator is 20 per cent. and maximum load 35 per cent. of the motor rating. Therefore, to get full load on the generator we must install five times as much motor horse power as generator horse-power. An example of this is shown by the installation of electric drive at the Baldwin Locomotive Works, where the capacity of the generators was estimated four motor horse power.

In short, the advantages of motor drive are the increased output per man, good speed regulation and greater efficiency of machine drive.

In regard to first cost it may be stated that in some cases, for example in a mill, the first cost of electric drive is cheaper than belt drive. On the other hand, in a machine shop electric drive is the more expensive. It has been estimated that the saving in power by using motor drive will pay the cost of the plant in from one to five years.—American Machinist.

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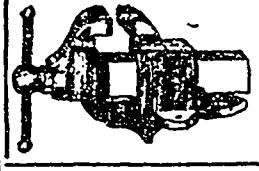

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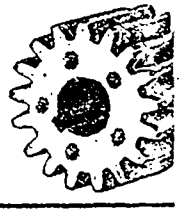

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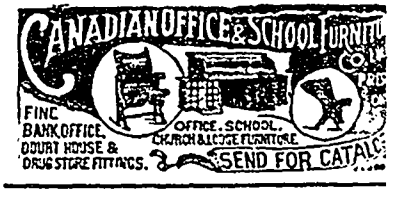

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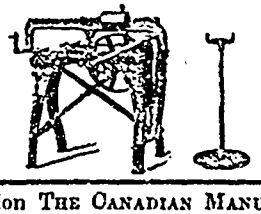

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lis-Chalmers-Bullock, Limited, Montreal.
key Pulverizer Co., Boston, Mass.
cDougall, John, Caledonian Iron Works Co., Montreal.

Centrifugal Pumping Machinery

rrie Machine Works, Baldwinsville, N.Y.
art-Turner Machine Co., Hamilton, Ont.

Chain Making Machinery

(Welded Coil Chain)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Channels

Bourne-Fuller Co., Cleveland, Ohio.
Canada Foundry Co., Toronto.
Leslie, A. C. & Co., Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

Charcoal Pig Iron

Canada Iron Furnace Co., Montreal.
McDougall, John, Caledonian Iron Works Co. Montreal.

Chemicals

Canada Chemical Co., London, Ont.
Nichols Chemical Co. of Canada, Montreal.

Chemists

Heys, Thomas & Son, Toronto.

Clay Working Machinery

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Coal, Coke and Charcoal.

Bourne-Fuller Co., Cleveland, Ohio.
Hamilton Facing Mill Co., Hamilton, Ont.

Coal Cutting Machines

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian Rand Drill Co., Sherbrooke, Que.
Jeffrey Mfg. Co., Columbus, Ohio.

Coal Tipples

Jeffrey Mfg. Co., Columbus, Ohio.
Jenckes Machine Co., Sherbrooke, Que.

Coil Chains

Greening, B. Wire Co., Hamilton, Ont.
Leslie, A. C. & Co., Montreal.

Coke Oven Brick

Dunbar Fire Brick Co., Pittsburgh, Pa.
Stowe-Fuller Co., Cleveland, Ohio.

Collection Agency

Petrie, H. D., Hamilton, Ont.

Concrete Mixers

Hopkins, F. H. &. Co., Montreal.

Condensers

Smart-Turner Machine Co., Hamilton, Ont.

Conduits (Interior)

Conduits Company, Limited, Toronto.

Contractors' Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Gartshore, John J., Toronto.
Hopkins, F. H. & Co., Montreal.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Smart-Turner Machine Co., Hamilton, Ont.

Contractors' Plants

Allis-Chalmers-Bullock, Limited, Montreal.
Hopkins, F. H. & Co., Montreal.
Jenckes Machine Co., Sherbrooke, Que.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Williams A. R. Machinery Co., Toronto.

Conveying Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Babcock & Wilcox, Limited, Montreal.
Canada Foundry Co., Toronto.
Jeffrey Mfg. Co., Columbus, Ohio.
McDougall John, Caledonian Iron Works Co. Montreal.
Perrin, William R. & Co., Limited, Toronto.
Smart-Turner Machine Co., Hamilton, Ont.

Copper Materials

Greening, B. Wire Co. Hamilton, Ont.
Phillips, Eugene F. Electrical Works, Montreal.
Syracuse Smelting Works, Montreal.

Corrugated Iron

Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Covers

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Cranes (Electric and Hand Power)

Smart-Turner Machine Co., Hamilton, Ont.

Crayons

Lowell Crayon Co., Lowell, Mass.

Crucibles

Dixon, Joseph, Crucible Co., Jersey City, N.J.
Hamilton Facing Mill Co., Hamilton, Ont.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
Syracuse Smelting Works, Montreal.

Crucible Caps

Hamilton Facing Mill Co., Hamilton, Ont.
McCullough-Dalzell Crucible Co., Pittsburg, Pa

Cruicible Covers

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Cutter Grinding Machines

Becker-Brainard Milling Machine Co., Hyde Park, Mass.

Dashes

McKinnon Dash & Metal Works Co., St. Catharines, Ont.

Dies (Socket, Sewer Pipe and Tile)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Directories

Kelly's Directories, Limited, Toronto

Draw Benches (Wire)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Dredges

Allis-Chalmers-Bullock, Limited, Montreal.

Drill Chucks

Krug & Crosby, Hemilton, Ont.

Drills

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Petrie, H. W., Toronto.

Drills (Pneumatic and Rock)

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian Rand Drill Co., Sherbrooke, Que.
Jeffrey Mfg. Co., Columbus, Ohio.

Drop Forgings

Globe Machine & Stamping Co., Cleveland, Ohio

Drop Forging Dies

Globe Machine & Stamping Co., Cleveland, Ohio.

Dry Kiln Apparatus

Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Dust and Shavings Separators

Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Dye Stuffs and Chemicals

Benson, W. T. & Co., Montreal.
Brunner, Mond & Co., Northwich, England.
Canada Chemical Mfg. Co., London, Ont.
Cassella Color Co., New York City.
McArthur, Corneille & Co., Montreal.
Nichols Chemical Co. of Canada, Montreal.
Winn & Holland, Montreal.

DYNAMOS (See Motors and Dynamos)

Electric Meters and Transformers

Packard Electric Co., St. Catharines, Ont.

Electric Mine Locomotives

Canadian General Electric Co., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Jeffrey Mfg. Co., Columbus, Ohio.

Electric Transformers

Allis-Chalmers-Bullock, Limited, Montreal.

Electrical Repairs

Keystone Engineering Co., Toronto.

Electrical Supplies

Bristol Co., Waterbury, Conn.
Canadian General Electric Co., Toronto

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Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Electrical Construction Co., London, Ont.
Forman, John, Montreal.
Jones & Moore Electric Co., Toronto.
Keystone Engineering Co., Toronto.
Packard Electric Co., St. Catharines, Ont.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Elevators and Conveyors

Darling Bros., Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Jenckes Machine Co., Sherbrooke, Que.

Elevator Insurance

Canadian Casualty & Boiler Insurance Co., Toronto.

Emery and Emery Wheels

Forman, John, Montreal.
Hamilton Facing Mill Co., Hamilton, Ont.
Petrie, H. W., Toronto.

Engineers (Chemical)

Heys, Thomas & Son, Toronto.
Hunt, Robert W. & Co., Chicago, Ill.

Engineers (Civil)

Parke, R. J., Toronto.
Vogel, C. H., Ottawa.

Engineers (Consulting)

Aitken, K. L., Toronto.
Electrical Construction Co., London, Ont.
Fensom, C. J., Toronto.
Hunt, Robert W. & Co., Chicago, Ill.
Keystone Engineering Co., Toronto, Ont.
Marion & Marion, Montreal.
Parke, R. J., Toronto.
Perrin William R. & Co., Limited, Toronto.
Vogel, C. H., Ottawa.

Engineers (Contracting)

Babcock & Wilcox, Limited, Montreal.
Canada Foundry Co., Toronto.
Darling Bros., Montreal.
Electrical Construction Co., London, Ont.
Fensom, C. J., Toronto.
Keystone Engineering Co., Toronto.
McDougall, John, Caledonian Iron Works Co., Montreal.
Robb Engineering Co., Amherst, N.S.

Engineers (Electrical)

Aitken, K. L., Toronto.
Allis-Chalmers-Bullock, Limited, Montreal.
Canadian General Electric Co., Ltd., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Crocker-Wheeler Co., St. Catharines, Ont.
Electrical Construction Co., London, Ont.
Fensom, C. J., Toronto.
Jones & Moore Electric Co., Toronto.
Keystone Engineering Co., Toronto.
Marion & Marion, Montreal.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Engineers (Mechanical)

Allis-Chalmers-Bullock, Limited, Montreal.
Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
Electrical Construction Co., London, Ont.
Fensom, C. J., Toronto.
McDougall, John, Caledonian Iron Works Co., Montreal.
Hunt, Robert W. & Co., Chicago, Ill.
Kerr Engine Co., Walkerville, Ont.
Marion & Marion, Montreal.
Robb Engineering Co., Amherst, N.S.
Sheldons, Limited, Galt, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

Engineers (Mill and Hydraulic)

Fensom, C. J., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Vogel, C. H., Ottawa.

Engineers (Mining)

Heys, Thomas & Son, Toronto.
Mills, S. D., Toronto.

Engineers and Contractors

Jeffrey Mfg. Co., Columbus, Ohio.
Jenckes Machine Co., Sherbrooke, Que.
Smart-Turner Machine Co., Hamilton, Ont.

Engines and Boilers

Allis-Chalmers-Bullock, Limited, Montreal.
Babcock & Wilcox, Limited, Montreal.
Canada Foundry Co., Toronto.
Goldie & McCulloch Co., Galt, Ont.
Hopkins, F. H. & Co., Montreal.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Petrie, H. W., Toronto.
Robb Engineering Co., Amherst, N.S.
Sheldons, Limited, Galt, Ont.
Smart-Turner Machine Co., Hamilton, Ont.
Sturtevant, B. F. Co., Boston, Mass.
Williams, A. R. Machinery Co., Toronto.

Engravers

Canadian Manufacturer, Toronto.
Jones, J. L. Engraving Co., Toronto.

Exhaust Fans

Hamilton Facing Mill Co., Hamilton, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Exhaust Heads

Darling Bros., Montreal.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Hyde Park, Mass.

Exhausters

Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Hyde Park, Mass.

Factory Sites

(See Factory Locations, page 31.)

Feed Water Heaters

Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
McDougall, John, Caledonian Iron Works Co., Montreal.
Pittsburg Filter Mfg. Co., Pittsburg, Pa.
Robb Engineering Co., Amherst, N.S.
Smart-Turner Machine Co., Hamilton, Ont.

Feed Water Purifiers

Pittsburg Filter Mfg. Co., Pittsburg, Pa.

Files

Spence, R. & Co., Hamilton, Ont.

Fillet (Pattern)

Hamilton Facing Mill Co., Hamilton, Ont.
Sadler & Haworth, Montreal and Toronto.

Filters (Oil)

Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
McDougall, John, Caledonian Iron Works Co., Montreal.
Perrin William R. & Co., Limited, Toronto.

Filters and Filtering Systems (Water)

Babcock & Wilcox, Limited, Montreal.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Pittsburg Filter Mfg. Co., Pittsburg, Pa.

Financial

Bradstreet's, New York City.
Dun, R. G. & Co., Toronto.
Neff & Postlethwaite, Toronto.
Petrie, H. D., Hamilton, Ont.

Finials

Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Fire Brick and Clay

Dunbar Fire Brick Co., Pittsburgh, Pa.
Elk Fire Brick Co., St. Mary's, Pa.
Hamilton Facing Mill Co., Hamilton, Ont.
Harbison-Walker Refractories Co., Pittsburg, Pa.
Pennsylvania Fire Brick Co., Beech Creek, Pa.
Queen's Run Fire Brick Co., Lock Haven, Pa.
Stowe-Fuller Co., Cleveland, Ohio.

Fire Escapes

Darling Bros., Montreal.

Fireproof Partitions

Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Flour Mill Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Goldie & McCulloch Co., Galt, Ont.

Forges and Blowers

Canada Foundry Co., Toronto.
Hamilton Facing Mill Co., Hamilton, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Founders

Canada Foundry Co., Toronto.
Goldie & McCulloch Co., Galt, Ont.
Hamilton, Wm. Mfg. Co., Peterborough, Ont.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Robb Engineering Co., Amherst, N.S.
Smart-Turner Machine Co., Hamilton, Ont.

Foundry Facings and Supplies

Hamilton Facing Mill Co., Hamilton, Ont.

Fuel Economizers

Babcock & Wilcox, Limited, Montreal.
[illegible]

Furniture (Lodge, Opera and School)

Canadian Office & School Furniture Co., Preston.

Galvanizing

Ontario Wind Engine & Pump Co., Toronto.

Galvanizing and Tinning Machinery and Furnaces (Wire)

Turner, Vaughn & Taylor Co., Cuyahoga Falls.

Gas and Gasoline Engines

Economic Power, Light & Heat Supply Co., Toronto.
Morrison, T. A. & Co., Montreal.
Smart-Turner Machine Co., Hamilton, Ont.

Gauges (Recording Pressure)

Bristol Co., Waterbury, Conn.

Gauges (Steam)

Petrie, H. W., Toronto.
Williams, A. R. Machinery Co., Toronto.

Gauges (Water)

Babcock & Wilcox, Limited, Montreal.

Generating Sets

Sturtevant, B. F. Co., Hyde Park, Mass.

Generators

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian General Electric Co., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton.
Electrical Construction Co., London, Ont.
Forman, John, Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Jones & Moore Electric Co., Toronto.
Phillips, Eugene F., Electrical Works, Montreal.
Toronto & Hamilton Electric Co., Hamilton.

Gloves, Mittens and Moccasins

Storey, W. H. & Son, Acton, Ont.

Government Notices

Factory Inspectors.
Minister of Agriculture.

Graphite

Dixon, Jos. Crucible Co., Jersey City, N.J.
Hamilton Facing Mill Co., Hamilton, Ont.
McCullough-Dalzell Crucible Co., Pittsburg.

Hack Saws

Krug & Crosby, Hamilton, Ont.

Hames.

McKinnon Dash & Metal Works Co., St. Catharines.

Hardware

Butterfield & Co., Rock Island, Que.
Gartshore, John J., Toronto.
Globe Machine & Stamping Co., Cleveland.
Hopkins, F. H. & Co., Montreal.
Morrow John Machine Screw Co., Ingersoll.

Heating and Ventilating Apparatus

Darling Bros., Montreal.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Hoisting Engines

Allis-Chalmers-Bullock, Limited, Montreal.
Jenckes Machine Co., Sherbrooke, Que.

Hoists (Chain and Pneumatic)

Canadian Rand Drill Co., Sherbrooke, Que.
Hopkins, F. H. & Co., Montreal.

Hose (Fire and Pneumatic)

Gutta Percha & Rubber Mfg. Co., Toronto.

Hydrants

Kerr Engine Co., Walkerville, Ont.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.

Hydraulic Accumulators

Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Smart-Turner Machine Co., Hamilton, Ont.

Hydraulic Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Canada Foundry Co., Toronto.
Darling Bros., Montreal.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Perrin, William R. & Co., Limited, Toronto.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.

Hydro-Electric Plant

Allis-Chalmers-Bullock, Limited, Montreal.

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Insulated Wires and Cables

Phillips, Eugene F., Electrical Works, Montreal.

Iron and Steel Specialties

Armstrong Mfg. Co., Bridgeport, Conn.
Bourne-Fuller Co., Cleveland, Ohio.
Canada Foundry Co., Toronto.
Leslie, A. C. & Co., Montreal.
London Rolling Mill Co., London, Ont.
Lysaght, John, Limited, Bristol, England and Montreal.
Metallic Roofing Co., Toronto.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Pedlar People, Oshawa, Ont.
Petrie, H. W., Toronto.
Union Drawn Steel Co., Hamilton, Ont.

Injectors

Canada Foundry Co., Toronto.
Hamilton Brass Mfg. Co. Hamilton, Ont.
Williams A. R. Machinery Co., Toronto.

Iron and Steel Inspection

Hunt R. W & Co., Chicago, Ill.

Lamps—Electric

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian General Electric Co., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Forman, John, Montreal.
Packard Electric Co., St. Catharines, Ont.

Lathes

Petrie, H. W., Toronto.
Williams, A. R. Machinery Co., Toronto.

Lathes (Wood-working)

Goldie & McCulloch Co., Galt, Ont.
Petrie, H. W., Toronto.
Williams, A. R. Machinery Co., Toronto.

Linoleum

Dominion Oil Cloth Co., Montreal.

Lubricators

Hamilton Facing Mill Co., Hamilton, Ont.

Machinists

Goldie & McCulloch Co., Galt, Ont.
Krug & Crosby, Hamilton, Ont.
Robb Engineering Co., Amherst, N.S.
Smart-Turner Machine Co., Hamilton, Ont.

Machinists' Supplies

Armstrong Mfg. Co., Bridgeport, Conn.
Butterfield & Co., Rock Island, Que.
Goldie & McCulloch Co., Galt, Ont.
Gutta Percha & Rubber Mfg. Co., Toronto.
Hopkins, F. H. & Co., Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Morrow, John, Machine Screw Co., Ingersoll, Ont.
Petrie, H. W., Toronto.

Machine Tools

Becker-Brainard Milling Machine Co., Hyde Park, Mass.
Darling Bros., Montreal.
Petrie, H. W., Toronto.

Malleable Castings

McKinnon Dash & Metal Works Co., St. Catharines, Ont.
Smith's Falls Malleable Castings Co., Smith's Falls, Ont.

Marine and Stationary Engines and Boilers

Allis-Chalmers-Bullock, Limited, Montreal.
Jenckes Machine Co., Sherbrooke, Que.
Smart-Turner Machine Co., Hamilton, Ont.

Mechanical Draft

Babcock & Wilcox, Limited, Montreal.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Metal Doors

Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Metal Stamping

Globe Machine & Stamping Co., Cleveland, Ohio.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Metallurgists

Mills, S. D., Toronto.

Mill Machinery and Supplies

Allis-Chalmers-Bullock, Limited, Montreal.
Armstrong Mfg. Co., Bridgeport, Conn.
Becker-Brainard Milling Machine Co., Hyde Park, Mass.
Darling Bros., Montreal.
Gartshore, John J., Toronto.
Goldie & McCulloch Co., Galt, Ont.
Gutta Percha & Rubber Mfg. Co., Toronto.
Hamilton Brass Mfg. Co., Hamilton, Ont.
Hay, Peter Knife Co., Galt, Ont.
Hopkins, F. H. & Co., Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Jenckes Machine Co., Sherbrooke, Que.
Morrow, John, Machine Screw Co., Ingersoll, Ont.
McDougall, John, Caledonian Iron Works Co., Montreal.
McLaren, D. K., Montreal and Toronto.
Petrie, H. W., Toronto.
Robb Engineering Co., Amherst, N.S.
Sadler & Haworth, Montreal and Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Spence, R. & Co., Hamilton, Ont.

Milling Cutters and Machines

Becker-Brainard Milling Machine Co., Hyde Park, Mass.

Mining Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian Rand Drill Co., Sherbrooke, Que.
Gartshore, John J., Toronto.
Hamilton, Wm. Mfg. Co., Peterborough, Ont.
Hopkins, F. H. & Co., Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Jenckes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Perrin, William R. & Co., Limited, Toronto.
Petrie, H. W., Toronto.
Williams, A. R. Machinery Co., Toronto.

Motors and Dynamos

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian General Electric Co., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton, Ont.
Electrical Construction Co., London, Ont.
Forman, John, Montreal.
Jeffrey Mfg. Co., Columbus, Ohio.
Jones & Moore Electric Co., Toronto.
Keystone Engineering Co., Toronto.
Petrie, H. W., Toronto.
Sturtevant, B. F. Co., Hyde Park, Mass.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Moulding Sand

Hamilton Facing Mills Co., Hamilton, Ont.

Moulders Supplies.

Hamilton Facing Mill Co., Hamilton, Ont.

Municipal Filtration Plants (Water)

Pittsburg Filter Mfg. Co., Pittsburg, Pa.

Nickel

Canadian Copper Co., New York, N.Y.
Orford Copper Co., New York, N.Y.

Noxzles

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Office and Bank Fittings

Canadian Office & School Furniture Co., Preston, Ont.

Oils and Lubricants

Dixon, Jos. Crucible Co., Jersey City, N.J.
Hamilton Facing Mill Co., Hamilton, Ont.
Imperial Oil Co., Petrolea, Ont.
Queen City Oil Co., Toronto.

Oil Cloth

Dominion Oil Cloth Co., Montreal.

Paints and Colors

Berry Bros., Walkerville, Ont.
McArthur, Cornelle & Co., Montreal.

Paper Manufacturers

Barber, Wm. & Bros., Georgetown, Ont.
Toronto Paper Mfg. Co., Cornwall, Ont.

Patents

Budden, Hanbury A., Montreal.
Fetherstonhaugh & Co., Toronto.
Marion & Marion, Montreal.

Patterns (Wood and Iron)

Maxwell, David & Sons, St. Mary's, Ont.

Perforated Metals

Globe Machine & Stamping Co., Cleveland, Ohio
Greening, B. Wire Co., Hamilton, Ont.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Personal Accident

Canadian Casualty & Boiler Insurance Co., Tor

Phosphorizers

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Pig Iron

Bourne-Fuller Co., Cleveland, Ohio.
Canada Iron Furnace Co., Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S
Syracuse Smelting Works Montreal.

Pipe (Riveted, Iron and Steel)

Babcock & Wilcox, Limited, Montreal.
McDougall, John, Caledonian Iron Works Co., M
real.

Pipe Threading Machines

Armstrong Mfg. Co., Bridgeport, Conn.
Butterfield & Co., Rock Island, Que.
Petrie, H. W., Toronto.

Pipes and Tubes

Bourne-Fuller Co., Cleveland, Ohio.
Canada Foundry Co., Toronto.
Montreal Pipe Foundry Co., Montreal.

Plaster

Albert Mfg. Co., Hillsborough, N.B.

Plates

Bourne-Fuller Co., Cleveland, Ohio.
Nova Scotia Steel & Coal Co., New Glasgow, N.S

Plumbago

Hamilton Facing Mills Co., Hamilton, Ont.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Pneumatic Tools

Allis-Chalmers-Bullock, Limited, Montreal.
Canadian Rand Drill Co., Sherbrooke, Que.
Hamilton Facing Mill Co., Hamilton, Ont.

Pointer Rolls (For Rods and Wire)

Turner, Vaughn & Taylor Co., Cuyahoga Falls,

Power Plants—Equipments

Allis-Chalmers-Bullock, Limited, Montreal.
Babcock & Wilcox, Limited, Montreal.
Canadian General Electric Co., Toronto.
Canadian Westinghouse Co., Ltd., Hamilton, O
Darling Bros., Montreal.
Economic Power, Light & Heat Supply Co., To
Electrical Construction Co., London, Ont.
Goldie & McCulloch, Galt, Ont.
Gutta Percha & Rubber Mfg. Co., Toronto.
Jeffrey Mfg. Co., Columbus, Ohio.
Jones & Moore Electric Co., Toronto.
Keystone Engineering Co., Toronto.
McDougall, John, Caledonian Iron Works Co., M
real.
Packard Electric Co., St. Catharines, Ont.
Perrin, Wm. R. & Co., Limited, Toronto.
Petrie, H. W., Toronto.
Phillips, Eugene F., Electrical Works, Montreal
Robb Engineering Co., Amherst, N.S.
Sadler & Haworth, Montreal and Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Sturtevant, B. F. Co., Boston, Mass.
Toronto & Hamilton Electric Co., Hamilton, O

Presses (Tile, Sewer Pipe, Nozzles and Sleeves)

Turner, Vaughn & Taylor Co., Cuyahoga Falls,

Pulleys

Darling Bros., Montreal.
Goldie & McCulloch Co., Galt, Ont.
Jeffrey Mfg. Co., Columbus, Ohio.
McDougall, John, Caledonian Iron Works Co., M
real.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont

Producer Gas Plants

Economic Power, Light & Heat Supply Co., To

Pumps and Pumping Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Canada Foundry Co., Toronto.

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Darling Bros., Montreal.
Dowsie Pump Co., Downieville, Pa.
Goldie & McCulloch Co., Galt, Ont.
Jenekes Machine Co., Sherbrooke, Que.
Kerr Engine Co., Walkerville, Ont.
Morris Machine Works, Baldwinsville, N.Y.
McDougall, John, Caledonian Iron Works Co. Montreal.
Ontario Wind Engine & Pump Co., Toronto.
Petrie, H. W., Toronto.
Smart-Turner Machine Co. Hamilton, Ont.

Punches and Shears

Globe Machine & Stamping Co., Cleveland, Ohio.
Petrie, H. W., Toronto.

Purifiers

Babcock & Wilcox, Limited, Montreal.
Goldie & McCulloch Co., Galt, Ont.
McDougall, John, Caledonian Iron Works Co., Montreal.

Purifying and Softening Systems (Water)

Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
McDougall, John, Caledonian Iron Works Co., Montreal.

Railroads

Chicago & North-Western Ry., Toronto and St. Paul, Minn.

Railway Supplies

Algoma Steel Co., Sault Ste. Marie, Ont.
Allis-Chalmers-Bullock, Limited, Montreal.
Hartshore, John J., Toronto.
Greening, B. Wire Co., Hamilton, Ont.
Gutta Percha & Rubber Mfg. Co., Toronto.
Hopkins, F. H. & Co., Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Phillips, Eugene F. Electrical Works, Montreal.

Reamers

Butterfield & Co., Rock Island, Que.

Rivets

Bourne-Fuller Co., Cleveland, Ohio.
London Rolling Mills, London, Ont.

Rock and Ore Crushers

Allis-Chalmers-Bullock, Limited, Montreal.
Bradley Pulverizer Co., Boston, Mass.

Rolling Mill Engineers

Bourne-Fuller Co., Cleveland, Ohio.

Roofing

Bourne-Fuller Co., Cleveland, Ohio.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Rubber Goods

Gutta Percha & Rubber Mfg. Co., Toronto.

Rubber Packing

Gutta Percha & Rubber Mfg. Co., Toronto.

Rubber Washing Tubs

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Rural Mail Boxes

Goldie & McCulloch Co., Cleveland, Ohio.

Saddlery Hardware

McKinnon Dash & Metal Works Co., St. Catharines, Ont.

Safes and Vaults

Goldie & McCulloch Co., Galt, Ont.

Saw Mill Machinery

Allis-Chalmers-Bullock, Limited, Montreal.

Screws

Morrow, John, Machine Screw Co., Ingersoll, Ont.

Screw Plates

Armstrong Mfg. Co., Bridgeport, Conn.
Butterfield & Co., Rock Island, Que.

Second-Hand Machinery

Krug & Crosby, Hamilton, Ont.

Sewer Pipes.

Dominion Sewer Pipe Co., Swansea, Ont.

Shafting

Bourne-Fuller Co., Cleveland, Ohio.
Goldie & McCulloch Co., Galt, Ont.
Jeffrey Mfg. Co., Columbus, Ohio.
McDougall, John, Caledonian Iron Works Co., Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.

Shear Knives

Joy, Peter Knife Co., Galt, Ont.

Sheets (Iron and Steel)

Bourne-Fuller Co., Cleveland, Ohio.
Hamilton, A. C. & Co., Montreal.
Hoyland, John, Limited, Bristol, England, and Montreal.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Sheet Metal Goods

Globe Machine & Stamping Co., Cleveland, Ohio.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Sheet Metal Stamping

Globe Machine & Stamping Co., Cleveland, Ohio.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.

Shovels.

Hamilton Facing Mill Co., Hamilton, Ont.

Smoke Stacks

McDougall, John, Caledonian Iron Works Co., Montreal.
Robb Engineering Co., Amherst, N.S.
Smart-Turner Machine Co., Hamilton, Ont.

Solder

Globe Machine & Stamping Co., Cleveland, Ohio.
Syracuse Smelting Co., Montreal.

Special Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Globe Machine & Stamping Co., Cleveland, Ohio.
Krug & Crosby, Hamilton, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

Speed Recorders

Bristol Co., Waterbury, Conn.

Sprinkler Insurance

Canadian Casualty & Boiler Insurance Co., Toronto.

Stamps and Stencils

Globe Machine & Stamping Co., Cleveland, Ohio.

Steam Pumps

Allis-Chalmers-Bullock, Limited, Montreal.
Canada Foundry Co., Toronto.
Darling Bros., Montreal.
Goldie & McCulloch Co., Galt, Ont.
McDougall, John, Caledonian Iron Works Co., Montreal.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Williams, A. R. Machinery Co., Toronto.

Steam Separators

Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
Robb Engineering Co., Amherst, N.S.
Sheldons, Limited, Galt, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

Steam Shovels

Allis-Chalmers-Bullock, Limited, Montreal.

Steam Specialties

Darling Bros., Montreal.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Hyde Park, Mass.

Steam Valves

Babcock & Wilcox, Limited, Montreal.
Darling Bros., Montreal.
Kerr Engine Co., Walkerville, Ont.
Petrie, H. W., Toronto.
Williams A. R. Machinery Co., Toronto.

Steel Rails

Algoma Steel Co., Sault Ste. Marie, Ont.
Drummond, McCall & Co., Montreal and Toronto.
Hartshore, John J., Toronto.
Hopkins, F. H. & Co., Montreal.

Steel Shafting

Darling Bros., Montreal.
Goldie & McCulloch Co., Galt, Ont.
Leslie, A. C. & Co., Montreal.
McDougall, John, Caledonian Iron Works Co., Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

Stocks and Dies

Armstrong Mfg. Co., Bridgeport, Conn.
Butterfield & Co., Rock Island, Que.
Petrie, H. W., Toronto.

Stoppers

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Structural Steel

Bourne-Fuller Co., Cleveland, Ohio.
Canada Foundry Co., Toronto.
Hopkins, F. H. & Co., Montreal.

Sulphate of Alumina

Nichols Chemical Co. of Canada, Montreal.

Suspension Furnaces

Continental Iron Works Co., New York City.

Switchboards

Allis-Chalmers-Bullock, Limited, Montreal.

Systematizers

Viau, Henri, Montreal.

Tanks (Oil and Water)

Canada Foundry Co., Toronto.
Goldie & McCulloch Co., Galt, Ont.
Jenekes Machine Co., Sherbrooke, Que.
McDougall, John, Caledonian Iron Works Co., Montreal.
Ontario Wind Engine & Pump Co., Toronto.

Taps and Dies

Butterfield & Co., Rock Island, Que.
Globe Machine & Stamping Co., Cleveland, Ohio.

Tees

Bourne-Fuller Co., Cleveland, Ohio.
Canada Foundry Co., Toronto.

Textile Manufacturers

Dominion Oil Cloth Co., Montreal.
Storey, W. H. & Sons, Acton, Ont.

Thermometers (Recording)

Bristol Co., Waterbury, Conn.

Tin

Leslie, A. C. & Co., Montreal.
Syracuse Smelting Works, Montreal.

Tool Steel

Bourne-Fuller Co., Cleveland, Ohio.
Hopkins, F. H. & Co., Montreal.
Leslie, A. C. & Co., Montreal.

Trucks

Hopkins, F. H. & Co., Montreal.
McDougall, John, Caledonian Iron Works Co., Montreal.
Sheldons, Limited, Galt, Ont.

Trucks (Railway)

Canada Foundry Co., Toronto.

Trucks (Wire Mill Supplies)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Tubs (Cleaning and Coating Wire)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Tumbling Barrels

Globe Machine & Stamping Co., Cleveland, Ohio.
Petrie, H. W., Toronto.
Smart-Turner Machine Co. Hamilton, Ont.

Turbines

Allis-Chalmers-Bullock, Limited, Montreal.
Canada Foundry Co., Toronto.
Jenekes Machine Co., Sherbrooke, Que.

Upright Drills

Krug & Crosby, Hamilton, Ont.

Valves

Babcock & Wilcox, Limited, Montreal.
Canada Foundry Co., Toronto.
Hamilton Brass Mfg. Co., Hamilton, Ont.
Kerr Engine Co., Walkerville, Ont.
Petrie, H. W., Toronto.
Smart-Turner Machine Co., Hamilton, Ont.
Williams, A. R. Machinery Co., Toronto.

Valves (Rubber)

Gutta Percha & Rubber Mfg. Co., Toronto.

Varnishes

Berry Bros., Walkerville, Ont.

Ventilators

Darling Bros., Montreal.
Metallic Roofing Co., Toronto.
Pedlar People, Oshawa, Ont.
Sheldons, Limited, Galt, Ont.
Sturtevant, B. F. Co., Boston, Mass.

Wagon and Carriage Wood Work

Hore, F. W. & Son, Hamilton, Ont.

Washers or Hollinders (Cleaning Rubber)

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Water Power Development

Vogel C. H., Ottawa.

Water Purifying Chemicals

Canada Chemical Mfg. Co., London, Ont.

Water Softening Plants

Pittsburg Filter Mfg. Co., Pittsburg, Pa.

Wheelbarrows.

Hamilton Facing Mill Co., Hamilton, Ont.

Windmills

Ontario Wind Engine & Pump Co., Toronto.

Wire Mill Supplies

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Wire and Wire Rope

Dominion Wire Rope Co., Montreal.
Greening, B. Wire Co., Hamilton, Ont.
Leslie, A. C. & Co., Montreal.
Phillips, Eugene F. Electrical Works, Montreal.

Wire Rope Fittings

Dominion Wire Rope Co., Montreal.

Wire Cloth

Greening, B. Wire Co., Hamilton, Ont.

Wire Drawing Machinery

Turner, Vaughn & Taylor Co., Cuyahoga Falls, Ohio.

Wood-Working Machinery

Goldie & McCulloch Co., Galt, Ont.
Petrie, H. W., Toronto.
Sheldons, Limited, Galt, Ont.
Williams, A. R. Machinery Co., Toronto.

Zinc

Leslie, A. C. & Co., Montreal.
Syracuse Smelting Works, Montreal.

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