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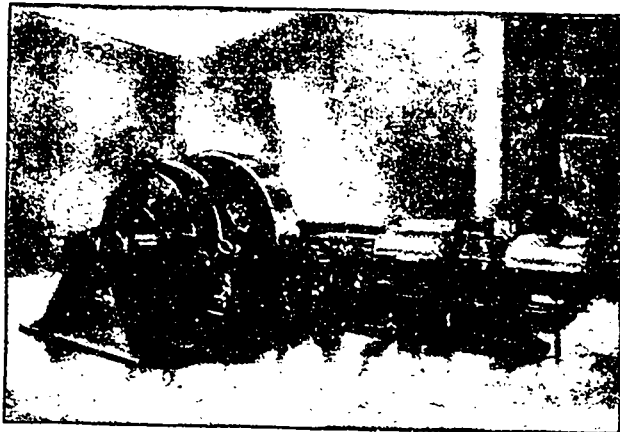
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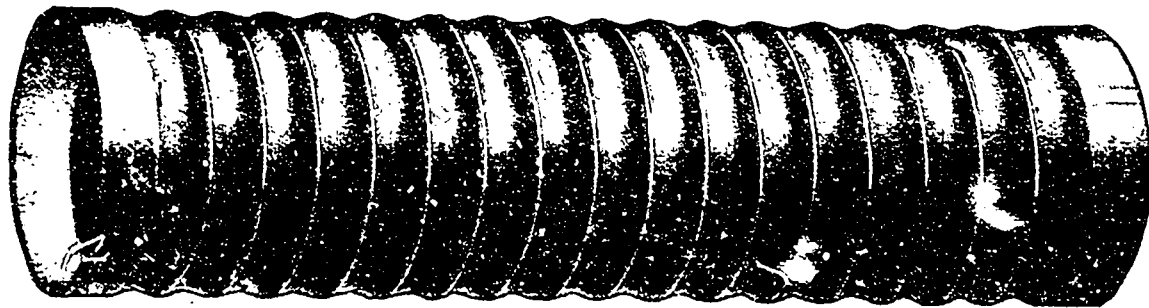
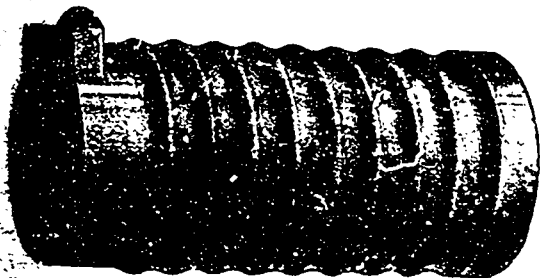
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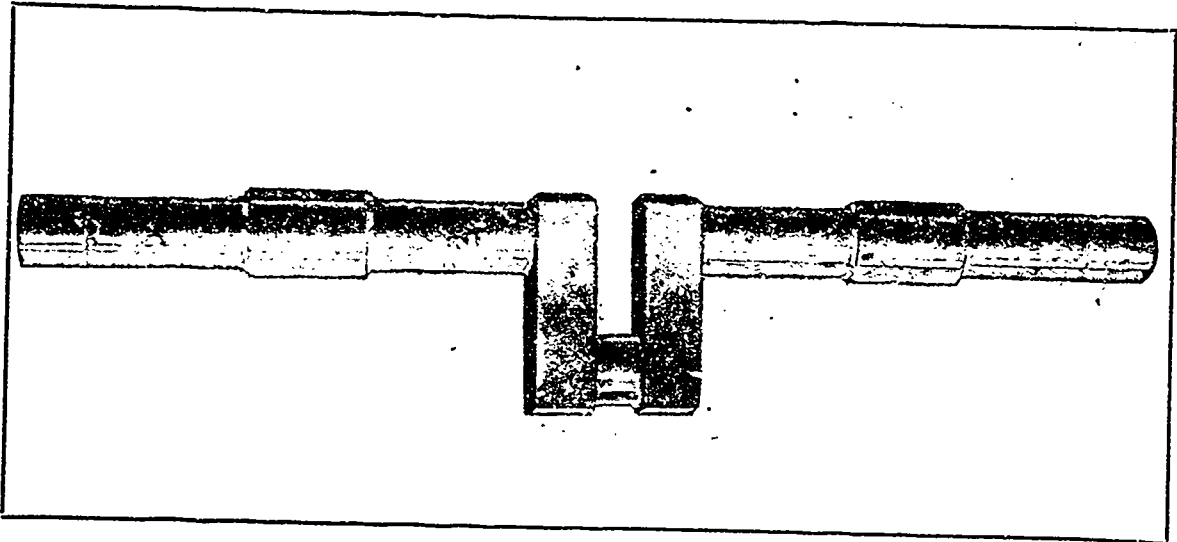
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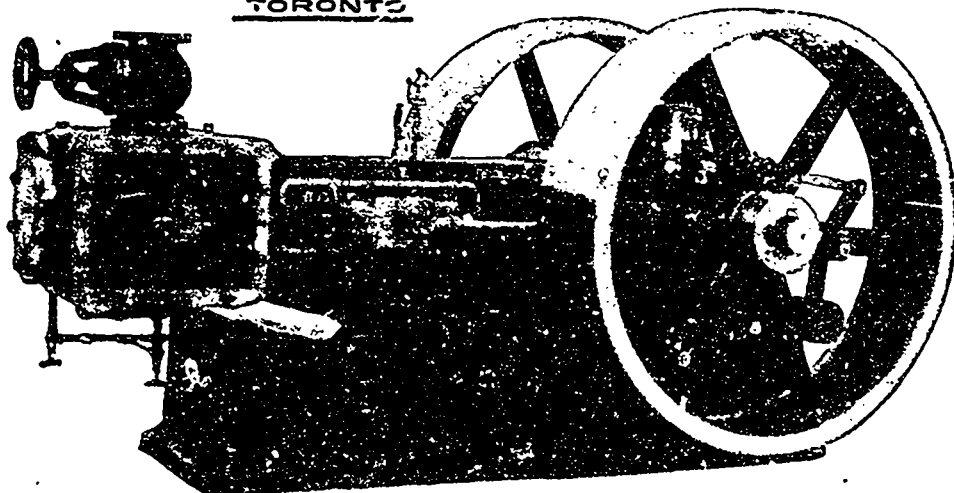
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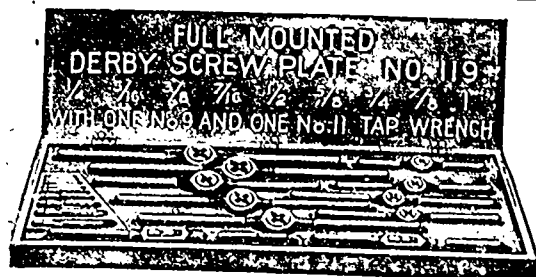
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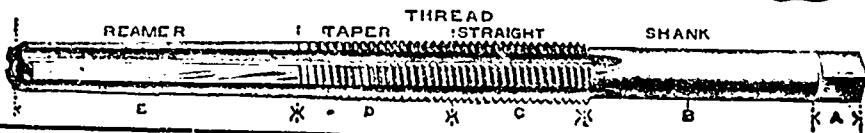
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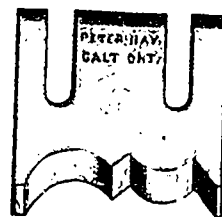
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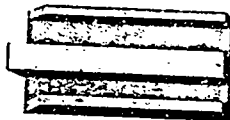
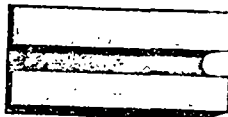
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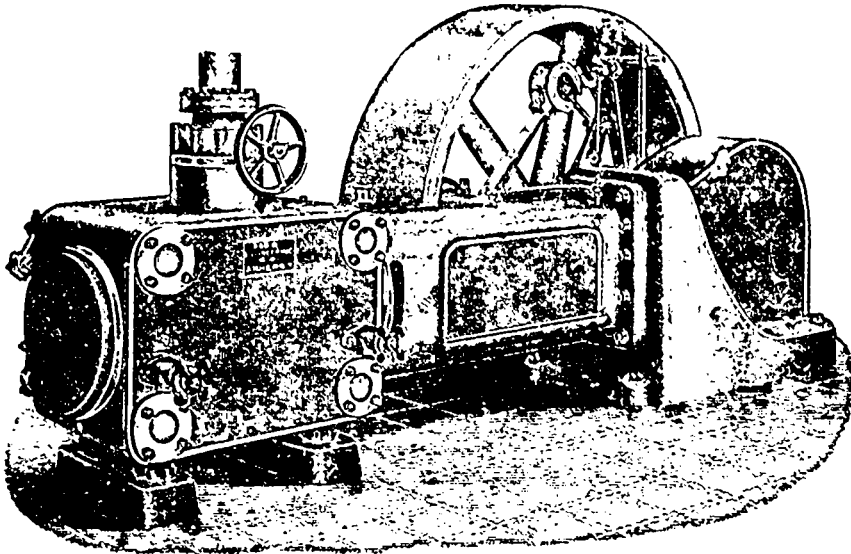
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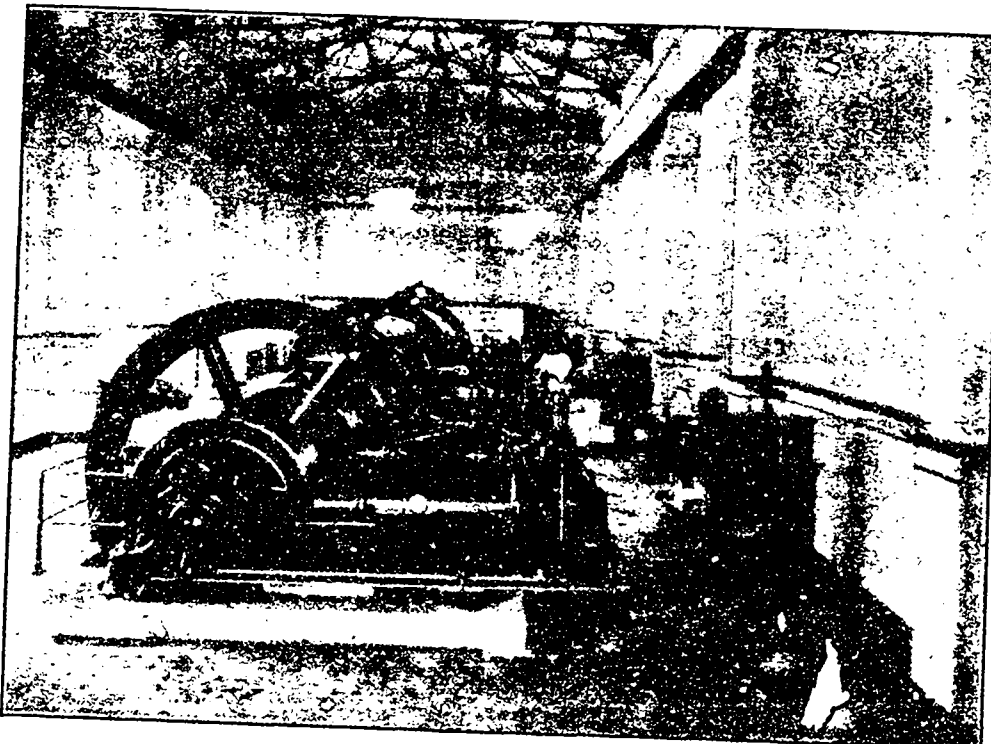
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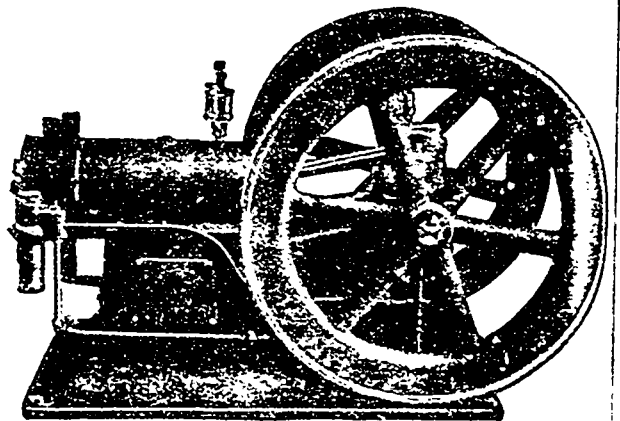
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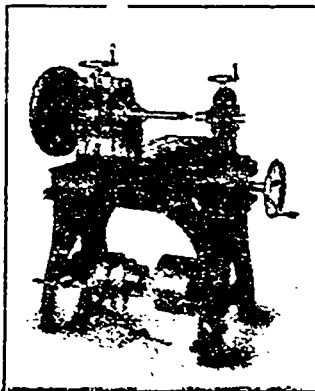
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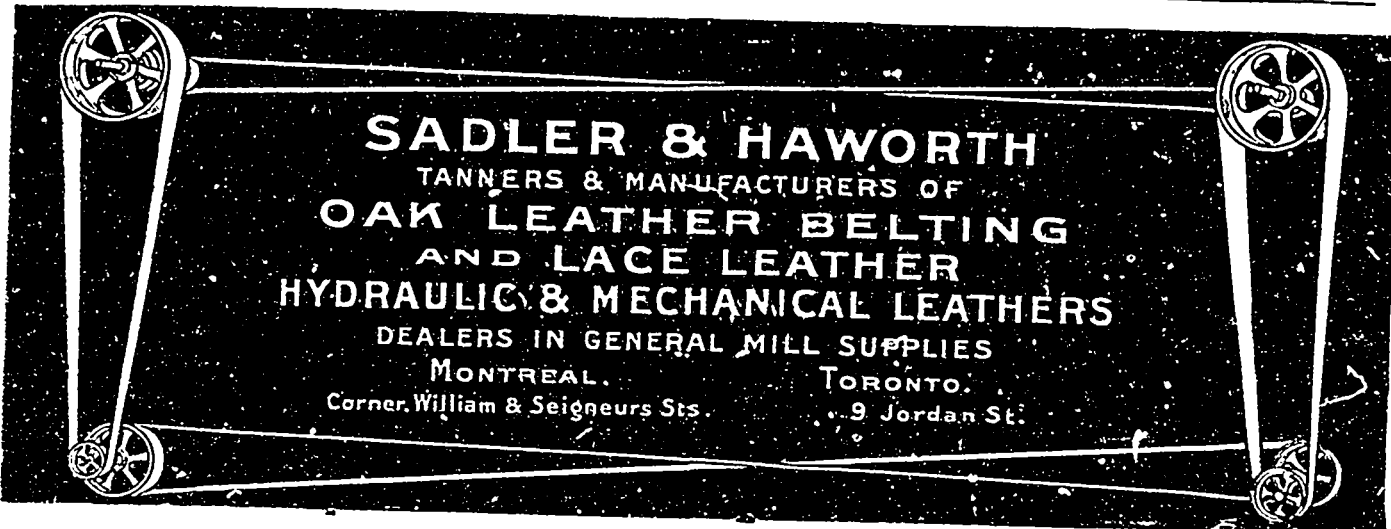
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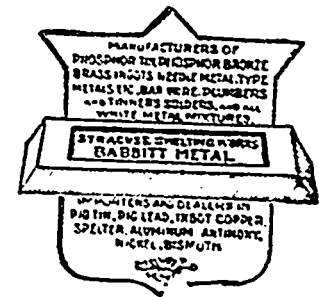
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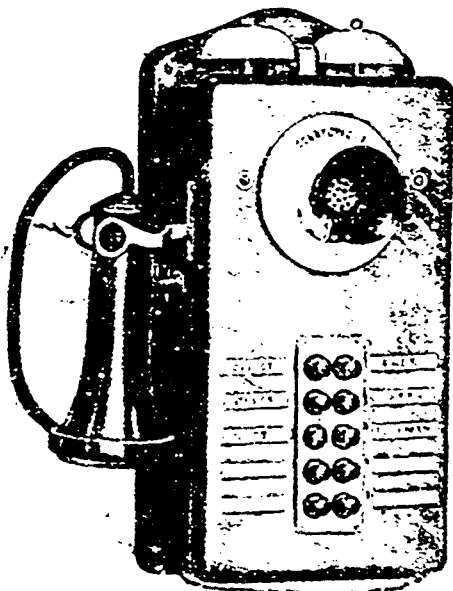
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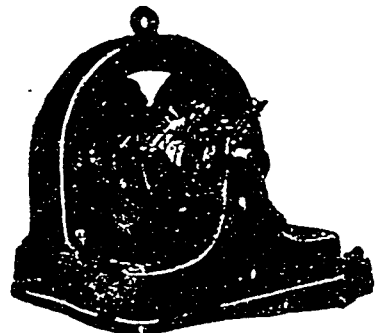


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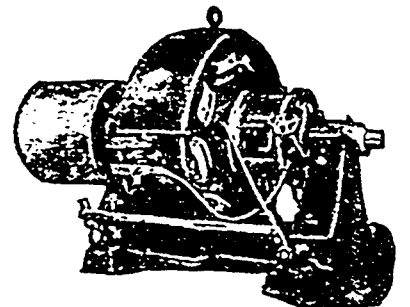
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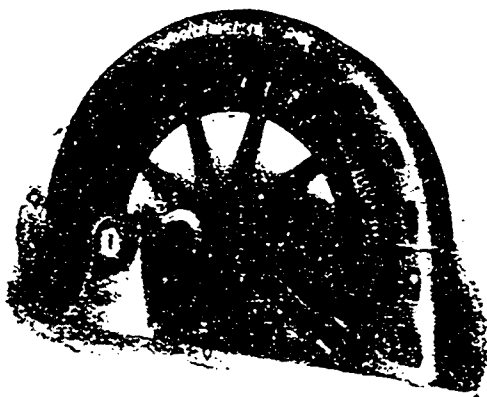
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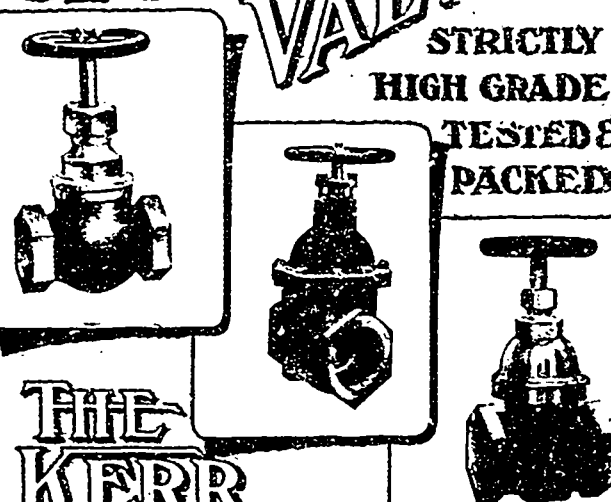
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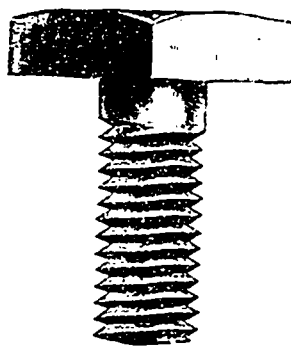
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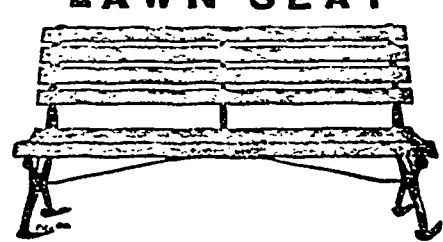
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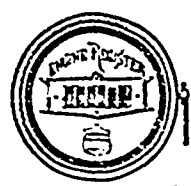
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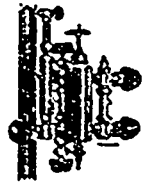
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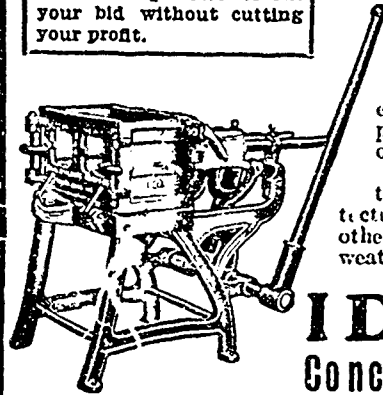
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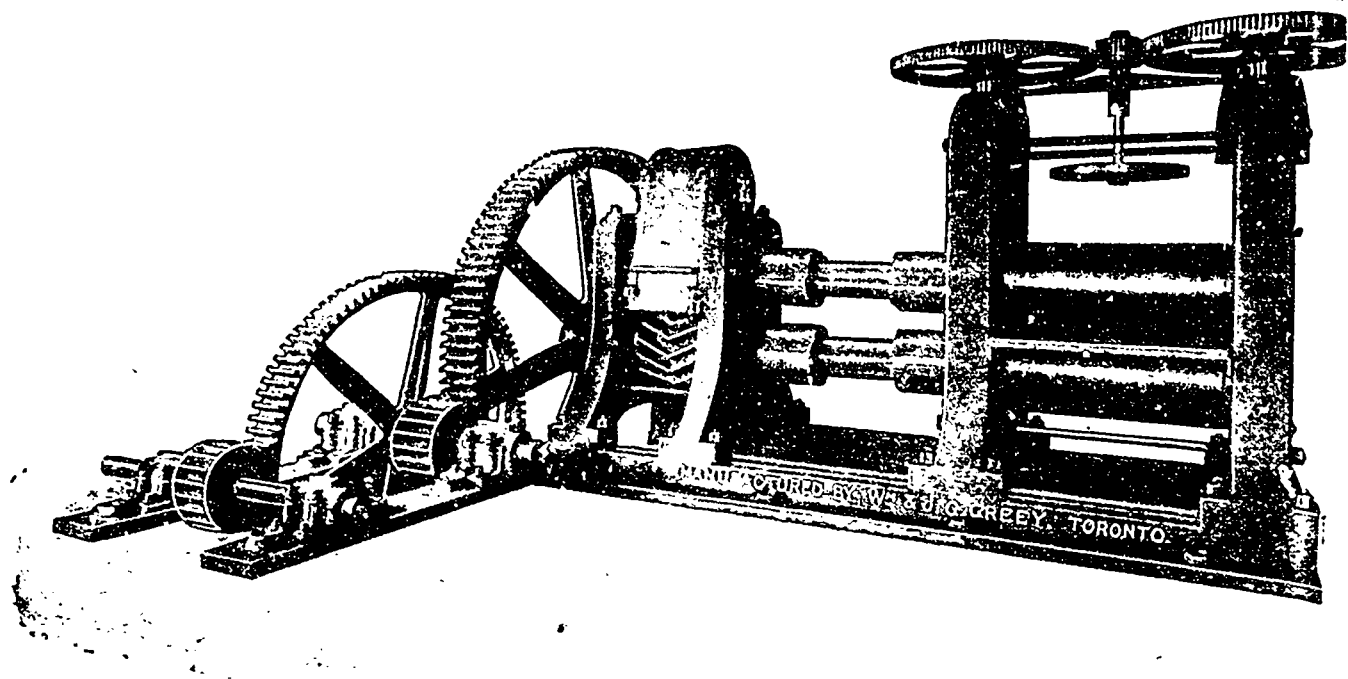
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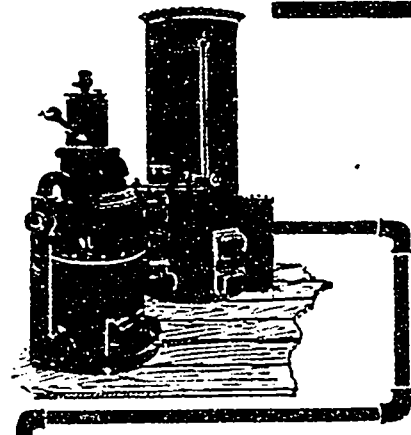
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The Canadian Manufacturer Publishing Co., Limited.

McKinnon Building, Cor. Melinda and Jordan Sts., Toronto.

J. J. CASSIDEY, - - - Editor.

D. O. MCKINNON, - - - Business Manager.

Montreal:—E. J. Chavo, 439 Grosvenor St.

Cable address. "CANAMAN." Western Union Telegraphic Code used.

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THE KINGDOM OF HEAVEN.

"The Kingdom of Heaven is likened unto a man who sowed good seed in his field but while men slept his enemy came and sowed tares among the wheat and went his way."

Sir John A. Macdonald and the statesmen who were associated with him, and the Old Guard of the Manufacturers' Association, who so nobly and effectively assisted them in the formation and carrying into effect of the National Policy of tariff protection to Canadian manufacturing industries, may well be likened to the man who sowed good seed, as indeed they did. For many years, during all the time the National Policy was the leading and most prominent feature in the financial affairs of Canada, the manufacturing industries were in a most flourishing condition. Under the "tariff for revenue only" which had previously prevailed, the mechanical industries of the country were suffocated and throttled, and the best that could be said of Canada was that it was a hewer of wood and a drawer of water for other countries. With the advent of the National Policy this condition became changed, and a feeling of hopefulness and cheerfulness has ever since pervaded the land, to which it had previously been a stranger. Of course there were those who thought differently regarding the policy; those who thought with Cobden and Bright and the other free trade advocates of Great Britain; those who contended that if free trade was a good thing for Great Britain it must, of course, be an equally good thing for Canada, and that because certain manufactured articles could be produced at less cost abroad than at home, the importation of foreign products should be encouraged, and that no tariff encouragement should be extended to the home manufacturers.

It might reasonably be expected that the home manufacturers would be the quickest and most active ones to

fight such free trade sentiments, and that the Association that so loudly proclaims itself to be the great and only champion of the manufacturers should be instant in season and out of season in seeing where and when and how the enemies of protection were sowing the tares of free trade. But not so. The managers of the Association have slept and are sleeping upon the watch towers while their enemies sow tares among their wheat. These managers delight in busying themselves about almost every conceivable thing into which they may intrude their individuality, but do not interest themselves in defending and upholding the very and only thing that enabled them to be what they are. Excursions hither and thither are a favorite amusement, and nothing in life seems to be so delightful as in seeing their names in print. They are, like the Yankee patriot, who was quite willing to sacrifice every one of his wife's relations in his country's wars. For the sake of showing their patriotic devotion to the Imperial sentiment they even propose to sacrifice Canada's best interest by giving a tariff preference to the Mother Country. They are asleep to their true interests, and to the interests of the great mass of manufacturers; and while they sleep their enemies sow the tares of free trade. Long before the introduction of the National Policy the free trade enemy had active organizations that have never yet gone out of business. Fertile in resources, the enemy leave nothing undone, no stone unturned to defeat protection. They are at it all the time, but who ever hears of these special champions, so called, of the interests of Canadian manufacturers instituting series of addresses to the voters of the country, proclaiming the advantages of protection. There are some fifteen or twenty thousand manufacturing concerns in Canada, only about two thousand of whom are members of the Association, and only a coterie of the Association pretend to represent the entire manufacturing interests of Canada. Let manufacturers in the Association and out of it, ask themselves if this is not so? Who, now-a-days, raise their voices to protect protection? Who interest themselves in combatting free trade arguments either in lunch rooms, on festive occasions, on excursion parties, in Parliament or out of it? What good has resulted from the expenditure of the large "educational fund" raised at the Halifax Convention, except a couple of small gum stickers intended to be displays of Canadian loyalty on private correspondence?

He who would be free himself must strike the blow. It behooves Canadian manufacturers generally to ask themselves if they should not do for themselves what now others are doing for them—to do something to defend and protect the protection upon which they so much depend.

THE SMOKE NUISANCE.

The City of Toronto has a by-law which reads as follows:

"For compelling manufacturers and others to have such chimneys or other apparatus as shall consume the smoke or prevent the same from fouling the atmosphere or being carried by the wind or otherwise to other shops, houses or premises to the inconvenience or injury of the neighboring premises or residents therein."

It will be noticed that this by-law prohibits only the fouling of the atmosphere or injury to property; but up to this time it has been found impossible to secure a conviction under it. And no wonder. It demands an impossible thing, for as yet no mechanical appliance has yet been invented, or at least put into practical use which would prevent smoke where bituminous coal is being burned. The emission of smoke from the chimneys of factories is impossible, and a by-law to prevent the clouds from darkening the sky would be just as practical and effective as a by-law to prevent smoke.

But the Property Commissioner and the Board of Control of the City of Toronto think differently, and a new by-law has been prepared which they think will be workable and which they will request the Legislature to substitute for the old one. The caption of it is as follows:

"For compelling the owner, lessee, tenant, agent, manager or occupant of any premises, steam engine, locomotive or steamboat, in which a fire is burned, and every person who operates, uses or causes or permits to be used, any furnace or fire within the limits of the city, to prevent the emission to the atmosphere from such fire, of opaque or dense smoke, for a period of more than six minutes in any one hour. The point at which such emission shall be determined, shall be that point at which the smoke is discharged from the opening, flue, stack or chimney, to the atmosphere. Nothing herein contained shall apply to private dwelling houses, except they are apartment houses of a greater height than three storeys and basement."

It won't work. The Commissioner had better discover if possible an apparatus that will work, and let his knowledge become known, otherwise his labor will be in vain, except to give annoyance to manufacturers, with an ultimate result of driving some of them away from the city.

CHANGES IN THE ONTARIO COMPANIES ACT.

Mr. Hanna, the Provincial Secretary for Ontario, will introduce at the present session of the Legislature a measure consolidating and amending the Ontario Companies Acts, which in many respects is of a most sweeping character. Mr. Thomas Mulvey, K.C., Assistant Provincial Secretary, who assisted Mr. Hanna in drawing up the new bill, pointed out that the bill is divided into distinct portions, each relating to a branch of company law, and it is expected that this will be a decided benefit to legal practitioners and others having to refer to the act in the course of their business. It provides for the incorporation not only of joint stock companies, but of corporations not having capital divided into shares, including many companies which had formerly to seek incorporation in the shape of private bills passed by the Legislature. A uniform system of incorporation is also provided for.

Under the present law joint stock companies are incorporated under the Ontario Companies Act by the machinery of the Provincial Secretary's Department; provident and benevolent societies are incorporated after a reference to the County Judge by filing papers with the Clerk of the Peace, butter and cheese companies are incorporated by filing a declaration with the Registrar

of Deeds; and other acts make provision for the incorporation of other classes of companies. These acts are swept away by the new measure, and companies of all kinds will be incorporated by the machinery of the Provincial Secretary's Department alone.

One very important clause which will be embodied in the new measure as it is introduced to the Legislature will provide that any company getting from a municipality a public utility franchise, must lay its scheme before and secure for it the approval of the Railway and Municipal Board before a provincial charter will be granted. This is aimed principally to prevent the giving of perpetual franchises or other improvident bargains to municipalities.

Another advanced step is the empowering of the Provincial Secretary to have an investigation made at the time of the books of any company operating a public utility, with the exception of street railway companies which come under the jurisdiction of the Railway and Municipal Board.

There is another sweeping change relating to companies incorporated to operate municipal franchises and public utilities, including river improvements and harbor companies, as well as lighting and other companies. The statutes at present provide a separate act for each of these classes of companies. The bill embodies all the provisions of all of the acts which relate to a company as a company.

Every company incorporated in Ontario will have to make an annual return of the most extensive kind to the Provincial Secretary's Department. These returns show, for instance, what shares are issued for cash, what for property, details of preference stock, and amount of bonds and debentures. The annual meeting of the meeting of shareholders must be of a more detailed nature than now. It is required to show to the shareholders the standing of the company with regard to the following items: Cash debts owing to the company from its customers, debts owing to the company by its directors or officers, stock in trade, expenditures on account of future business; land, buildings, and goodwill, franchise, patents and copyrights, trade marks, leases, contracts and licenses; debts owing by the company secured by mortgage or other lien upon the property of the company; debts owing by the company but not secured; amount received on common shares; amount received on preferred shares, and indirect and contingent liabilities. It is also provided that every shareholder attending a meeting and asking for a copy of this statement shall be entitled to receive one. The bill further enacts that the books of every company shall be audited annually, in addition to the audit by the auditor appointed in the usual way, by an auditor appointed by the shareholders. If no auditor is appointed the Provincial Secretary on the application of any shareholder may appoint one.

Provision is made with a view to attempting to prevent what is now one of the most fruitful sources of litigation.

company formation, namely, the launching of concerns without adequate capital, often a result of bad management, and sometimes a condition deliberately sought. The prospectuses, which all companies offering shares to the public must first file with the department, shall set out the minimum subscription upon which the company may be launched, and no allotment of shares can be made until that subscription has been reached. The company cannot enter into a contract, or, if it does, the contract is only provisional, and the company cannot do business until the Provincial Secretary gives a certificate that it is entitled to commence business.

The new act wipes out the exceptions to the responsibility of directors of companies for untrue statements made in prospectuses of companies, and makes them liable for all statements so made, whether true or false, and from whatever source obtained.

PER CAPITA TRADE.

On the opening of the Dominion Parliament in November, discussing the "Speech from the Throne" made by His Excellency the Governor General, Sir Wilfrid Laurier, the premier, speaking in approbation thereof, and of the prosperity of the country, said that with the exception of a small section of the country in the Lower St. Lawrence, every part of Canada was blessed with an abundant harvest, and the prices were remunerative, in some commodities almost extravagantly so. Under such circumstances it was not to be wondered at that our trade increased by leaps and bounds. On July 1 last it reached the \$500,000,000 mark, and it was on a fair way to the goal of \$600,000,000. He compared the trade per head of Canada with that of other civilized countries as giving better indication of the extent of Canada's prosperity. Great Britain, the mother of trade, as it is the mother of freedom, has a trade of \$100 per head; Germany has \$50 per head; the United States, large and prosperous as it is, has a trade of \$40 per head, while Canada's trade is \$90 per head of population.

The fair inference from what Sir Wilfrid said was that Great Britain, the mother of free trade, is the most prosperous of civilized countries, because of the fact that her foreign trade amounts to \$100 per capita of population, while the trade of the United States, probably the most ultra protectionist country, large and prosperous as it is, has a trade of only \$40 per head. Canada, while not a free trade country as Great Britain is, nor as ultra protectionist as the United States is, has a trade of \$90 per head, which is nearly as much as that of Great Britain, and much more than that of the United States.

If the facts are intended to be taken in favor of free trade we fail to observe the acuteness of the point. Long before the industrial existence of either the United States or Canada, Great Britain was a great manufacturing country. Because it was a powerful nation, having attained its greatness under a more severe system of protection than ever characterized any other nation, it did all it could even by force of arms to suppress and prevent the development of manufacturing enterprises in any of her possessions, including her then American

colonies, and what is now the United States might even now have been true and loyal to the crown had it not been for British oppression, which included the desire to be and remain the producer of manufactured products for all the world, all the world being the producers of the raw materials. And now, after all these many years of success as a manufacturing nation, Great Britain stands only 10 per cent. higher as a world trader, under free trade, than Canada that has not yet rounded out two score years of commercial existence.

Sir Wilfrid seems to think it remarkable that Great Britain, with 40,000,000 inhabitants, should do a world trade of \$100 per capita, while the United States, with more than double that population, should be unable to do more foreign trading than \$40 per capita, and therefore not in nearly as good industrial condition as the Mother Country. Has Sir Wilfrid ever considered the social conditions of the inhabitants of the two countries? In Great Britain among the tillers of the soil a most profound depression has prevailed, growing worse year by year ever since the days of John Bright and Richard Cobden. Since those days no year has passed but fewer acres of land were in cultivation than in the previous year. No farmer owns the land upon which he lives—it is all the property of the landed proprietors, who are fattened from the rents wrung from the tillers of the soil. Unable to compete with the cheaper products of the virgin soil of newer countries, admitted duty free—under free trade—large cities and manufacturing districts are congested with the rural classes driven from their homes, hence the pauperism and crime now so prevalent there; and hundreds of thousands of born Britishers are now valuable citizens of the United States and other countries, all because of free trade. Under it the poor have become poorer, while the rich are rolling in greater wealth than ever before.

Sir Wilfrid tells us that the foreign trade of the United States amounts to only \$40 per capita—does he know the reason why? Protection. The masses in the United States, to a large extent, live upon the land, and they own it, and it requires more than 90 per cent. of all that the agricultural and industrial classes there can produce to satisfy the wants of their own country, and the \$40 per capita that Sir Wilfrid speaks of represents the export of the surplus of their production that cannot be consumed at home, while the imports, as a general thing are of articles that cannot be produced to good advantage at home, or the requirements of the wealthy for luxuries.

Sir Wilfrid should understand that when the conditions in Canada more nearly approach those of the United States, as our population increases and our manufacturing industries are more fully developed, our foreign trade will be greatly reduced from \$90 per capita, and the sooner the advent of that time the better for Canada.

EXPORT DUTY ON ELECTRIC POWER AND NATURAL GAS.

The details of the bill providing for an export duty on electric power, petroleum and natural gas, which the minister of justice is introducing in parliament is wider in its scope and more stringent in its terms than was at first intended.

At one time it was to be confined to power, but the complaints, which came from the Windsor and Essex region, that natural gas was being exported to Cleveland and other United States points to the detriment of Canadians, caused the government to include gas and petroleum in the provisions of the bill. It is a radical movement, and accomplishes with one blow what others have been endeavoring to do in a variety of ways in the Ontario legislature for some years past.

The act will be simple in its operation. All companies, either power, petroleum or natural gas, must have a license. They cannot commence operations either by laying wires or pipes without first obtaining a license. All companies will be subject to an export duty on whatever is exported, but the minister of justice can relieve any company from paying the tax. To obtain this relief it will be necessary on the part of the company to supply its Canadian customers with a specified quantity of either fluids at a reasonable price. If this is not done the license cannot be obtained. If any company discontinues supplying its Canadian customers the license can be cancelled at will by the minister. For every day that a company will export fluid without a license there is a penalty not exceeding \$5,000 and not less than \$1,000. There is a similar penalty provided against any company that will begin operations in laying wire or pipe without first securing a license.

The minister of justice has the sole power of putting the machinery of the act into operation by merely publishing in the Canada Gazette any decision that he has arrived at, and the governor general in council can make such regulations from time to time as is deemed requisite for the successful carrying out of the law. The minister can not only impose a fine, but he can confiscate and destroy the company's property for contraventions of the act.

Two of the existing companies on the Canadian side at Niagara Falls make no pretence to supply Canadian consumers. If they do not do so the act will put them out of business. In the meantime their whole market is in Buffalo. The Pellatt Company disposes of its power in Toronto, and that is what is expected of all companies, to a limited extent. It is charged against natural gas companies that they are in the business largely for supplying the United States market, and they also will have to conform to the law. The Standard Oil Co. has large interests in the Petroleum and Sarnia oil fields and that gigantic institution will have to conform to the provisions of the new act.

HON. GEORGE W. ROSS, SENATOR.

The transfer of Hon. G. W. Ross, late leader of the Opposition in the Legislature of Ontario, to the Senate of Canada is a matter that gives us opportunity to allude to some of the services he rendered his province during the time he was premier of it. His advent into public life was as member of the Dominion House of Commons, to which he was elected to represent the constituency of West Middlesex in 1872. Two years later he was elected to the Commons by acclamation, and in 1878 and

1882 by public vote. In 1883 he was sent to the Legislature and in December of that year he became Minister of Education of the province under Sir Oliver Mowat. Under his administration of that department great impulse was given to the work of education, and as a result school premises were made more comfortable and more sanitary. High schools were enlarged and equipped with apparatus and libraries, technical and art schools were instituted for the benefit of artisans, and mining schools for those interested in mining. Under his auspices Ontario assumed the premier position in Canada in all educational matters.

In 1899 Mr. Ross succeeded to the Premiership on the retirement of the late Mr. Hardy. Of the various public measures that occupied his attention during those five eventful years the most important were the new assessment act, to which the Hon. Mr. Gibson gave so much of his time and ability; the act for the improvement of the public highways, by which \$1,000,000 were set apart for the betterment of transportation in rural districts, and the act enabling municipalities to unite for the purpose of utilizing energy of Niagara Falls in producing and transmitting electricity.

While Mr. Ross may be remembered longest in the business community as the man who during his Premiership pushed a railway into the northland of Ontario that laid bare the riches of Cobalt, it was as a resourceful Minister of Education that he most signally served the people. The mere recital of a few of the more important changes in Ontario's educational system during his administration as Minister and Premier shows how vast has been the advance since 1883. We mention some of them:

Established kindergartens as part of the public and separate school systems. Number of kindergartens in 1904, 129; number of teachers, 255; number of pupils, 12,021.

Introduced household science and manual training in the school system.

Placed the study of Canadian history, drawing, temperance and hygiene on the list of obligatory subjects of the public school course.

Authorized a new series of text-books in every subject on the public school course.

Provided for the manufacture of all text-books used in public, separate and high schools in Canada. In 1883 out of a total of 184 text-books in use in Ontario schools 87 were imported from Great Britain or the United States. In 1904 only the printed sheets of one text-book were imported.

Secured the production of all text-books by Canadian authors, with only one exception. In 1883 out of a total of 184, 135 were by American or British authors.

Established county model school libraries.

Established district model schools.

Provided for libraries in public schools for the use of the pupils.

Provided for libraries in teachers' institutes.

Changed mechanic institute libraries to public libraries.

Established art schools.

Erected and opened an additional normal school at London, making the number three instead of two, as in 1883. Cost \$100,798.

Enlarged the Normal School in Toronto and rebuilt the Model School and extended the Normal School proper for the better accommodation of the department of household science and manual training and other improvements—cost \$213,000.

Enlarged the Normal School of Ottawa by providing a new public hall and department for household science and the normal kindergarten—cost \$110,000.

Established a department for the training of kindergarten teachers in the Normal Schools.

Established courses of instruction in household science and manual training in the Normal Schools.

Opened a gallery for the exhibition of the work of Canadian artists in the departmental buildings, Toronto.

Established the department of Canadian archaeology and appointed curator. (The collection of Indian relics made by the curator ranks among the best on the continent.)

Founded the Ontario Historical Society, with headquarters at the Education Department.

Collected for the use of the Normal School students and others specimens of the flowers of Ontario.

A similar collection of the birds of Ontario scientifically classified and arranged.

Enlarged the art gallery of the department and added the busts of all the Governor-Generals of Canada, the Lieut.-Governors of Ontario, the Chancellors of the universities and the Chief Justices of the High Court.

Enlarged the buildings of the School of Science, Toronto, at different times, and added to the equipment. Total cost for the purpose of capital account of \$650,000. Enlarged the staff and extended the courses of study.

Established summer classes at different points in New Ontario for short courses in mining.

Established a Mining School at Kingston. Secured the erection of new buildings and made provisions towards maintenance and towards buildings over \$100,000 and for maintenance annually about \$20,000.

Established a reference library in the School of Science, Toronto, for the use of students and staff.

Abolished second-class certificates as a qualification for high school masters.

Established reference libraries in high schools and collegiate institutes.

Established gymnasiums and corps of military cadets in high schools and collegiate institutes.

Arranged a definite qualification for specialists on the basis of equivalents in all the universities of Canada.

Established a normal college at Hamilton for the training of high school teachers.

Established a medical faculty in the University of Toronto looking to the full direction of the medical education for Ontario by the Provincial University, which was finally accomplished in 1904-5.

Established the department of political science and psychology in the Provincial University.

Enlarged the staff of the Provincial University in all its departments.

Co-operated with the trustees of the University in the erection of new buildings for (1) biology, (2) chemistry, (3) students' union and gymnasium, (4) convocation hall, (5) women's residence, (6) university library, (7) physics building.

WANTS TO EVADE PAYING DUTY.

The Globe publishes another of its free trade screeds, this time entitled "A Border Ordeal." We reproduce a section of it :

If it could be arranged that a majority of the inhabitants of this continent would make two or three trips yearly across the lines that separate Canada from the United States there would very soon ensue vast conversions to the doctrines of free trade. By the time a man got his trunk turned outside in a few times a light would begin to break in on him such as had never been able to penetrate to his inner consciousness before. Bad as it is for him, however, it is still worse for the other sex. For them it is simply excruciating. If there is anything that a woman does with care it is the packing of a trunk. The mere man slings in a few trousers, coats and vests, often leaving a liberal empty space below the tray or lid. Not so the ladies. By the time our sisters, our cousins, and our aunts get through the work of packing a trunk it would be impossible to add a buttonhook without imperilling its framework. The lid has to be closed down with scientific solicitude, and it is supposed not to be opened until the destination is reached.

It is agonizing, then, to be compelled to open the precious structure in the inconvenient surroundings of a baggage car, its delicate and blushing contents exposed to the cold official eye and invaded by his rude paw churning up its contents in search of something contraband. The woman who does not become a free trader instantaneously is no true representative of the sex. Even man, the cosmopolite, entertains murderous thoughts when he sees the collars and cuffs which he had straightened out so nicely suddenly released from their constraint and curling back into their old form, defying him to find a place for them in the few minutes allowed him to restore his trunk to order. Then perhaps he has two or three phials of his favorite corn cure, or favorite corn juice, or cough mixture, which he has managed to insulate by the insertion of soft undershirts or pyjamas between them. These insulations are rudely disturbed by the official hand, and during the rest of the journey the traveller has visions of smashed bottles and shirt fronts smeared with samples of the materia medica which were intended for the inside of his chest, not the outside."

If the Globe knows of any civilized country on earth where import duties are not imposed, it should impart that information to its readers in large type, prominently displayed. If it knows of any method by which the contents of baggage and packages may be known and information had as to whether the contents are dutiable or not, except by personal inspection, it should without delay impart that information to all civilized countries, and to all travellers who pass from our country to another, so as to alleviate the annoyances of which it complains. Judging from its screed one might suppose that The Globe is not much of a traveller. It entertains the idea that nations ought to be able to get along without income, and therefore collect no dues or

duties, and if they do so they are ignorant tyrants, and that the machinery of their custom houses not only rob people who pass them, and give all the annoyance possible to their victims. Did The Globe ever travel say from Canada to free trade Great Britain and not have its trunk and grip, and satchel turned inside out by the customs officials in a search for contraband or dutiable goods? If it was ever free from such an annoyance it should proclaim the fact, and tell how it was done. Did it ever travel with one of "the other sex" who, when landing at Liverpool, did not have to undergo such excruciating experience? If The Globe's sisters, or its cousins or its aunts ever visit the Old Country they have to submit to such things. All women when travelling from one country to another have to put up with having their baggage rummaged through, and its delicate and blushing contents exposed to the cold official eye and invaded by his rude paw; and men also have to submit to the same thing, in search of contraband articles. Both women and men are given at times to transporting such things secretly, and introducing them surreptitiously into countries where it is contrary to law to do so. Some women find it irresistible not to smuggle silk, satin and laces, and men to smuggle whiskey and cigars. Why do intelligent people violate the law and abuse the hospitality of the country they may be visiting? Why should they cheat, wrong and defraud the customs of any country? They know it is wrong to do so. Are all travellers thieves? It is because so many of them are, in this manner, that stringent laws are enforced, such as The Globe complains so bitterly about. And because such examinations of baggage are made The Globe says that the woman who has to submit to them who does not become a free trader instantan is no true representative of her sex.

If The Globe ever has a chance to travel into the United States, in which country it imagines so many obnoxious customs methods to exist, it might be disabused of its impressions if it will consult the railway passenger agent of whom it may be purchasing its ticket.

EDITORIAL NOTES.

The total capital employed in the United States in the manufacture of clay products, according to the census report of 1905, was \$230,882,977, and 118,449 wage earners were employed, the wages paid being \$53,823,670, materials consumed were valued at \$32,907,961, and manufactured products were valued at \$135,352,854. These figures represent an increase at the census of 1905 compared with that of 1900 of 56 per cent. in capital, 12.1 per cent. in the number of wage earners, 36 per cent. in wages, 43.6 per cent. in the cost of material and 41.7 per cent. in the value of products. The number of establishments decreased 14.3 per cent. Ohio was the leading state in the production of clay products. In 1905 its products were valued at \$25,686,870, or 19 per cent. of the total for the country, as compared with \$16,480,812, or 17.3 per cent. of the total, in 1900. Pennsylvania was second, with products valued at \$18,039,187, or 13.3 per cent. of the total, an increase over 1900 of

\$3,957,343, or 28.1 per cent. Clay products are divided into two main classes, one consisting of brick, tile and terra cotta and the other of pottery products. Of the total value of clay products, \$109,518,341 was for brick, tile and terra-cotta and \$25,834,513 for pottery products. Of the brick, tile and terra cotta, the most important item was common brick, the value of which was \$51,239,871. Fire brick, valued at \$11,752,625, second, sewer pipe, at \$8,416,009, third, and vitreous paving brick, at \$7,256,088, fourth.

A fish market has been established under municipal supervision by the city of Frankfort, Germany. No fish will be sold at low prices, controlled by the city. A reliable fish-cooking book will inform interested parties of the best mode of preparing fish. This book will be furnished free of charge, as also an expert treatise relating to the importance of a fish diet. This step has been taken as a consequence of the present meat famine, and it is expected that it will meet with success, as fish is a nutrient combining a low price with high nutritive value.

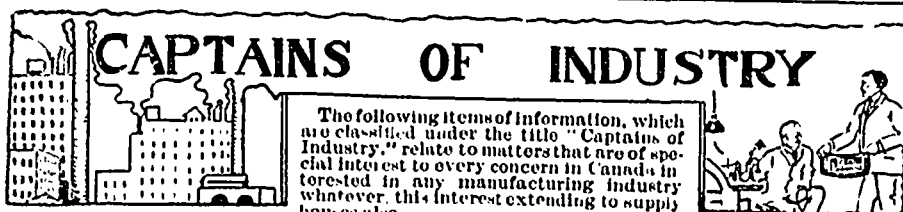
The quantity of milk demanded for the supply of large cities is constantly increasing. The number of cans of crude milk, plus the number of cans of cream and sweetened condensed milk, all estimated as milk, required for the New York markets in 1906 was 20,081,000, or forty quart cans, or 803,279,880 quarts, or 2,200,000 quarts daily.

The December statement of the British Board of Trade shows increases of £1,553,500 in Great Britain's imports and £2,757,000 in its exports. The principal increase for the month was in the imports of raw materials, which cotton from America totaled £1,000,000. On the other hand, the imports of grain decreased £900,000. The increase in exports was principally in manufactured articles. In 1906 imports increased £42,967,976 and exports £45,856,299. The year's figures are the largest on record. The year's principal increases in imports were raw materials, and in exports manufactured goods. From the returns, imported goods re-exported being included, the following comparative table of the United Kingdom's November trade in merchandise may be compiled:

	1906.	1905.	1904.
Imports	£54,673,986	£53,120,486	£52,845,300
Exports.	38,502,303	35,745,303	34,512,400
Excess imports	£16,171,683	£17,375,183	£18,332,900

For the full calendar year the United Kingdom's foreign trade makes the following comparison:

	1906.	1905.	1904.
Imports.	£608,247,373	£565,279,402	£551,048,600
Exports.	453,678,287	407,821,988	371,015,300
Excess imports	£154,569,091	£157,457,414	£180,023,300



The following items of information, which are classified under the title "Captains of Industry," relate to matters that are of special interest to every concern in Canada interested in any manufacturing industry whatever, this interest extending to supply houses also.



The Niagara Falls Machine & Foundry Co., Niagara Falls, Ont., have secured a large contract to supply cast and wrought iron work for the Michigan Central's Detroit River tunnel from the contractors, the Butler Bros. & Hoff Co. They also have a contract to supply fire hydrants for the city of Toronto. The company will enlarge their foundry at once.

The Cobalt Central Mines Co., Cobalt, Ont., are now installing the first stamp mill and concentrating plant in the mining region. The machinery consists of a Blake crusher, ore bin, self-feeder, roughing rolls, revolving screens and gigs, and has a capacity of 100 tons per day.

The Government has awarded to Fred Whitbam, Brantford, Ont., the contract to build the four new normal schools, at a total cost of \$212,100, divided as follows: North Bay, \$54,200; Peterboro, \$53,800; Stratford, \$52,050; Hamilton, \$52,050.

The Mickle Dymont Lumber Co., Brantford, Ont., will erect a new factory at a cost of about \$10,000.

The Dominion Radiator Co., Toronto, will erect new works at the head of Dufferin Street, at a cost of about \$300,000. Ten acres of land will be occupied and the building will be 2,500 feet long. At present the company employ 200 men, but 300 extra hands will be needed when the new plant is in operation.

The Canadian Nut & Bolt Co., Niagara Falls, Ont., have decided to erect a new factory. They have been awarded the contract to supply a large quantity of nuts and bolts for railway switches to the Canadian Ramapo Iron Works Co., who are erecting a large plant there.

The Hamilton & Fort William Navigation Co., Hamilton, Ont., have placed an order with the Canadian Shipbuilding Co., Toronto, for an 8,500 ton freight steamer for the iron, ore, coal and wheat trade.

A new theatre will be erected on Richmond Street, Toronto, at a cost of about \$75,000. The promoters include Rust & Weber, of New York City.

The Canadian Northern Railway Co. have purchased about 110 acres of land in the Don flats, Toronto. The purchases include all city and other lots from the north side of Winchester Street bridge up to the Canadian Pacific track, which runs from Leaside to West Toronto. On this site they will erect roundhouses, car sheds, repair shops, cold storage plant, and other requirements.

The premises of the Rideau Skating Rink, Ottawa, were destroyed by fire January 25. Loss about \$15,000.

The Morton Browne Co., Toronto, have been incorporated with a capital of \$40,000, to manufacture garments, wearing apparel, etc. The provisional directors include W. M. Wakecott, S. A. M. Nelson and M. Burt, Toronto.

The Cobalt Ore Sampling Co., Cobalt, Ont., have been incorporated with a capital of \$100,000, to carry on a mining, milling and reduction business. The provisional directors include W. H. Fletcher, N. R. Macdonald and G. W. Parker, Cobalt, Ont.

Bonanza Reef Extension, Limited, Toronto, have been incorporated with a capital of \$100,000, to carry on a mining, milling and reduction business. The provisional directors include J. G. Shaw, G. F. Thompson and W. R. Williams, Toronto.

The Pooock Bros. Co., Toronto, have been incorporated with a capital of \$50,000, to manufacture boots, shoes, etc. The provisional directors include J. W. Pooock, P. Cook, London, Ont., and S. Pooock, St. Thomas, Ont.

The Montreal Cobalt Power Co., Toronto, have been incorporated with a capital of \$1,000,000, to produce light, heat and power, etc. The provisional directors include J. W. Bain, R. R. Perry and L. C. Todd, Toronto.

The Russell Brick & Tile Co., Russell, Ont., have been incorporated with a capital of \$100,000, to manufacture brick, tile, cement, etc. The provisional directors include D. S. Macdougall, J. D. McPhail and W. F. Kenney, Russell, Ont.

The Duluth Cobalt Mining Co., Haileybury, Ont., have been incorporated with a capital of \$500,000, to carry on a mining, milling and reduction business. The provisional directors include J. F. Gillies, J. M. Ewing and W. S. Edwards, Toronto.

Kennedy, 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 W. H. Jackson, J. A. Morden and A. S. Miller, Toronto.

The Silverfield Cobalt 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 T. H. Barton, F. D. Byers and O. F. Taylor, Toronto.

The new Physics Building of Toronto University is to be equipped with Sturtevant ventilating fans.

The Northern Turpentine Co., Ottawa, have been incorporated with a capital of \$250,000, to manufacture turpentine, creosote wood alcohol, varnish, paint, etc. The provisional directors include R. G. Code, J. D. Robertson and A. H. Edwards, Ottawa.

The Continental Timber Co., Toronto, have been incorporated with a capital of \$50,000, to manufacture lumber, shingles, pulp, etc. The provisional directors include D. A. Brebner, J. L. Ross and A. W. Holmstead, Toronto.

The Enterprise Corporation, Hamilton, Ont., have been incorporated with a capital of \$500,000, to carry on a mining, milling and reduction business. The provisional

directors include T. Hobson, O. D. Pent and H. S. Lees, Hamilton, Ont.

The Casoy Mountain Cobalt Mining & Developing Co., Haileybury, Ont., have been incorporated with a capital of \$250,000, to carry on a mining, milling and reduction business. The provisional directors include D. Williamson, Haileybury, Ont., R. B. Ferguson, and D. A. Reid, Regina, Sask.

Messrs. Burnett, Ormsby & Clapp, Toronto, have been incorporated with a capital of \$100,000, to carry on a general financial, investment and brokerage business. The provisional directors include G. G. Burnett, J. T. Ormsby, Toronto, and C. R. Clapp, Woodstock, Ont.

The Wentworth Quarry Co., Hamilton, Ont., have been incorporated with a capital of \$60,000, to manufacture building stones and blocks, concrete, cement, etc. The provisional directors include T. H. Crerar, J. McCoy, Hamilton, and W. Martin, Binbrook Township, Ont.

Among recent contracts secured by the B. F. Sturtevant Co., Boston, Mass., are complete ventilating and heating systems for the Massey Harris Co., Brantford, Ont., and the W. C. Edwards Co., Limited, Ottawa.

The Wellesley Cheese & Butter Co., Wellesley, Ont., have been incorporated with a capital of \$5,000 to manufacture cheese, butter, etc. The provisional directors include C. S. Zehr, D. R. Streicher and C. Burgener, Wellesley, Ont.

The O'Boyle Bros. Construction Co., Sault Ste. Marie, Ont., have been incorporated with a capital of \$100,000, to construct vessels, ships, wharves, docks, factories, etc. The provisional directors include J. O'Boyle, D. P. O'Boyle and J. J. McFadden, Sault Ste. Marie, Ont.

Thrift, Limited, Toronto, have been incorporated with a capital of \$25,000, to manufacture toy saving banks, metal toys, novelties, etc. The provisional directors include M. McDonald, A. L. Bitzer and M. F. Pumaville, Toronto.

The Producers Torpedo Co., Leamington, Ont., have been incorporated with a capital of \$15,000, to manufacture nitro-glycerine dynamite, etc. The provisional directors include G. W. Benson, E. Winter and V. C. Copus, Leamington, Ont.

The Philip Carey Mfg. Co., Hamilton, Ont., have been incorporated with a capital of \$100,000, to manufacture roofing materials, cement, paint, oil, boiler covering, asbestos, steam pipe, etc. The provisional directors include O. A. Cole, Toronto, E. H. Ambrose, Hamilton, and G. D. Crabbs, Cincinnati, Ohio.

The McRae Mfg. Co., Toronto, have been incorporated with a capital of \$40,000, to manufacture garments, wearing apparel, caps, etc. The provisional directors include W. H. Steele, J. A. McRae and A. H. Benis, Toronto.

Messrs. Walter Davidson & Co., Toronto, have been incorporated with a capital of \$50,000, to manufacture lumber, brick, stone, cement, etc. The provisional directors include W. Davidson, J. Davidson and J. J. Barnes, Toronto.

Menswear, Limited, Toronto, have been incorporated with a capital of \$40,000, to manufacture men's furnishings, clothing,

etc. The provisional directors include S. Collett, R. E. Bonsall and J. E. Dundas, Toronto.

The Sharpe Lake Cobalt Silver Mining Co., Ottawa, have been incorporated with a capital of \$1,000,000, to carry on a mining, milling and reduction business. The provisional directors include W. Abbott, Cobalt, Ont., W. E. Matthews, and R. G. Code, Ottawa.

The Independence Cobalt Silver Mines 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. P. Briggs, Toronto, H. H. Mason, Hartford, Conn., and C. E. Loomis, Attica, N.Y.

The Silver Horse Shoe Cobalt Mining Co., Toronto, have been incorporated with a capital of \$40,000, to carry on a mining, milling and reduction business. The provisional directors include J. Brown, N. Sinclair and S. Frame, Toronto.

The Breithaupt Leather Co., Penetang, Ont., are installing two complete hot blast apparatus furnished by the B. F. Sturtevant Co., Boston, Mass. One is for the beam house and the other for the sole leather dry house. Both consist of an engine-driven fan with heater and a distributing system through which the hot air is forced.

Mines, Limited, Toronto, have been incorporated with a capital of \$40,000, to carry on a mining, milling and reduction business. The provisional directors include W. H. Moore, G. F. Macdonnell and A. J. Mitchell, Toronto.

The Cobalt Mutual Mines, Limited, Haileybury, Ont., have been incorporated with a capital of \$100,000, to carry on a mining, milling and reduction business. The provisional directors include H. L. Slaght, W. H. Phelan and W. J. Farrell, Haileybury, Ont.

The Railway Reserve Mines, Ottawa, have been incorporated with a capital of \$1,000,000, to carry on a mining, milling and reduction business. The provisional directors include J. L. Orne, T. A. Beament, Ottawa, and W. J. Bell, Sudbury, Ont.

The Keystone 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, J. M. Ferguson and E. V. O'Sullivan, Toronto.

The Peninsula Tug & Towing Co., Warton, Ont., have been incorporated with a capital of \$20,000, to construct ships, vessels, engines, boilers, etc., and to carry on a towing and wrecking business. The provisional directors include J. G. G. Simpson, F. Wood and W. Fox, Warton, Ont.

The Russell-Chambers Co., Toronto, have been incorporated with a capital of \$500,000, to manufacture lumber, brick, stone, cement, tile, limestone, etc., and to construct wharves, piers, factories, mills, engines, etc. The provisional directors include W. B. Russell, S. Johnston, Toronto, and W. C. Chambers, Harriston, Ont.

The premises of the Cudahy Packing Co., and H. B. Johnston & Co., leather manufacturers, Toronto, were destroyed by fire January 14. Loss about \$15,000.

The premises of the Irvine Lumber & Fuel Co., Brampton, Ont., were destroyed by fire January 24.

The switchboard of the Bell Telephone Co., London, Ont., was damaged to the extent of about \$10,000, as a result of an electric wire crossing a telephone wire.

The premises of St. Augustine Separate School, Dundas, Ont., were destroyed by fire January 23.

The Queen City Vinegar Co., Toronto, will erect a new factory.

Messrs. Matthews & Co., sheet iron manufacturers, Toronto, will erect a factory 80x40 feet on the corner of Church and Lombard Streets.

The Winton Automobile Co., an American concern, are considering the establishment of a branch factory in Toronto.

The Hugh Johnson Syndicate, Ottawa, will erect an office building on the corner of Queen and Bay Streets, Toronto.

H. A. McEwen, Carleton Place, Ont., has purchased a site from K. Farah, New Liskeard, Ont., on which he will erect a foundry and machine shop.

The New Method Laundry Co., Toronto, will establish a laundry at the corner of Palmerston Avenue and Collegiate Street.

Messrs. C. B. Janes & Co., manufacturers of veneers and boxes, Orillia, Ont., may move to Lakefield, Ont.

J. Griffin, St. Thomas, Ont., will erect a four story office building at Fort William, Ont.

A new Presbyterian Church, will be erected at Fort William, Ont.

The Manning Avenue School, Toronto, may be replaced by a modern building.

The Secretary of the Militia Council, Ottawa, invites tenders up to February 20 for the construction of an additional story on "D" and "E" block, Fort Osborne, Winnipeg, Man.

The Ontario Lantern Co., Hamilton, will erect an addition to their factory at a cost of about \$2,500.

The St. Thomas Packing Co., St. Thomas, Ont., will erect a new plant.

The Peterborough Steel Rolling Mills Co., Peterborough, Ont., are considering the erection of a new plant.

Messrs. Geo. Foster & Sons, Brantford, Ont., will erect a new warehouse 132x52 feet.

The Minister of Marine and Fisheries, Ottawa, is arranging for the transport of fresh fish from the Maritime Provinces to the markets of Ontario and Quebec by means of cold storage. A vote of \$25,000 has been placed in the estimates to encourage the railway companies to establish the necessary cold storage service.

The Department of Public Works, Ottawa, invite tenders up to February 22 for the construction of a pier head at Burlington Channel, Hamilton, Ont.

The Berlin Rubber Co. and the Merchants' Rubber Co., Berlin, Ont., have been bought by the Canadian Consolidated Rubber Co. The two firms represent a capital of about \$500,000.

A large Catholic Church will be erected at Toledo, Ont.

The congregation of the First Baptist Church, Ottawa, will erect a new Sunday School building at a cost of about \$25,000.

The Glebe Presbyterian Church, Ottawa, will be extended.

The congregation of the Catholic Church, Peterborough, Ont., will erect a new edifice.

The Grand Trunk Railway Co. intend moving their Toronto repair shop from the Esplanade to New Toronto, where large buildings will be erected for not only the regular repair work, but also for the manufacture of steel switches, frogs and crossings.

The Ontario Iron & Steel Co., Toronto, are erecting a large steel plant and rolling mill at Welland, Ont. The equipment will include two 25-ton open hearth furnaces, two 12 and 22 in. trains and a steel casting plant containing one 20-ton open hearth furnace. The mills are to be electrically driven, and it is expected that the plant will be in operation early in the summer.

The ratepayers of Galt, Ont., will vote on a by-law to grant the Plumbers' Supplies Co. \$15,000. If the by-law is passed the company will erect a factory containing 44,000 square feet of floor space.

The Ontario Lead & Wire Co., Toronto, have changed their name to Somerville Limited.

The Glen Miller Paper Mills, Toronto, Ont., will erect a new building.

The Street Railway Co., Hamilton, Ont., will erect large car barns on Windsor Street.

Additions will be erected to the Boyd and Waldorf Hotels, Hamilton, Ont.

The North American Cobalt Smelting & Refining Co., Hamilton, Ont., will remove their plant to St. Catharines or Merrickville, Ont., as the former city could not supply the necessary site nor a satisfactory power contract. A new smelter will be erected at a cost of about \$300,000.

The wholesale crockery store of Messrs. Taylor & Mulveney, Hamilton, Ont., was damaged by fire January 11. Loss about \$35,000.

H. E. Hodgins, Osnabrock Centre, Ont., invites tenders up to February 11 for reinforced concrete piers, necessary grading, etc., for bridges to be built in Osnabrock Township.

A. J. Small, Toronto, will erect a new theatre in London, Ont.

J. V. Jenkins, proprietor of the Quilt Hotel, Belleville, Ont., which was destroyed by fire a short time ago, will rebuild the hotel.

Building permits to the amount of \$84,000 were issued in Toronto during the week ending January 19.

The Phillips Mfg. Co., Toronto, will erect a large factory in the spring.

The Ontario Lamp & Lantern Co., Hamilton, Ont., will erect an addition to their factory at a cost of about \$2,500.

In nuggy, sticky and damp weather when doors, drawers and things get tight, bind and jam, try flake graphite. Put it in well. The results will please you.

The Metal Shingle & Siding Co., Peterborough, Ont., are erecting a new office building.

The Dominion Power & Transmission Co., Toronto, have been incorporated with a capital of \$25,000, to manufacture lumber, timber, wood, metal, etc., and to carry on the business of a power and transmission company. The provisional directors include R. Gowans, W. Bain and R. M. O'Connell, Toronto.

The Edmonton Standard Coal Co., Edmonton, Ont., have been incorporated with a capital of \$100,000.

of \$300,000, to carry on a mining, milling and reduction business. The provisional directors include J. S. Lovell, E. W. McNeill and H. Chambers, Toronto.

The Wortman & Ward Foundry Co., London, Ont., are asking for a fixed assessment for ten years at \$25,000.

The Galt Art Metal Co., Galt, Ont., report an increase of 100 per cent. in their business during 1906, and with the many new lines they are introducing they also expect a large increase during the present year.

The Cobalt Mines Syndicate, Toronto, have been incorporated with a capital of \$100,000, to carry on a mining, milling and reduction business. The provisional directors include J. H. Hallett, J. M. Ferguson and J. E. Day, Toronto.

The Ontario Quebec Cobalt 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 E. V. O'Sullivan, J. E. Day and J. M. Ferguson, Toronto.

The new lodging house for immigrants at Toronto, will be altered at a cost of about \$2800.

The Jack Pot Cobalt Silver Mining Co., Toronto, have been incorporated with a capital of \$750,000, to carry on a mining, milling and reduction business. The provisional directors include R. S. Gilpin, D. A. Rose and W. C. Campbell, Toronto.

The Kerr Lake Crown Reserve, Limited, Toronto, have been incorporated with a capital of \$2,000,000, to carry on a mining, milling and reduction business. The provisional directors include E. E. Berkinshaw, W. H. Blain and P. A. Deane, Toronto.

The Cobalt Gem 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. E. Day, J. M. Ferguson and E. V. O'Sullivan, Toronto.

Dundas Street, Toronto Junction, will be paved at a cost of about \$80,000.

A market building will be erected at Berlin, Ont., at a cost of about \$20,000.

An Opera House will be erected at New Bedford, Ont.

The Ottawa Hunt Club, Ottawa, will erect a new club house.

R. W. Leonard, St. Catharines, Ont., and Mr. Peck, Hamilton, Ont., both associated with the North American Refining & Smelter Co. are considering establishing a smelter at Thorold, Ont., at a cost of about \$250,000.

The Billings & Spencer Co., Hartford, Conn., will erect a plant for the manufacture of drop forgings, at Welland, Ont., at a cost of about \$100,000.

The Imperial Steel & Barb Wire Co., Chicago, Ont., are looking for a suitable site in the West to establish a plant for the manufacture of barb wire and nails.

The Kaminstiquia Power Co. are preparing to double the capacity of their hydro-electric power plant at Kakabeka Falls, near Fort William, Ont. Work will be begun as early as possible this spring, and will be completed at the earliest possible date. Mr. Black, managing director of the company, and E. W. Thompson, were in Fort William and Port Arthur a short time ago looking over the situation preparatory to making the extension.

Messrs. Barnett & McQueen, Port Arthur, Ont., have received the contract from the Grand Trunk Pacific Co. for the construction of a large grain elevator, which will have a capacity of about 10,000,000 bushels. The construction will be concrete, steel and tile and will be entirely fireproof. It will be built so that four trains can discharge their grain in the hour at the same time. The elevator will be built at the mouth of the Mission River and the contracting work will commence as soon as the spring opens up.

Mr. Fred Somerville, Toronto, has leased three acres of land on Ashbridge's Bay. He will build a foundry for the manufacture of radiators, boilers, soil pipes, etc.

The Toronto Electric Light Co., Toronto, are applying for authority to increase their capital, from \$1,000,000 to \$4,000,000. The company intend erecting two new sub-stations in the east and west ends of the city. A third sub-station is also contemplated for the north end. In addition the company purpose to lay about seven miles of underground transmission cables.

The Toronto Laundry Machine Co., on Dundas Street, Toronto, are doubling the size of their plant. The increase has been necessitated by the growing demand for large laundry machinery. The work will be completed by August 1.

The Andrew Darling Co., wholesale clothing manufacturers, Toronto, will erect a new factory at the corner of Spadina and Adelaide St., next to their present premises. The new building will be 115x97 feet, eight stories, and built of concrete, reinforced on the Kahn system. Gordon & Helliwell are the architects.

The Montreal Wood Mosaic Flooring Co., Montreal, have been incorporated with a capital of \$5,000, to manufacture wood mosaic window screens, etc. The charter members include D. H. McLennan, R. W. Barclay and C. Stewart, Montreal.

Messrs. J. Hirsch & Sons, Montreal, have been incorporated with a capital of \$100,000, to manufacture cigars, tobaccos, wines, liquors, etc. The charter members include J. Hirsch, M. Hirsch and R. Hirsch, Montreal.

The Montreal Street Railway Co., Montreal, are asking for authority to increase their capital from \$10,000,000 to \$18,000,000.

The Canadian Pacific Railway Co. will double track their line between Smith's Falls, Ont., and Montreal.

The Canadian Pacific Railway Co. will build 350 miles of railway in the West during the coming summer, which will involve an expenditure of about \$6,000,000.

The main building of the new plant which Jenkins Bros., New York, valve manufacturers, are erecting in Montreal, will be 290x50 feet. There will also be a foundry, 150x64 feet, and an engine and boiler house, 60x45 feet. Later the company expects to build a second foundry, 100x60 feet.

Fred Eaton, of the American Car & Foundry Co., Berwick, Pa., and several other capitalists, are considering the establishment of a wood and steel car plant in Montreal at a cost of about \$500,000.

Messrs. Swift, Copland & Co., Montreal, have been incorporated with a capital of \$200,000, to manufacture furs, skins, hats, caps, etc. The charter members include

W. A. M. Swift, J. J. Louson, Westmount, Que., and J. P. Copland, Montreal.

The Laurentian Granite Co., Montreal, been incorporated with a capital of \$200,000, to manufacture brick, stone, tile, marble, granite, cement, terra-cotta, plaster, slate, etc. The charter members include R. Bickerdike, L. H. Henault, and W. H. Evans, Montreal.

The Safety Explosives Co., Quebec City, have been incorporated with a capital of \$300,000, to manufacture explosives, chemicals, etc. The charter members include R. W. Withycomb, W. A. Weir and W. J. Wright, Montreal.

The premises of the Roman Catholic Church, St. Leonard de Port Maurice, Que., were destroyed by fire January 17. Loss about \$75,000.

The novitiate of the Cote des Neiges College, Montreal, was destroyed by fire January 23. Loss about \$15,000.

The B. Gardiner Co., clothing manufacturers, Winnipeg, Man., may establish a factory in Montreal.

The Builders' Exchange, Montreal, are considering the erection of a building to be known as the Builders' Exchange Building.

Messrs. John W. Peck & Son, Ville St. Louis, Montreal, will extend their premises.

The Canadian Gold Car Heating & Lighting Co., Montreal, have been incorporated with a capital of \$300,000, to manufacture machines and apparatus for heating and lighting cars, steam ovens, etc. The charter members include R. C. Smith, F. H. Markey and K. G. Robertson, Montreal.

An electric railway will be erected from the natural steps to Quebec City.

M. C. Galarnau, Montreal, has purchased the property of the Victoria Square Printing House Co., and will erect a ten story warehouse thereon.

The Canadian Pacific Railway Co. have purchased the St. Lawrence Hall, Montreal, and intend eventually to erect on this site a modern building. The price paid for the property was over \$500,000.

The Y.M.C.A. block, Moncton, N.B., was damaged by fire January 16. Loss about \$20,000.

The Queens Hotel, Fredericton, N.B., will be improved.

An addition 120x80 feet will be erected to the St. John Cotton Mills, St. John, N.B.

Geo. Appleby, Nauwigewauk, N.B. has been awarded the contract for the re-building of the Ketchum wharf in King's County N.B.

The Brunswick Street Baptist Church, Fredericton, N.B., will be enlarged and a new lighting system installed.

The premises of Messrs. Crump & Perrier, plumbers and gasfitters, and several adjoining buildings, Halifax, N.S. were destroyed by fire January 18. Loss about \$20,000.

The Standard Fuel Mfg. Co., Halifax, N.S., have decided to remove their works to Amherst, N.S.

A new jail will be erected at Sydney, N.S., at a cost of about \$15,000.

T. W. Kneeland, of the Gaspereaux Power Co., Malone, N.Y., is erecting a power house at White Rock Mills, a short distance south of Port Williams, N.S. He will also establish a pulp mill there.

The National Car Co., Halifax, N.S., recently incorporated with a capital of \$1,000,000, intend erecting a plant for the construction of from 15 to 25 cars per day.

Messrs. Rhodes, Curry & Co., Amherst, N.S., are considering doubling the capacity of their axle shop.

The Dominion Coal Co., Glace Bay, N.S., have renewed their contract with the New England Gas & Coke Co. for the supply of coal for a period of three years from next November, when the old contract expires. The new contract is at an advanced price, and calls for the delivery of 25,000 tons a month.

The Barber & Ellis Co., paper box manufacturers, Toronto, are opening a branch in Winnipeg, Man.

The ratepayers of Portage la Prairie, Man., voted favorably on a by-law granting a 30-year franchise to the International Heating & Lighting Co., of Cleveland, Ohio. The company are to be given the privilege of taking over the existing electric lighting plant for a period of 25 years. They will expend about \$100,000 in installing their plant, and will manufacture gas for heating, lighting, and general domestic purposes.

The Consolidated Bicycle & Motor Co., Winnipeg, Man., have been incorporated with a capital of \$60,000, to manufacture bicycles, motor cars, motor boats, pumps, etc. The provisional directors include C. G. Cruikshank, J. A. Hudson and J. S. St. Mars, Winnipeg, Man.

The McCutcheon Lumber Co., Minitonas, Man., have been incorporated with a capital of \$50,000, to manufacture lumber, timber, machinery, furniture, doors, etc., and to construct wharves, piers, docks, etc. The provisional directors include A. N. McCutcheon, Winnipeg, Man., W. J. Osborne, and R. G. Bertram, Minitonas, Man.

The Northwestern Brass Co., Winnipeg, Man., are erecting a new steel building 100x80 feet, at a cost of about \$40,000.

The Maaro Wire Works, Winnipeg, Man., have extended their plant at a cost of about \$30,000.

The Dominion Express Co., Winnipeg, Man., will erect a large receiving building near the Canadian Pacific Railway depot.

The Prairie Lumber Co., the Gibson Lumber Co., Winnipeg, Man., and the Regina Lumber Co., Regina, Sask., have amalgamated and will be known as the Beaver Lumber Co.

The Hitzlings Paper Box Co. have been established in North Winnipeg, Man. The factory has a floor space of 10,000 square feet and is fitted with modern machines.

The Lake Winnipeg Lumber Co., Winnipeg, Man., have been incorporated with a capital of \$100,000, to manufacture lumber, timber, trunks, boxes, doors, sashes, etc. The provisional directors include Stewart, R. H. Mainer, E. J. Russell, Winnipeg, Man.

The Finch Co., Winnipeg, Man., have been incorporated with a capital of \$100,000, to manufacture goods, wares, merchandise, etc. The provisional directors include D. E. Finch, F. J. C. Cox and J. Brockest, Winnipeg, Man.

Messrs. Tudhope, Anderson & Co., Winnipeg, Man., have been incorporated with a capital of \$300,000, to manufacture machinery, implements, carriages, wagons, harness,

stone, cement, lime, etc. The provisional directors include H. F. Anderson, J. J. Bryan, Winnipeg, Man., and J. B. Tudhope, Orillia, Ont.

The Manitoba Rolling Mill Co., Winnipeg, Man., have been incorporated with a capital of \$100,000, to manufacture iron, steel, copper, coal, etc. The provisional directors include W. F. Hull, P. J. Proctor, Winnipeg, Man., and T. M. Kirkwood, Toronto.

The waterworks system, Brandon, Man., will be extended at a cost of about \$45,000.

A new High School will be erected at Strathclair, Man., at a cost of about \$50,000.

The premises of the Russel Hotel, Strathclair, Man., were destroyed by fire January 14.

The grain elevator of R. J. Hurt, Boissevain, Man., was destroyed by fire January 15. Loss about \$25,000.

The car shops and round house of the Canadian Pacific Railway Co., Napinka, Man., were destroyed by fire January 15.

The waterworks and sewerage systems, Selkirk, Man., will be extended.

A steel bridge will be built at Brandon, Man., at a cost of about \$35,000.

A bridge will be built over the Souris River, Souris, Man., at a cost of about \$12,000.

The large departmental stores of the Hudson Bay Co., Winnipeg, Man., were destroyed by fire January 11.

Thos. Elliott, Neepawa, Man., is making arrangements to establish a cement block making plant in Davidson, Sask.

The Imperial Lumber Co. have purchased several lots in Cupar, Sask., and have commenced business there.

The following new buildings will be erected in Edmonton, Alta., in 1907:

Post Office...	\$300,000
Wind-or Hotel...	150,000
Registry Office...	50,000
Court House...	100,000
Y.M.C.A....	55,000
Main Sewer...	350,000
Electric Cars...	125,000
Water and Electric Light...	100,000
Fire Hall...	20,000
Street Paving...	225,000
Public School...	40,000
Incinerator...	45,000
Meat Packing Plant...	500,000
Brewing Company...	250,000
Gurnsey Warehouse...	150,000
Hospital...	65,000
C.P.R. High Level Bridge...	1,000,000

This is a total of \$3,525,000, exclusive of the bridge and depot for the Grand Trunk Pacific, and the capitol buildings. Probably \$5,000,000 will not pay for all the work.

Messrs. Hockin & Siddoner, Moose Jaw, Sask., will erect a large hardware store shortly.

The Lethbridge Brewing & Malting Co., Lethbridge, Alta., have decided to add another story to the \$35,000 addition now being erected to their plant.

The Diamond Coal Co., Diamond City, six miles from Lethbridge, Alta., will develop their property at a cost of about \$200,000.

A school building will be erected at North Battleford, Sask., at a cost of about \$10,000.

A University is being considered for Prince Albert, Sask.

The Chisholm block, Edmonton, Alta., was destroyed by fire recently. Loss about \$30,000.

The Macombe Sewer Pipe Co., Macombe, Ill., have been awarded the contract for the supply of sewer pipe for the city of Edmonton, Alta. The amount was \$79,295.

The Northwest Electric Co., Calgary, Alta., have opened a branch in Moose Jaw, Sask.

It is stated that the Nichols, Shepard Co. threshing machine manufacturers, Barab, Creek, Mich., have secured a site in Regina, Sask., and will establish a branch in the spring.

The Ineham Lumber Co., Okotoks, Alta., will erect a new saw mill.

The Graham Island Lumber Co., Masset Harbor, B.C., will erect a saw mill having a capacity of 250,000 feet daily.

The premises of the Hadden Shingle Co., Cloverdale, B.C., were destroyed by fire recently.

Mills Bros. have established a saw mill at Vernon, B.C.

The British Columbia Packing Co., New Westminster, B.C., will erect a five story addition to their plant.

A new wing will be added to the Hotel Vancouver, Vancouver, B.C., at a cost of about \$200,000.

Morrison, Crawford & McIntyre, steel metal workers, Vancouver, B.C., have changed their name to Morrison, Crawford, Limited.

FINANCIAL.

The Banque de Hochelaga have opened a branch in Edmonton, Alta.

The Monarch Bank of Canada may open a branch in Winnipeg, Man.

A branch of the Monarch Bank of Canada is being opened in Victoria, B.C.

The Sovereign Bank of Canada have opened a branch at Lambeth, Ont.

A branch of the Metropolitan Bank has been opened in Cobourg, Ont.

The Bank of Montreal may open a branch in Medicine Hat, Alta.

The Royal Bank of Canada have opened a branch in Calgary, Alta.

A branch of the Merchants Bank of Canada has been opened at Killam, Alta.

The Farmers Bank of Canada are opening a branch at Weston, Ont., also at Williams town, Ont.

The United Empire Bank of Canada have opened a branch at Cobourg, Ont.

A branch of the Sovereign Bank of Canada has been opened at Beaverton, Ont.

Canada has now thirty-six chartered banks, the latest addition being the Farmers Bank of Canada.

The Eastern Townships Bank have opened branches at Knowlton, Marieville and St. Ferdinand d'Halifax, Que.

The Sovereign Bank of Canada have opened a branch at Sandwich, Ont.

A branch of the Molson's Bank has been opened at Richmond, Que.

The Union Bank of Canada have opened a branch at Englehart, Ont.

The Bank of British North America will

erect an addition to the building in Vancouver, B.C., at a cost of about \$100,000.

A branch of the Sovereign Bank of Canada has been opened at Englehart, Ont.

The Canadian Bank of Commerce will erect a bank building at Sydney, N.S.

The Standard Bank of Canada are opening a branch at Cobourg, Ont.

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.

Allis-Chalmers-Bullock, Limited.—The calendar sent out by this firm is one of the most artistic we have received. In shape it is like the shield used by the company as name plate on their machinery. A view of the works is shown on the upper part of the shield, the calendar pad on the lower section, while the "coat-of-arms" of the Dominion of Canada and of the various provinces add much to its attractiveness. The Calendar is lithographed, each "coat-of-arms" being shown in proper colors, while a wreath of maple leaves in autumn tints gives additional beauty to the design. Allis-Chalmers-Bullock, Limited, Montreal.

"Suzanne." To mark an epoch in their history the seventieth anniversary of the foundation of their company under its present name, and the fifty-fifth year of their establishment as paper makers, Wm. Barber & Bros., are sending out to their customers a calendar which will be a delight to all who receive it. It is a 7x10 inch reproduction in rich brown of the painting, "Suzanne," by Philip Boileau, a Canadian artist who has won wide distinction. This painting shows an American girl in evening costume, with roses fastened in the heavy masses of her dark hair. In sending out this calendar Wm. Barber & Bros. state they want this calendar to be their representative during 1907. For a house which has sustained a reputation for high standard of quality for more than half a century, no more suitable representative could be sent out than "Suzanne." Wm. Barber & Bros., Georgetown, Ont.

The Westinghouse Diary.—A diary which in addition to providing memorandum blanks for each day in 1907 gives an exceptional amount of information of a technical nature of value to electrical workers. The statistical tables are particularly comprehensive, yet the diary is vest pocket size it will be seen at once in what compact space these tables are given. The Canadian Westinghouse Co., Hamilton.

Maps of Power Districts.—A series of maps issued by the Ontario Power Co., of Niagara Falls. No. 1, a general map of territory from Hamilton, Ont., to Syracuse, N.Y., showing transmission lines, transformer stations, etc. No. 2, a map showing in greater detail territory close to Niagara River, St. Catharines and Welland being included. No. 3, a smaller map showing the Welland canal with transmission lines, etc. No. 4, a map showing with much detail Niagara Falls, the location of the various electrical companies and lands held by them, electric tram railway lines, transmission lines,

etc. No. 5, a map of Buffalo, Depew and West Seneca, showing lands of large industrial concerns, etc. The Ontario Power Co., Niagara Falls, Ont.

Hughes Continuous Gas Producers.—A 32-page catalogue giving full information with illustrations of the Hughes Mechanically Poked Continuous Gas Producer. The Wellman-Seaver-Morgan Co., Cleveland, O.

Rhodes, Curry Calendar.—The 1907 calendar sent out by Rhodes, Curry & Co., Limited, combines utility with attractiveness. A bird's eye view of the company's large works gives beauty and color while the calendar pad provides figures large enough to read across a big room. Rhodes, Curry & Co., Amherst, N.S.

FIRST COST OF MECHANICAL vs. CHIMNEY DRAFT.

It is extremely difficult to make a general comparison of the first cost of a chimney with that of a mechanical draft plant, because of the fact that most chimneys for power plants are usually put up with a view of obtaining a draft from 0.5 to 0.75 of an inch of water, while mechanical draft systems are seldom installed except to give a draft of not less than at least one inch. It is probable that most chimneys are between 100 and 150 feet high, while a chimney to give a draft of one inch would have to be between 175 and 200 feet high, and the cost of a chimney increases very much as the height is made greater than about 125 feet. Moreover, for a large power plant several small steel chimneys are often put up instead of one large brick chimney, and these chimneys may be of cheap steel construction, so that the cost may be small. Again, there is a curious difference between a chimney and a mechanical draft apparatus, that while a tall chimney to give a high draft costs more than a low chimney to burn the same quantity of coal under a low draft, a fan to supply air for a given quantity of coal under a high draft costs less than a fan for the same quantity of coal under a low draft. A low draft, however, means a low rate of combustion per square foot of grate surface, and hence a large area of grate in order to burn a given quantity of coal per hour, and it means also an almost total inability to burn coals of very low grade; while a high draft means a rapid combustion per square foot of grate surface, and hence a small grate to burn a given quantity of coal per hour, and also the ability to burn cheap coals of low grade.

A chimney to give a draft of 0.75 of an inch must be about 125 feet high, and one to give a draft of 1.5 inches would probably have to be at least 250 feet high. The cost of the higher chimney would be so very much greater than that of the lower that few engineers would recommend it solely because of the greater draft which would be maintained with it. In the case of a mechanical draft apparatus, however, the apparatus to supply the air for the combustion of a given quantity of coal per hour under a maximum draft of 0.75 of an inch would be larger and cost more than the apparatus to supply the air for the combustion of the same quantity of coal under a maximum draft of 1.5 inches. The diameter of the fan wheel for the higher draft would be only about 0.83 of the diameter of the fan wheel for the lower draft, and the dimensions of the engine, assuming it to

be direct-connected to the fan, might also be smaller for the higher draft. The work done in running the fan for the higher draft would be twice as great as that for the lower, and hence the running expenses would be almost twice as great, but even then the running expenses would be small. Thus to supply air for the combustion of 5,000 pounds of coal per hour with an economizer under a maximum draft of 0.75 of an inch of water, an induced mechanical draft apparatus would require a fan with a 7-foot wheel; while to supply air for the combustion of the same quantity of coal under a maximum draft of 1.5 inches a fan with a wheel 6 feet in diameter would be more than ample and a 5½ foot wheel would be almost large enough. The 7-foot fan would have to be run at a speed of 195 to 200 revolutions per minute and would require a direct-connected engine having a cylinder 6 inches in diameter with an 8-inch stroke; while the 6-foot fan would have to be run at a speed of about 325 revolutions per minute, and an engine having a cylinder 6 inches in diameter and an 8-inch stroke would be more than ample for it, because of the greater number of revolutions made per minute. The dimensions of the engine are based upon the supposition that the boiler pressure would be at least 190 pounds. This example illustrates the curious anomaly in regard to the difference between a chimney and a mechanical draft plant. In the case of the chimney the consideration of the first cost makes the engineer keep the chimney as low as possible and get along with as low a draft as possible; while in the case of a mechanical draft apparatus the consideration of first cost makes the engineer keep the draft as high as possible. The running expense is what makes the engineer keep the draft given by a mechanical draft apparatus low, but the running expense is usually more than offset by such advantages as the ability to burn cheaper fuel and to maintain a hotter fire in the furnace, thus securing that more perfect combustion for poor fuels that always attends a high draft. It is seldom that a mechanical draft system is installed to give a draft no greater than would be likely to be given by a chimney, and hence the higher draft capable of being obtained with the mechanical draft apparatus must be carefully borne in mind when considering the first cost. It is possible, of course, to put up one or more cheap chimneys for a power plant and make the cost of them less than the cost of a properly designed mechanical draft system, but it is probable that in most cases a lined, self-supporting steel chimney or a brick chimney will cost considerably more than a mechanical draft apparatus capable of furnishing air for the combustion of the same quantity of coal per hour, and further, capable of giving a higher draft than the chimney. When, because of local conditions it is necessary to discharge the gases of combustion at a considerable height, 100 to 150 feet above the ground, the mechanical draft apparatus plus the chimney for discharge of the gases may cost even more than a chimney alone that would be capable of furnishing at a low draft the air required for the combustion of the coal; but if the draft required be at all high, it is probable that even under these circumstances the cost of a suitable mechanical draft apparatus would be less than that of the chimney.—"Mechanical Draft" by J. H. Kincaid.

BRADSTREET'S LIST OF FAILURES IN THE DOMINION OF CANADA AND NEWFOUNDLAND, CLASSIFIED AS TO CAUSES.

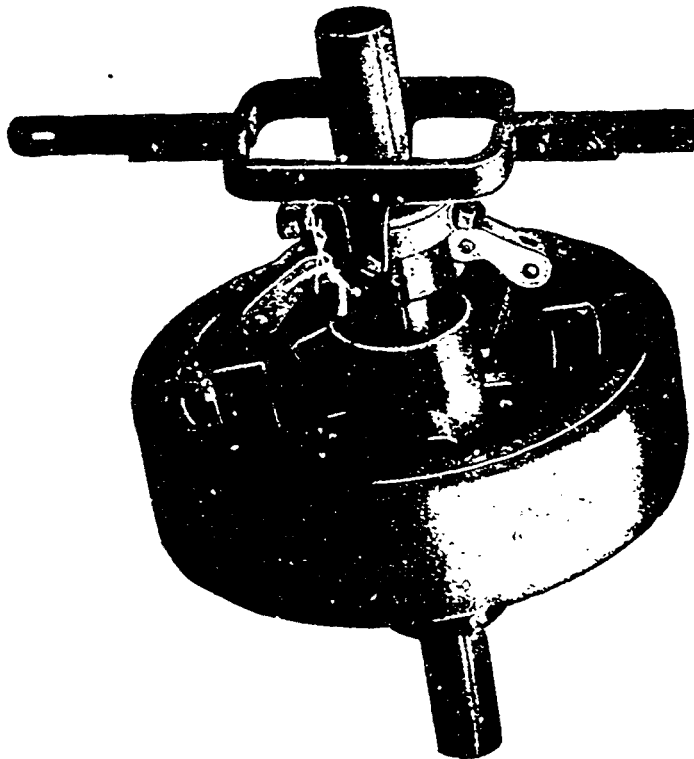
Failures due to	No. 1906	No. 1905	No. 1904	No. 1903	Assets, 1906	Assets, 1905	Assets, 1904	Assets, 1903	Liabilities, 1906	Liabilities, 1905	Liabilities, 1904	Liabilities, 1903
Incompetence.	203	257	167	118	\$878,185	\$1,633,436	\$833,870	\$461,631	\$1,528,086	\$3,530,019	\$1,715,801	\$966,302
Inexperience.	41	30	37	20	230,238	1,045,935	51,375	21,590	577,030	1,336,250	149,331	56,970
Lack of capital.	626	790	731	667	2,266,775	2,787,080	2,337,109	2,111,453	5,089,314	6,297,446	5,340,657	4,808,600
Unwise credits.	13	6	13	5	90,100	47,500	21,750	30,390	153,327	105,100	39,200	40,500
Failures of others.	14	12	13	7	101,290	76,300	131,315	363,700	346,385	130,790	425,700	480,900
Extravagance.	9	14	5	3	52,175	49,692	11,800	8,000	29,383	77,341	53,082	23,500
Neglect.	41	61	31	26	52,061	145,676	62,900	41,275	111,301	678,147	123,042	99,100
Competition.	9	11	3	1	12,213	11,550	11,000	15,000	27,426	23,172	17,400	18,300
Special conditions.	163	101	62	41	392,766	526,060	339,153	201,569	931,351	1,619,700	636,305	461,000
Speculation.	7	4	11	9	25,600	19,000	113,200	483,600	77,251	110,513	515,107	1,012,000
Fraud.	108	118	99	62	182,700	211,962	192,600	130,977	620,331	736,216	938,036	399,200
Totals.	1,239	1,450	1,175	938	\$1,303,976	\$6,581,191	\$4,137,418	\$3,870,605	\$9,450,693	\$13,879,700	\$10,019,311	\$8,372,001

*Also St. Pierre and Miquelon.

THE CLARKE FRICTION CLUTCH.

Some new and novel features are shown in the Clarke Friction Clutch. As will be seen from the accompanying cut this clutch is simple in design, yet is exceedingly strong and rigid, with large allowances for emergency and other strains, and has an exceptionally large frictional surface. It is made entirely of iron and steel, all parts subject to strain being of high grade steel. The frictional surfaces are of iron, permitting the utmost pressure and having no wood or fibre grips to burn

adjusting two screws the clutch may be set to slip when any required load is exceeded. The load does not come on the clutch in one instant, but is gradually picked up as clutch is thrown in. The only time when wear takes place on this clutch is when load is being picked up, there being no wear when disengaged or when load has been taken. When the clutch is engaged it is self contained and requires no pins nor strings to hold it at work. It is so arranged that shafts cannot get out of line nor parts drop out of position.



THE CLARKE FRICTION CLUTCH COUPLING.

or wear. The entire pressure is exerted uniformly over the whole surface, not being greater on the outside edge than on the inside. It is very small, so occupies very small space on the shaft. It is also lighter than other clutches of same power, an important point as all friction clutch couplings are placed on the over-hanging ends of shafts.

The Clarke Clutch can be regulated to slip when a given load is exceeded, an important point where an overload might result in damage to machinery. It operates successfully at high speeds. By simply

Clarke Clutches are made to dies and templets and are standard. The centrifugal or whirling action of the toggles or levers have no effect on the working of this clutch. Dust, grit, etc., have practically no effect on this clutch. It is so compact that there is practically no danger to operators. Any man can handle it. It is thrown in and out without effort and does not require the constant attention and careful nursing so frequently demanded by friction clutches. The Clarke Clutch is built in sizes from 3 to 150 h.p. by Wm & J G Greey, 2 Church Street, Toronto.

THE SOUTHERN CALIFORNIA NEW TRAIN.—BEST ROUTE.

The Los Angeles Limited, electric light new from the Pullman shops, with all the 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 tea sleeping cars, composite observation dining cars, a la carte service. For sleeping car reservations and full particulars apply to your nearest agent or address R. H. Bennett, 2 East King St., Toronto.

There will be held during the summer of 1909, at the city of Seattle, on Puget Sound, an International Exposition known as the Alaska-Yukon-Pacific Exposition. The primary purpose is to explore resources and potentialities of the Alaska and Yukon territories in the United States and the Dominion of Canada and to promote known and to foster the vast importance of the trade of the Pacific Ocean and of the countries bordering upon it. In addition to demonstrate the marvelous progress of Western America. It is estimated that 7,500,000 persons live in the section of country between the United States and Canada within a radius of 1,000 miles of Seattle who are deeply interested in making the Exposition a component of their material wealth and development.

NEW STEEL PLANT.

It is now announced definitely that the United States Steel Corporation will build a big Canadian plant upon the property recently bought for it at Sandwich, Ont., below Windsor on the Canadian side of the Detroit River.

Plans have been drawn for the new city, and all that has been holding back the development of their plans has been the lack of an understanding with the Dominion Government with regard to the production of steel rails made from American iron from Canadian ore, and as to a contract upon the free list of iron ore, coke and limestone, raw materials needed in the manufacture of steel and iron.

The Grand Trunk Pacific Railway Company to build about 4,600 miles of track for a transcontinental line. Eighty per cent will be used. This means a demand for 65,568,000 tons of rails for this road. The duty on steel rails is \$7 a ton, and if the rails are made in Canada the price will be so high that it would be almost prohib-

One reason why the steel trust will not delay the construction of the Sandwich plant a minute longer than is necessary, is that it will take the steel trust and all other steel plants in Canada all their time to fill the demand for rails for the Grand Trunk Pacific alone, if that road uses Canadian made rails. As has been stated, it will take about 65,568,000 tons of rails. One plant having a capacity of a thousand tons a day could not

fill that order in less than 27 years, unless it ran double shifts, when it would cut that period in two. A plant that would turn out 1,000 tons of steel rails a day would be no small affair, as it would keep three blast furnaces with a daily capacity of 100 tons of pig iron each busy to supply the material for the rails.

American iron ore, coke, and limestone now enter the Dominion free of duty. The

steel trust can select no point so easy of access to all the raw material as their property at Sandwich. Some time ago the trust secured options on several thousands of acres of land underlaid with limestone in Presque Isle County, Mich., and are now exercising these options. With the duty on steel rails at \$7 a ton, it requires no argument to show the advantages of the move decided upon by the United States Steel Corporation.

Does Canada Need a Clay-Working School?

ARTICLE I.—AN ADDRESS BY PROF. EDWARD ORTON, OHIO STATE UNIVERSITY, ON "THE CLAY-WORKING SCHOOL—ITS NEED, ITS FORM, ITS FUNCTION."*

On the invitation of your secretary, Mr. Bechtel, seconded by the Hon. Dr. R. A. Pyne, Minister of Education, I have come from Ohio to speak to you on the topic of "Technical Education." From the fact that I have offered to these gentlemen to speak on other topics, and that they selected this one, I infer that this subject is now under discussion among you and that if you have not already decided that you want a clayworkers' school in Canada, you are at least interested in discussing such a project.

Before you can reach any intelligent opinion as to whether you want or need such a school, you must first consider what the present situation of the clay industries is, what their needs are, and lastly, whether the establishment of a school would be likely to meet these needs, in whole or in part. I assume that Canadian clayworkers are very much like those to the south of the line, and that the needs of one class are not very different from the needs of the other. Of course, sterner climatic conditions a less dense population, and the requirement of a more varied output from any single plant, prevents the specialization in manufacture which we practice in some parts of the United States; all these will modify the situation somewhat, and rather in the direction of making the requirements of success more difficult for you than they are for your southern neighbor.

As I see it, clay manufacture is one of the largest branches of the great mineral industry, co-ordinate with and of almost equal importance with metallurgy—the manufacture of metals from their ores—and, like it, is really a phase of chemical engineering. By chemical engineering is meant the conduct of processes on a scale which require the use of engineering methods and appliances, but which are fundamentally chemical processes after all. Probably many of you have not been accustomed to think of your work as either chemical or engineering, but I am sure that a little consideration will show you that it is both, and nothing else.

For instance, let us see what the ordinary and universal processes of clay manufacture really are when viewed from this standpoint.

To begin with, there is the occurrence of the raw materials of clay manufacture to be considered. We cannot erect and operate clay plants without locating the clays and other minerals first; at least, we ought not to try, unless we have more money than we need. However, every little while, some unfortunate inventor calls upon me with this tale of woe, which summarized,

means he and his associates have gone into the clay business without taking pains to be sure that they had a suitable deposit of clays to permanently support an industry, and now find themselves with an idle and useless plant on hand.

TECHNICAL KNOWLEDGE NECESSARY.

What kind of knowledge is required in locating, inspecting and testing clay beds? First—Mineralogy, which tells of the many minerals which the clayworker must use to get his effects, or get rid of to avoid future troubles. Clays themselves are for the most part complex rocks, composed of other rocks powdered and mixed together until all are indistinguishable. One need not be a highly trained mineralogist to be a good clayworker, but he certainly ought to know the composition, chemical and physical properties and heat behavior of 20 or 30 of the commoner minerals which make up the good and the bad portions of clays the world over.

Second—Geology, which tells us how clays and other rocks occur, how they lie with regard to each other, and in what formation and under what surroundings to search for them. Think of the enormous losses of energy and time which annually occur from ignorance of the fundamentals of this subject. For instance, in Ohio, although we have the greatest whiteware industries in the United States, we have not a pound of white burning clay of our own. Every bit of our whiteware materials must be imported from other states, some of it even from abroad. And in Georgia, Alabama, Virginia, Pennsylvania, Missouri and elsewhere, are localities which have the white clays, the quartz, the feldspar and the coal in close proximity. Think of the lost energy and the gigantic waste involved in this useless transportation of heavy, cheap, crude materials instead of light and costly products. One does not need to be much of a geologist, or to know more than its merest fundamentals, to know where to search, and better still, how to avail himself of the knowledge and researches of others in looking for a given material. No one today expects to do everything for himself. We have grown too complex in our civilization for that. The man succeeds in this day who best knows how to avail himself of what has already been done, and who starts in the light of other people's failures—and not in the darkness where they started.

Next, let us consider the preparation of clays for manufacture, and the manu-

facture of the prepared body into various wares. What kind of forces are we dealing with here? Two, chiefly: Chemistry and Mechanical Engineering.

THE PLACE OF CHEMISTRY.

Chemistry is the fundamental consideration; i.e., it controls the success or non-success of the operation. For instance, if we have a bed of good shale, with one calcareous layer, it is chemistry which warns us of its effect, and advises us to throw it out. Or, if it is too intimately mixed with the rest, and cannot be rejected, it is chemistry which tells us to pulverize it so finely that its effect will be evenly distributed throughout the product, and not appear as unsightly blemishes wherever a grain occurs. Again, if we have a clay with a little pyrites in it, and we want to make a face brick, it is chemistry which tells us not to weather it, but to work it direct from the pit to the machinery, if we want to avoid the dreaded scum. Again, if we want to make stoneware pottery from the same clay, it is chemistry which tells us to weather it and tells us how to do so to purify it with the greatest speed.

If we wish to make a refractory material, it is chemistry which defines the field of suitability—it is chemistry which tells what grog may be added, and what must be rejected. It is chemistry which tells us why a sandy bond clay must be avoided in one case, and sought in the next. It is chemistry which tells us what flux to use where we want to make a stony porcelain for electric wares and what to use when we want to make a translucent porcelain for dish wares. And so instances by the hundred might be adduced which will demonstrate that in the field of clay-body-compounding, whether it be the simple task of making an ordinary brick-body from a single naturally occurring clay, or the complex one of compounding a porcelain-body from a dozen widely scattered ingredients, chemistry is the final and fundamental consideration. And yet, even when all our chemical work is done, and our proportions are ever so cleverly adjusted, if our mechanical preparation is faulty, we have not reached our goal. Inefficient washing, or pulverizing, or tempering, or making—all mean bad ware, no matter if the body analyzes just right under the chemistry's balance.

* Delivered before the Convention of the Canadian Clay Products' Manufacturers, at Toronto, on December 13, 1906.

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THE DRYING OF CLAYWARES.

In the drying of claywares, we have chief ly another field of science to determine our course. Here physics, rather than chemistry, or at least the physical aspect of chemistry is in control. On the dry plateaus of Mexico, where every day is a sunny one, with a dry air and a tropical sun, clay drying can be kept almost wholly a matter of common labor, and drawing very little from the field of technology. But in the cool, humid climate of Canada, where frost interferes with outside drying the larger part of the year, and frequent rains break into the short months of the summer, drying must become almost wholly an artificial process. The fundamental considerations here are the generation of heat by combustion of fuel, the use of this heat in vaporization of water, the relative volumes and weight of gases under all sorts and conditions, the movement of bodies of gases by stacks and fans, the amount of air to a given amount of drying work, and the allowances to be made for the friction of walls, the turnings of flues, and the surfaces of wares to be dried. But beyond and on top of all this comes the recognition of the peculiarities of the clay itself—the physical factors of its fineness of grain, its plasticity, its shrinkage, its hygroscopic qualities, its surface phenomena, capillarity, viscosity, absorption and the factors of safety which all these considerations entail in the design and operation of a drier.

IN THE BURNING PROCESS.

When we come to the burning of our dried ware, we are once again in the field of chemistry. The generation of heat from fuel. The preparation of the clay for hardening by the roasting out of its volatile constituents. The recognition of the minerals which require oxidation. The adjustment of the air supply to help or hinder this process where the carbon contents vary in amount or kind. The final vitrification. The theory of solid solutions by which alone the composition of vitrified and glassy silicates becomes intelligible. The use of fractional molecular formulae to picture to ourselves what is taking place in these complex mixtures, which are forming wherever clays are burnt. The recognition of the conditions which lead to the slow gradual hardening of safe clays and the quick sudden fusion of tricky ones. The function of temperature versus time and the means of controlling temperatures. All these belong chiefly in the field of the chemist.

IN THE BUILDING OF KILNS

But in the building of kilns to carry out these processes, we draw once more on the engineer and the physicist. How big shall our kiln be? How shall the draft be taken, up, down, horizontally, or reversing? How tall a stack shall we make? How many fireplaces for a kiln of given diameter? How much fuel for a given weight of ware? How thick walls? Shall we use periodic, compound or continuous kilns? Does the type of the ware and the type of the kiln show any necessary relationship? Is it always most economical to use the kiln which shows the highest fuel economy? All these, and uncounted other questions of like nature, arise to connect this crucial period of clay manufacture indissolubly with the field of the physicist as well as the chemist.

IN DECORATION OF PRODUCTS.

When at last we reach the decoration and beautifying of our clay products, I think I can hear some say: "Here, at least, we can leave the domain of science, and enter the field of art, where the imagination, the recognition of symmetry of line, the beauty of color, and the charm of historical symbolism replace the sordid balance of the chemist and the rule and square of the engineer." But, softly! Who gives to our artistic friend the delicate translucent porcelain from which he fashions so clean and pure an outline? The chemist. Who is responsible if it warps and twists out of shape in firing, destroying the beauty but lately imparted to it? The chemist. Who devises the colors with which it is adorned? Who decides what colors may be blended, what type of glaze to employ, over or under the painting? The chemist. In short, who can be most easily supplied—the artist who draws the picture, or the chemist who makes the work of the artist possible? Look at the relative compensation of the two, and you have some sort of a criterion as to how the world views this question. The master-potter, whether he works in terra cotta or pottery or tile, is invariably the commanding feature, even in art establishments. In the famous Rockwood Art Pottery, Cincinnati, Ohio, they could better afford to lose a dozen of their best artists at once, than to lose Stanley Burt, their chemist and superintendent, who co-ordinates the work of the body-maker, the modeler, the fireman, the glaze-maker and the artist, and whose scientific insight smooths the obstacles and adjusts the conflicts which every department would precipitate if left to its own devices.

In this hasty review of some of the controlling factors of the clay industry, we have seen that the clayworker must deal with chemical, physical and mechanical considerations chiefly; that he ought to be a little of a geologist, a mineralogist, a draftsman, a surveyor and an engineer if he is to handle with wisdom and precision the problems which are a daily part of his business.

In fact, it seems as if we have a tremendous and prosperous industry, directly and necessarily depending on Science and Engineering, yet not recognizing this connection in any formal way. We have blundered along, making money it is true, because the public must have our products—but only making money because we cannot suffer from foreign competition. Clay products, except the finer, are too cheap to transport long distances and hence the clayworkers of any country are not going to be displaced from their trade by foreign competition. But they may be doing poor work, making poor products, getting small returns from their expenditures—in short, running their business at a low efficiency.

A CHEMICAL ENGINEERING INDUSTRY

My argument is, then, that the clay industry is a chemical engineering industry, and that it will only reach its proper development and its true place among the professions, when it is treated as a profession, rather than a trade.

The function of the clayworker's school is now fairly before us. If the status of clay manufacture is to be improved and put where it belongs, it can only be done by a bringing into the industry men who more

fully and clearly understand these sciences and the way in which these sciences are clayworking operations. And the only way to get such men is to train them for their future work. They are not to be had in any considerable number, either in the industry or out of it. Hence to increase supply we must make it for ourselves. Practical men have learned much of clays and clay-working, but they have not chiefly learned in spite of obstacles, and without the aid of scientific training. The function of the school is to show the "Why" as well as the "How" of clay manufacture. One can learn to do it then in a given time and so long as conditions are made that one can get fairly good results. But the trained clayworker cannot with safety in the experience gained in one place in another, because he cannot allow for the time of to help the clay industry?

The question may be asked—Why do not bring into the clay industries young engineers and young chemists who have studied in the existing schools of technology? Do all study the same list of sciences as above. If a knowledge of these sciences is all that is needed, why not bring them in to help the clay industry?

This is a pertinent question. We doubt such a step could be taken with benefit. If there were no better way, a plan should be carried out. But the connection between clayworking, chemistry and engineering, as these subjects are now taught, is not very clearly discernible. Scientists do not deny the connection; they have not the necessary familiarity with the industry to enable them to draw deductions from it or to attempt to solve its problems. Comparatively few men, with originality and power to think deeply in new fields. Hence a chemist must, as he is helped in applying his chemistry to a new industry, whether it be mining, smelting, weaving, or dyeing or clayware. Especially is this true in the beginning of each young chemist's work. He can do chemical reasoning with confidence in industrial work, only when he has become their very close and vital relation.

SPECIAL TRAINING IS NECESSARY

There is no question, then, but that training in what the clay industries have and are doing is just as necessary for the success of a clayworker's school as is training in mining is necessary for a mining school. There is, however, some diversity of ideas among clayworkers as to what kind of a school is needed. In fact there are three types in existence—the Trade School, the Art School and the Technical School. Each has its advantages and limitations.

THE TRADE SCHOOL IN EUROPE

In Lauban, Germany and Svedala, Sweden they have the best advantage of the trade schools for brickmakers. They create but a limited part of the year, when the industry is most active. They are supported partly by the government, partly by the government of education, partly by the fees of the pupils. They use a considerable part of the time of the pupils in actual brickmaking operations. At Svedala, at least, they produce and sell bricks, having a skeleton of regular hands to run the plant. When

is filled in with scholars from day to day, each man working at different positions in rotation. They study part of each day and work a part. The brick plant comprises as many kinds of machines and as many kinds of kilns as can conveniently be used, so that the men may practice on all methods. The period of school is short—a few months in the winter for one year, or at most two seasons.

The output of the trade school is designed to be good mechanics and artisans. Its maximum product would scarcely exceed the foreman grade, and the training is not designed to make superintendents and masters.

THE ART SCHOOL IN EUROPE.

There are a number of schools, both in Germany and other foreign countries, as well as in America, where a high-grade training is given in pottery work, especially the modelling, mold-making, drawing, painting and designing, but also including instruction in the glazing, firing and a limited amount of theoretical work in mathematics, chemistry and physics. The typical school of this sort is at Bunzlau, Germany, and is under the able direction of Mr. Pukall, a most accomplished ceramic chemist.

The produce of this class of schools at their best is the superintendent of a pottery plant, but they are much more likely to land men in positions as artists or department foremen. There is no engineering training as such in their courses and while they make highly competent men in shops and potteries, men of great personal activity in doing things themselves, they cannot in the nature of the case lead to positions of great technical and financial responsibility.

THE TECHNICAL SCHOOL.

This type of school in clayworking treats the subject as indicated in the earlier portion of this paper—i.e., as a branch of chemical engineering. It devotes not more than 25 to 35 per cent. of its time to specifically clayworking subjects—the other 65 or 75 per cent. is devoted to a good stiff drill in sound engineering—to mathematics, physics, chemistry, drafting, surveying, designing, mechanics, geology and similar hard mental labor. Schools with such solid courses of study exist at the Ohio State University and the University of Illinois, and schools with general cultural subjects, largely replacing engineering, exist at the New York and New Jersey State Schools of Clayworking and Ceramics at Alfred, N.Y., and New Brunswick, N.J., respectively. In England, the training given at Victoria Institute, Tunstall, is also of this grade, being deficient in engineering phases. In Germany, the Techni-che Hoche-Schule at Coethen, is more akin to the work of the best American schools than the English school is, and gives strong sound engineering training so far as it goes.

And here let me tender my advice—advice born of experience in this work and actuated by a strong desire to see the movement for ceramic education succeed and become more vigorous as the years go on.

FOUR YEARS' COURSE DESIRABLE.

My recommendation is—start your school on the highest possible plane—do not be led by any short-sighted policy, or by the hope of quicker returns, into establishing a

school of any less grade than a thorough four-year engineering course. Furthermore, do not make the mistake of establishing your school under the auspices of any but the strongest and best equipped institutions. You have technical and engineering schools in Canada, worthy of a place among the best that the world affords. In these schools you can find young men preparing for civil, mechanical and electrical engineering, for mining and metallurgy and for architecture. In the profession which you represent, the profession which, as the forests dwindle is destined to supply the construction materials for the world—which even now in its infancy, so to speak, produces a valuation surpassed only slightly by that of the utilitarian metals (exclusive of silver and gold)—Is your profession to be satisfied with a less rigorous or less fundamental training than that given to the miner of iron or the melter of lead?

And again, let me advise that you select for the director of such a school a clayworker. Do not select anyone who represents the school side only—a university man whose life has been spent in the school-room and library. Go out into the industry and find some man who has a good technical education—who has acquired a good sound knowledge of at least one clay industry—who is on his feet in this specialty, and who knows what clayworkers are doing, thinking and needing. Such a man, will, if he have the spirit of a teacher, soon repair the gaps in his own knowledge and adjust himself to the duties of a professional chair. He is infinitely more likely to succeed than any scholar who has grown up in the atmosphere of the university. No one but a clayworker can instill the 'clayworkers' spirit into young men.

These reasons all gather strength and conviction when one has familiarity with the results which four years of hard drilling yield to the average raw youth received by us. And this brings me to the point—What may we properly expect from a graduate of a four-year technical course?

There are perhaps some radical, or at least some frequent misconceptions on this topic. I find employers as a rule have a foggy and often erroneous idea of what a young graduate from a technical school should be called upon to do.

Schools are for two purposes—First, to impart knowledge; second, to train the judgment. The first they can accomplish much better than the second. The mind of the student is so fully occupied with grasping the new truths that are put before him and practicing himself in their use, that in the very nature of the case he cannot progress far in the process of ripening his judgment.

The feature of responsibility, the most powerful factor in maturing the judgment, is necessarily largely absent from college exercises. The student is thus likely to emerge from his training period with much knowledge stored away in his head, but with an unformed judgment. He is not an engineer, merely because he carries the university degree. He becomes an engineer only when he unites knowledge and judgment. Practice, experience and responsibility are necessary to convert the raw young collegian into a sound and dependable engineer. The school receives its crude material as pig-iron. It makes it into steel. But experience is

the smith that forges this steel and tempers it to meet the duties which are awaiting it.

I sound this note of warning, that you, as clayworkers, may not expect the impossible from your college graduates. The boys may know a good many things that you do not—they probably will—at least they ought to. But it does not for a moment follow that their judgment can replace yours in the plant. It may, after a time, if the boy continues studious, works hard and develops his judgment by continual use. But the green college graduate is not very much different, so far as his usefulness or power in your business is concerned, from any other young greenhorn. The chief difference is in the quality of the raw material—one is steel now, waiting for the tempering, while the other is still pig-iron, and likely to remain as such.

Besides this whole question of what the school can do for you, there is another—closely related, but still distinct. Assuming that you are by this time converted to the idea that technical education is needed by the clay industry—in your own factory for instance. Assuming that you also agree with me that you want your young clayworkers to have only the best kind of an education that can be given them, and that your school must be of the most thorough type. Assuming that you have been thoroughly disillusionized as to what to expect from the product of the school when it first comes into your factory and that you now see that you must really assume in some degree the position of teacher to him instead of his being a teacher to you, and that what he becomes in your business really depends largely on the tact and skill with which you use him and develop him. Assuming that all these things are understood and agreed upon, there is still one other important thing to consider.

WHAT CAN YOU DO FOR THE SCHOOL?

If you Canadian clayworkers are going to set up a successful technical school for your industry, you must first realize that it is not wholly a question of what the school can do for you, but also a question of what you can do for it. If the school succeeds, it will only be by mutual co-operation of clayworkers and teachers. The school will need your constant help and support in two ways. First, in placing its graduates in places where they can at once begin to acquire the experience which alone is able to ripen their judgment and make them useful. This entails a sacrifice upon your part. You may not particularly need a young man, but it should be your pleasure to make a chance for him if you can. Even for the short three months of the summer vacation, they need the chance to do work and see work done. It will not often be profitable for you to use them for a short-time engagement, but that is not the question. The question is what the boy needs. You must all of you adopt as a principle, the practice of helping your ceramic engineers to get their feet on the ground by contact with actualities—whether you personally expect to realize anything from their services later or not. You must expect to "cast your bread upon the waters," and have faith that it will be richly returned to you "after many days." If you approach this matter in the broad spirit of optimism and altruism

actuated by a sincere desire to make the clay industries of Canada the best in the world, and can sufficiently submerge for the time your own petty personal interests for the broader, bigger, higher interests of your profession as a whole, then you will find a way easily enough to take these young colts fresh from the stock farms and teach them their paces in the great speedway of life.

Besides this, there is another requirement—that you show yourselves willing to aid the teachers in your technical schools in securing their data, to help them in determining the principles and laws of your business to show them the troubles which beset the industry. How can the teacher know these things, except as you help him to see them. He cannot be an expert in all branches of the clay industry. He should be in one. But the expert knowledge which he needs to give the boys has not found its way into books as yet. Physics and chemistry he can teach. There have been scholars devoting their lives to those subjects for the last 200 years. But in clayworking, there is no ancient literature to consult, except on the historic, or artistic side. Scientists have as a rule passed it by. There are only a few who are devoting their lives to solving its problems.

PRACTICAL KNOWLEDGE NECESSARY.

Further, the better knowledge of all engineering and scientific industries comes from the industries themselves. The investigator, working alone in his laboratory, is not able to reproduce the conditions which surround the work in the factory or the kiln. His conclusions are unsafe until they have been carefully tested in practice.

Therefore, I assert that only by intimate and constant contact with plants working under regular trade conditions can the chemical engineer of the clay industry reach the truth about the problems of the clay industry and give guidance as to their solution.

TRADE SECRECY A RELIC OF BARBARISM.

And here comes in to interfere and hold back, that miserable relic of barbarism—Trade Secrecy. Do we find rival firms discussing ways and means of improving the known defects of their wares? By no means. They talk about the weather, or the races or anything else. Will one brick-maker willingly let another know what his fuel costs per thousand? Not if he can help it. Potters carry their glaze and body mixtures in their little memorandum books, securely in their inside vest pockets, apparently unconscious that each of them is making pretty much the same thing as his neighbor and that his recipe cannot fluctuate outside of rather narrow limits or the ware would be bad. And so the game goes endlessly on. Each one of us goes limping and halting through life, making poor ware and little money, because forsooth, he fears some one else may possibly profit more than he by the adoption of publicity.

If you undertake to establish a technical school, you ought, each and every one of you, to mentally obligate yourselves to give to that school, or to its professors and directors, every bit of data which you yourselves have or which they can show you how to find out. If these conditions can be brought about—the professors working

hard to give the boys the facts and to develop their reasoning power and you co-operating with the professors to prepare data—then you Canadian clayworkers will in truth soon lead the world.

Any body of men who set themselves with enthusiasm to co-operate toward such noble and high-minded ends become irresistible in their progress. There has been less of this kind of co-operation in clay manufacture perhaps than in most other industries. The strides of the iron and steel industries of the United States which have astounded the world in the last quarter of a century are easily explained when we consult the literature of the American Institute of Mining Engineers to see how completely they have forgotten about trade secrecy.

THE NEEDS IN BRIEF.

And now, in conclusion, let me recapitulate the points of this talk:

1st. Clayworking has been shown to have a strictly scientific basis, in which engineering methods and chemical principles are of equal importance.

2nd. It opens itself to the assistance of school methods and laboratory investigation, as well as the other mineral industries, mining and metallurgy, which have long since received recognition in the curricula of engineering schools.

3rd. It is not now using the aids of science in any large degree for the personnel of the present superintendents and owners of clay plants, includes relatively few technically educated men, and practically none who have had the training of a ceramic school.

4th. Ceramic schools of high grade have been established elsewhere and have been in successful operation for ten years or more, and their graduates have won brilliant success in many industries, and have shown their power to grasp and overcome the difficulties which they meet.

5th. The ceramic graduate is not able, as he leaves school, to stand alone, and needs kind and encouraging treatment until he begins to acquire the poise which comes of experience.

6th. If given this kind of treatment, a year or two makes him a useful and often an invaluable man—one whose horizon is wider and whose grasp is stronger than the product of any other kind of training.

7th. The establishment of a technical school for clayworkers in Canada, especially if brought about by the influence of this body, should commit you one and all to a broad policy of publicity and the free interchange of data.

8th. If, in order to make this school a success, you adopt this policy, you will soon find that the value of the school has become secondary to the broader advantages of freer intercourse and a more helpful spirit between manufacturers. In short, you Canadian clayworkers will find that in embracing the cause of science and education you have entertained an angel unawares.

THE CHICAGO ELECTRICAL TRADES EXPOSITION.

Those who went to the Electrical Trades Exposition in Chicago expecting to see the same things they saw last year were agree-

ably disappointed. Indeed all except those who have been closely watching the progress of electricity were surprised at the great variety of new devices and applications to be seen. Electricity is making wonderful progress that it takes an exhibition every year for one to keep track of.

One of the most marked advances is motor application. The electric motor not only successfully replacing other means of power drive, but is fast abolishing that drive for even the smallest machines. There is scarcely any type of machine that can be driven more economically, conveniently and efficiently by the modern small motor—now made in units as small as 1 h.p.—than by hand.

In the Westinghouse exhibit alone there were to be seen twenty odd machines of widely varying types, driven by motors exactly suited to their requirements. It was scarcely a visitor to the show, who did not find some type of machine in which he was directly interested, and many away with new ideas of economy and convenience.

There were machines not only for the manufacturer, but for "the butcher, the baker, the candle-stick maker" as well, and too for domestic purposes, that interested all comers. It is only lately that electricity has meant anything more than light in the home. That this is only one of its uses was demonstrated by the motor household utensils in operation in the exhibit, including a washing machine, an ironing machine, a sewing machine and a sanitary cleaning and scrubbing outfit. The latter device attracted universal attention through its ability to remove quantities of dust and dirt from apparently delicate clothes, rugs, upholstery, etc. The use of a plant of this nature for private residence depends upon the motor drive, as any other forms of power would be too expensive, require too much space and attention.

It goes without saying that a form of power which is economical enough for domestic purposes, is well adapted to the requirements of those who cater to domestic needs upon a large scale, and so keepers, grocers, laundrymen, bakers, confectioners found many of their uses of daily use among the motor driven, as coffee grinders, dough mixers, blenders, mangles, refrigerating machines, clothes wringers, dish washers and ice cream freezers. That electric motors furnish ideal power for all such machines was apparent to all who saw them in operation.

Among the machines of interest to manufacturers were a lathe, a saw, a ventilating fan, a printing press and a blacksmith's blower. Merchants saw an interesting device in the motor and automatic pin ticketing machine, which is fast replacing the old method of pricing goods by hand.

Those who visited this interesting educational exhibit went away wondering there were any machines left to the credit of which the electric motor had not adapted. If there are any such, next time visitors will undoubtedly find them on the list.

It may be useful to secure the goodwill of the engineer, the electrician, the machinist, the foreman, and the book-keeper, but

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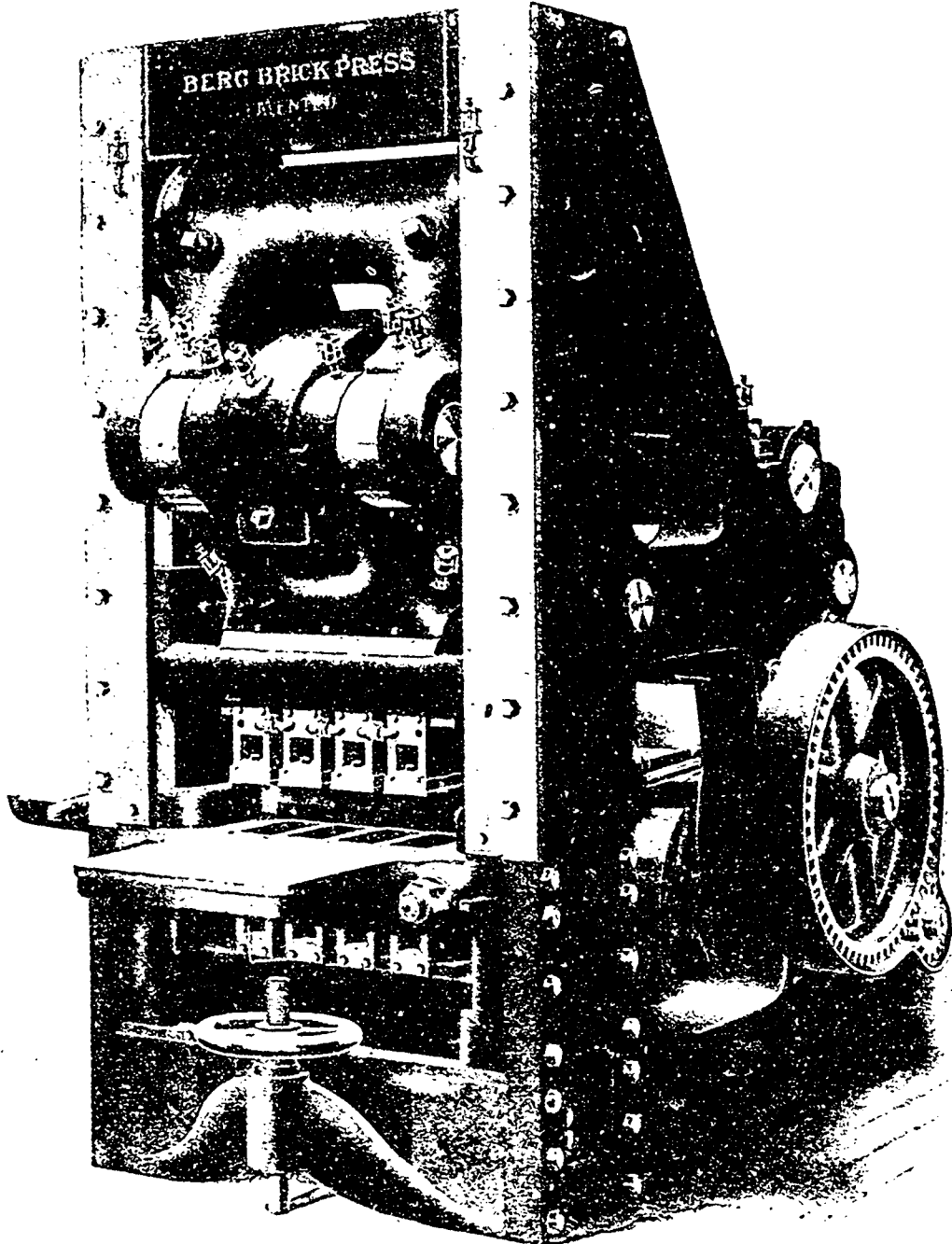
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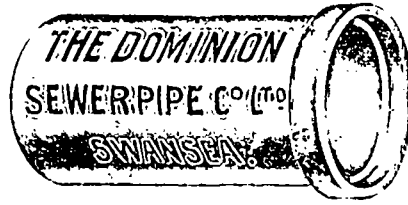
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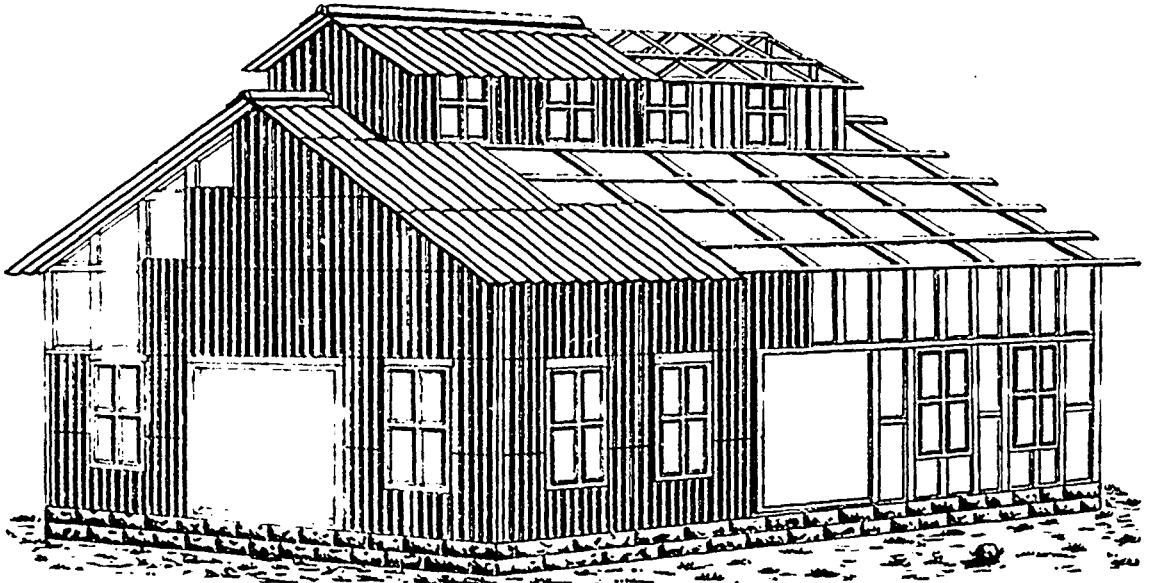
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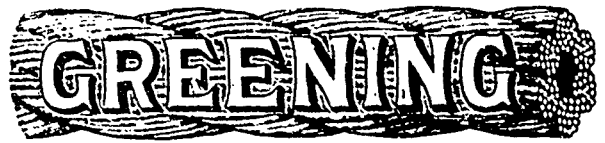
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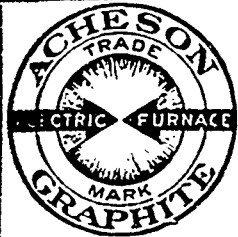
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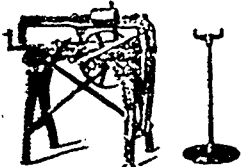
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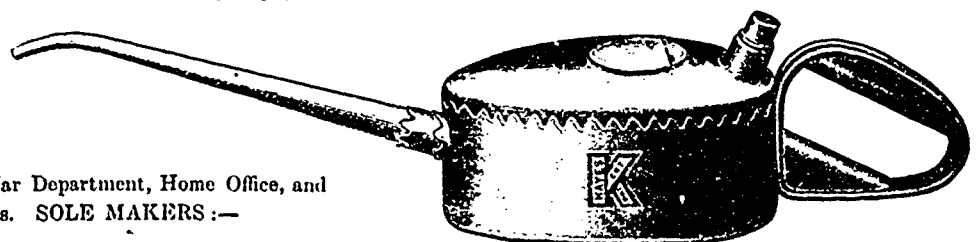
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- 25 H.P. Gould, Shapley & Muir, horizontal.
- 25 H.P. 4-cylinder, marine.
- 21 H.P. Ohio, horizontal, NEW.
- 21 H.P. Portable, on wheels, Ohio, NEW.
- 18 H.P. Ohio, horizontal, NEW.
- 15 H.P. Pierce gasoline.
- 14 H.P. Portable on wheels, Ohio, NEW.
- 14 H.P. Fairbanks-Morse, horizontal.
- 12 H.P. Goldie & McCulloch, horizontal.
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- 8 H.P. Defiance, double cylinder, marine, NEW.
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- 4 1/2 H.P. Triton, upright, Marine, NEW.
- 4 H.P. Ohio, horizontal, NEW.
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- 3 1/2 H.P. Triton, upright, marine, NEW.
- Six 3 H.P. Upright, Petrie's Imperial, NEW.

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- No. 1 Single Purchase Crab Winch, 2 ton.
- No. 12 Double Purchase Crab Winch, 7 ton.
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12" x 16" plain slide valve, L.H.	50
11" x 24" plain slide valve.	50
10" x 24" plain slide valve, L. Hd.	45
9" x 22" plain slide valve, R. Hd.	45
10" x 12" plain slide valve, L.H.	25
9 1/2" x 10" centre crank, Button, N.L.W.	20
9 1/2" x 18" M. Mowry.	22
8 1/2" x 12" plain slide valve	20
9" x 10" Leonard centre crank.	20

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No. 6 Horizontal Centrifugal, Morris	1050
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New No. 2 Taber Rotary Pump	250
No. 0 Taber rotary pump	100
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- 6 1/2" x 8" Double Drum, Double Cylinder Hoister with Boiler, NEW.
- 6 1/2" x 8" Double Drum, Double Cylinder Hoister with Boiler, NEW.
- 6 1/2" x 8" Double Cylinder, Double Drum Hoister, with Boiler, NEW.
- 6" x 10" Double Drum Hoister, no Boiler.
- 5 1/2" x 7" Double Cylinder, Double Drum Hoister with Boiler.
- 7" x 8" Single Cylinder Single Drum Hoist, less boiler.
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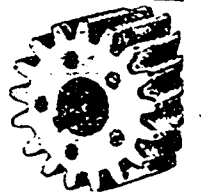
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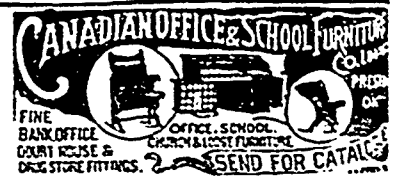
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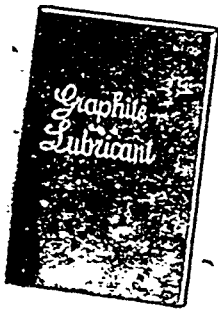
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All advertisers are invited to send in full list of lines sold by them. We desire to keep this index thoroughly up-to-date, but this will be impossible unless each advertiser sees to it that he is represented under each heading he is entitled to.

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Petlar People, Oshawa, Ont.
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Dominion Oil Cloth Co., Montreal.

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McCullough-Dalsell Crucible Co., Pittsburg, Pa.

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Kerr Engine Co., Walkerville, Ont.
McDougall, John, Caledonian Iron Works Co., Montreal.
McKinnon Dash & Metal Works Co., St. Catharines, Ont.
Marshall, David & Sons, St. Mary's, Ont.
Smart-Turner Machine Co., Hamilton, Ont.

Cement Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Bradley Pulverizer Co., Boston, Mass.
McDougall, John, Caledonian Iron Works Co., Montreal.

Centrifugal Pumping Machinery

Marx Machine Works, Baldwinville, N.Y.
Smart-Turner Machine Co., Hamilton, Ont.

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

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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 Hand 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.

Collectors (Pneumatic)

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

Condensers

Smart-Turner Machine Co., Hamilton, Ont.

Conduits (Interior)

Conduits Company, Limited, Toronto.

Connecting Rods.

Canada Forge Co., Welland, Ont.

Contractors' Machinery

Allis-Chalmers-Bullock, Limited, Montreal.
Gartshore, John J., Toronto.
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.
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.
Petlar People, Oshawa, Ont.

Covers

McCullough-Dalsell Crucible Co., Pittsburg, Pa.

Cranes (Electric and Hand Power)

Smart-Turner Machine Co., Hamilton, Ont.

Crankshafts

Canada Forge Co., Welland, Ont.

Crayons

Lowell Crayon Co., Lowell, Mass.

Crucibles

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

Crucible Caps

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

Crucible Covers

McCullough-Dalsell 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, Hamilton, 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 Hand 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 Battery Filler

International-Acheson-Graphite Co., Niagara Falls, N.Y.

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, Cornille & 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 Supplies

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

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Electrical Construction Co., London, Ont.
Forinan, John, Montreal.
Jones & Moore Electric Co., Toronto
Packard Electric Co., St. Catharines, Ont.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Electrodes

International-Acheson-Graphite Co., Niagara Falls, N.Y.

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.

Engineers (Consulting)

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

Engineers (Contracting)

Babcock & Wilcox, Limited, Montreal.
Canada Foundry Co., Toronto.
Darling Bros., Montreal.
Electrical Construction Co., London, Ont.
Fensom, C. J., 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.
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.

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.
Jenckes Machine Co., Sherbrooke, Que.
Morris Machine Works, Baldwinsville, N.Y.
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

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Fans

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

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

Metallio Roofing Co., Toronto.
Pellar 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

Metallio Roofing Co., Toronto.
Pellar 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.

Forgings

Canada Forge Co., Welland, Ont.

Founders

Canada Foundry Co., Toronto.
Goldie & McCulloch Co., Galt, 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.
International-Acheson-Graphite Co., Niagara Falls, N.Y.

Fuel Economizers

Babcock & Wilcox, Limited, Montreal.
Sturtevant, B. F. Co., Hyde Park, Mass.

Furniture (Lodge, Opera and School)

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

Galvanizing

Ontano Wind Engine & Pump Co., Toronto

Galvanizing and Tinning Machinery and Furnaces (Wire)

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

Gas Blowers and Exhausters

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

Gas and Gasoline Engines

Economic Power, Light & Heat Supply Co., Long, 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, Ont.
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, Ont.

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.
International-Acheson-Graphite Co., Niagara Falls, N.Y.

McCullough-Dalzell Crucible Co., Pittsburg, Pa.

Hack Saws

Krug & Crosby, Hamilton, Ont.

Hames.

McKinnon Dash & Metal Works Co., St. Catharines

Hardware

Batterfield & Co., Rock Island, Que.
Gartshore, John J., Toronto.
Globe Machine & Stamping Co., Cleveland, O.
Morrow, John, Screw, Limited, Ingersoll, Ont.

Heating and Ventilating Apparatus

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

High Pressure Blowers

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

Hoisting Engines

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

Hoists (Chain and Pneumatic)

Canadian Rand Drill Co., Sherbrooke, Que.

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.

HARBISON-WALKER REFRACTORIES CO.
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**Fire Clay, Silica,
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*Manufacturers of
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 Refractories.*

*Importers of
 Chrome Ore.*

*Sole Agents for
 Carl Spaeter Magnesite.*

Blast Furnace Linings, Stove
 Brick, Open Hearth Furnace
 Brick, Cupola Linings, Brick
 for Gas Furnaces, Brick for Mill,
 Forge and Heating Furnaces,
 Brick for Copper, Nickel, Brass
 Furnaces, etc. Rotary Cement
 Linings, Brick for Lime Kilns, etc.

7500 Regular Customers. Write for Booklet K. 1,100,000 Daily Capacity.

TWO good points among many others in favor of McCullough-Dalzell Crucibles: They will not "skelp"; each holds three pounds of molten metal to the number. Write for prices to-day.

MCCULLOUGH-DALZELL CRUCIBLE COMPANY, PITTSBURG, PA.

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 SILICA CEMENT

MAGNESITE BUFRNT MAGNESITE

Our factories are the most complete in the country. Located in Pennsylvania, Ohio, and Kentucky—and controlling the largest known bodies of refractory materials for different work. Operated by experienced managers. We manufacture material for all heat work—second to none. Capacity over 200,000 Brick and Special Shapes per day. Write for catalogue.

TO THE VARNISH BUYER

the most serious considerations are quality, reliability and uniformity, and these qualifications are of special importance to the dealer who is trying to build up a permanent varnish trade.

Berry Brothers' label or brand may be safely relied upon as ensuring the above conditions.

Our Varnishes are the safest goods to handle and the surest and most reliable goods to use.

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 VARNISH MANUFACTURERS
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Write for our 100 page illustrated catalogue. Every dealer should have a copy for reference.

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"GENUINE OAK" LEATHER BELTING

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MONTREAL TORONTO QUEBEC ST. JOHN

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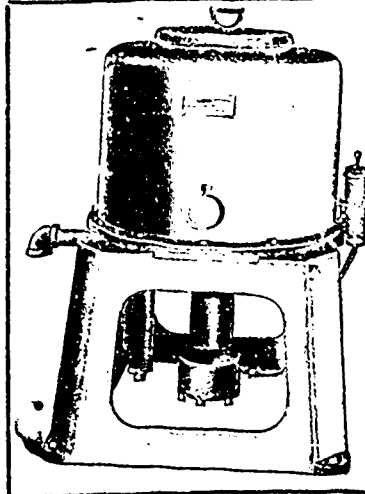
For Card Room, Six Sett Woolen Mill, a practical man as second hand. Apply to D. K. McLAREN, Montreal.



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- THOMAS KELTY, Parliament Buildings, Toronto.
- ARTHUR W. HOLMES, Parliament Buildings, Toronto.
- JOHN ARGUE, Parliament Buildings, Toronto.
- MARGARET CARLYLE, Parliament Buildings, Toronto.
- MRS. JAS. R. BROWN, Parliament Buildings, Toronto.

Persons having business with any of the Inspectors will find them at the above address. HON. NELSON MONTEITH, Minister of Agriculture



Save the Oil

From Chips, Saws, Bolts, or any other parts which are full of oil, and

Save the Waste

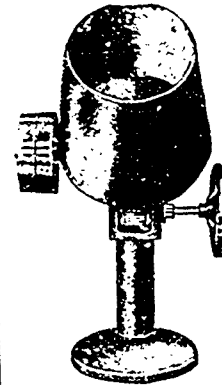
Get 90% of the oil out and have waste clean for use again.

Ask for the Catalogue.

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The Globe Tilting Tumbler being CHEAPEST to operate are the CHEAPEST TO BUY.

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Albert Manufacturing Co.

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"Hammer Brand" Calcined Plaster

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PATENT ROCK WALL PLASTER

HILLSBOROUGH, N.B., CANADA.



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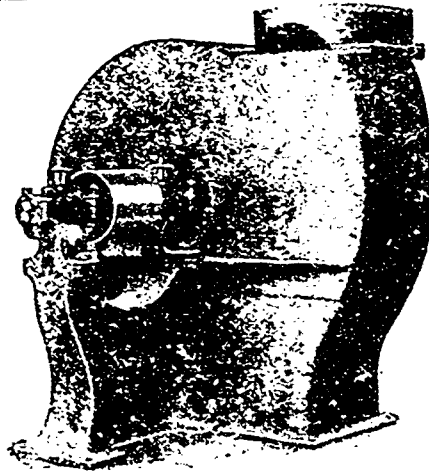
Indicating that the pipe fitter's tool that bears it is of genuine Armstrong make. There are many "Armstrong Patterns" etc., but none of them have this trade mark "F. Armstrong" pipe cutting and threading machines, stocks and dies, vises, etc., are the standard of discriminating buyers.

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Hydro Park, Mass.

New York Philadelphia Chicago Cincinnati London

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Better bars for re-working are obtained from selected scrap than from pig iron—have more life and strength.

London Bars are made from selected scrap and come in Flats, Rounds, Squares, Ovals, Half-Ovals, Half-Rounds and Bands.

Large stock always on hand, insuring prompt shipment.

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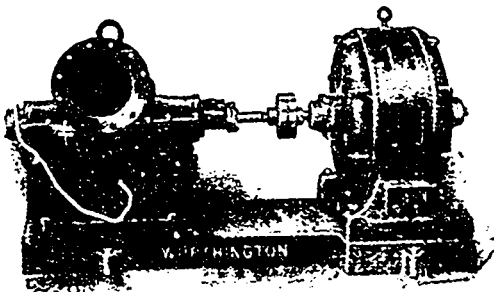
William R. Perrin
AND
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TORONTO, Canada.

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