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VOL. 55. No. 2.

TORONTO

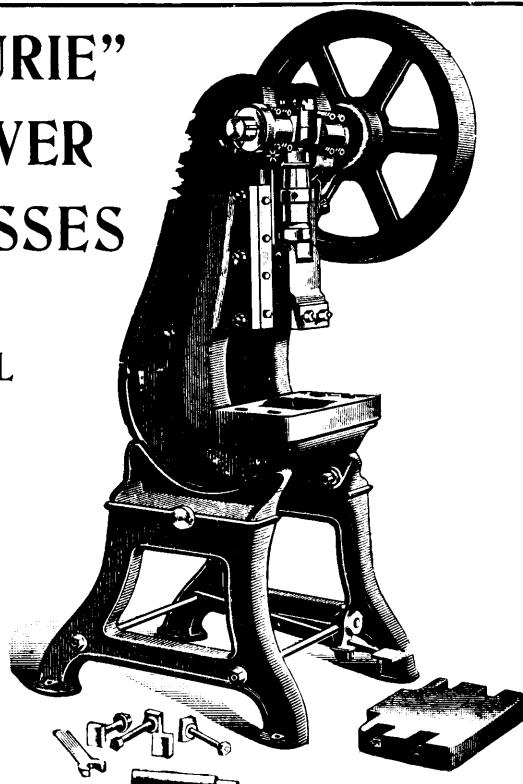
JULY 19, 1907



See the Classified "Ads" on Page 46

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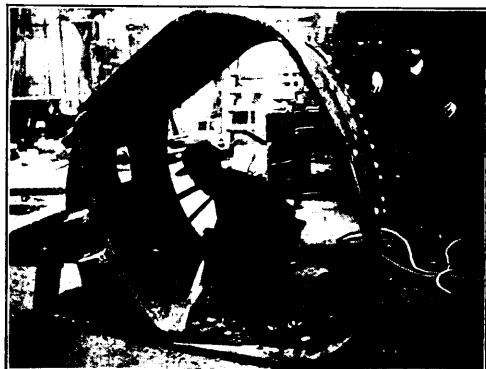


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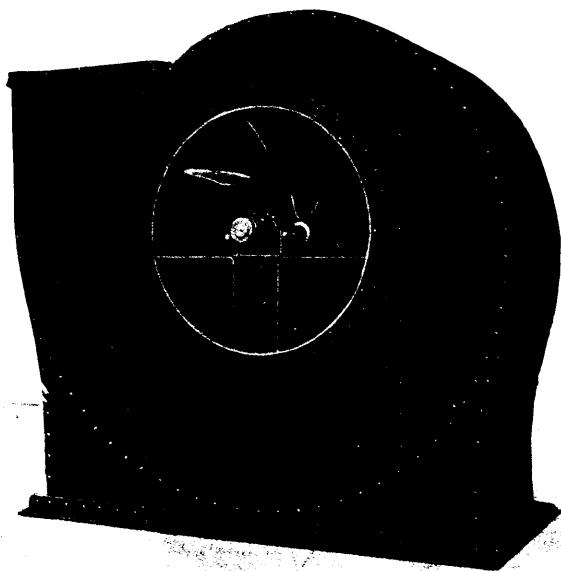
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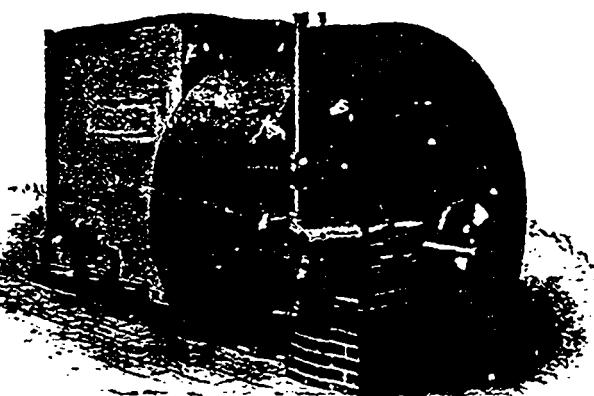
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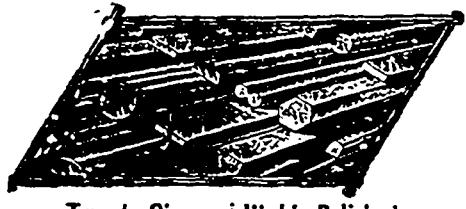
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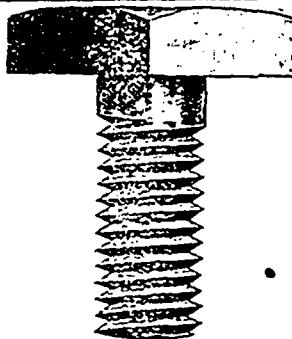
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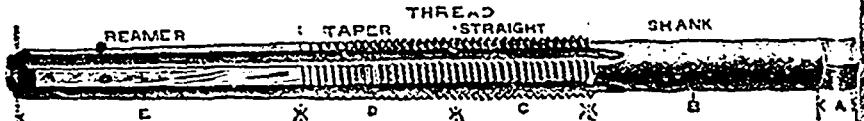


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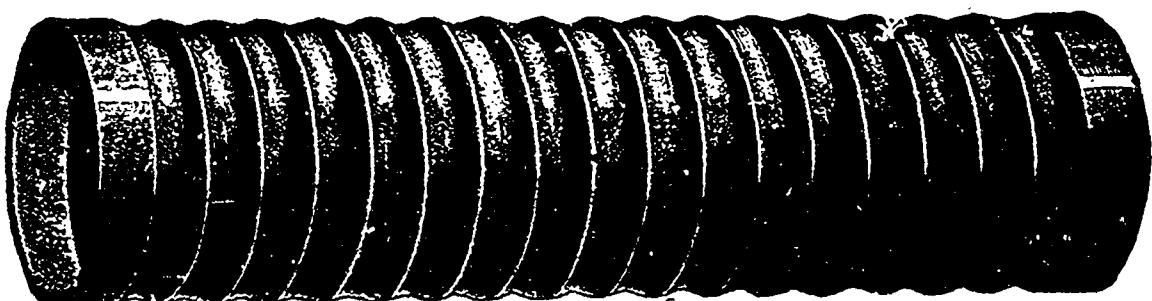
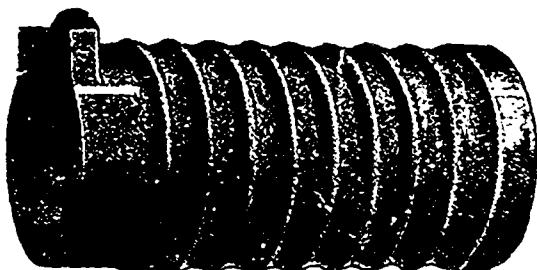
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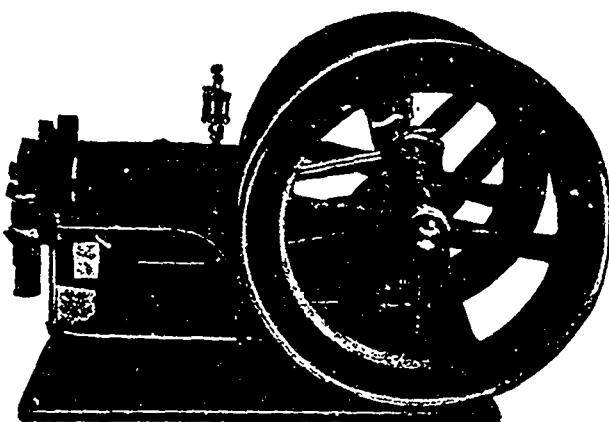
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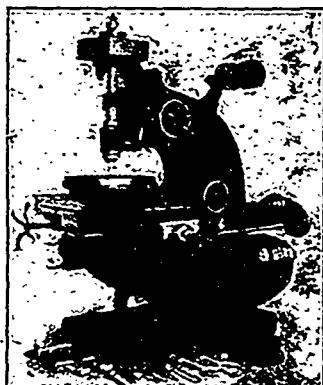
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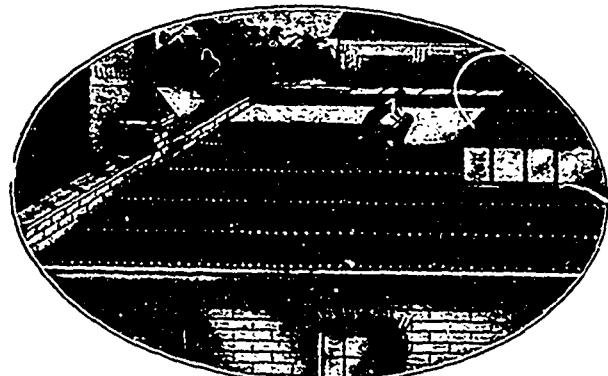
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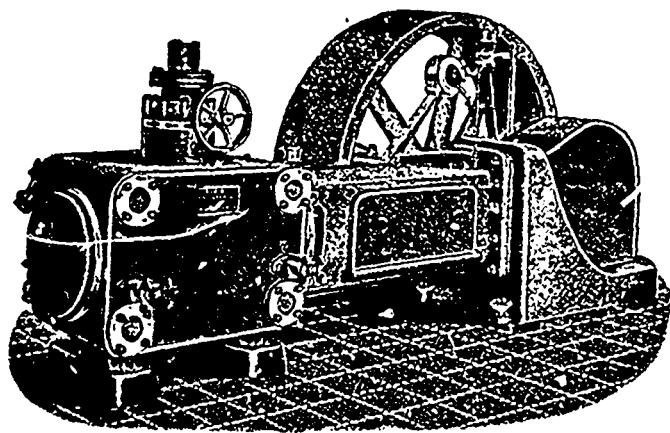
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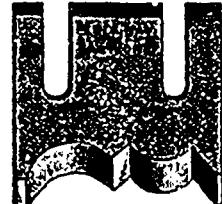
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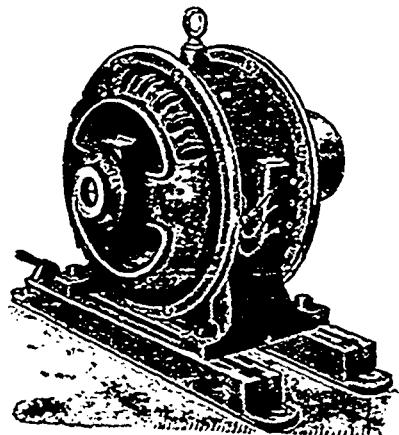
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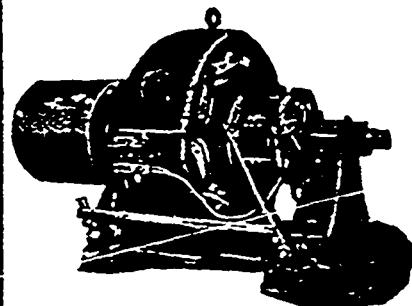
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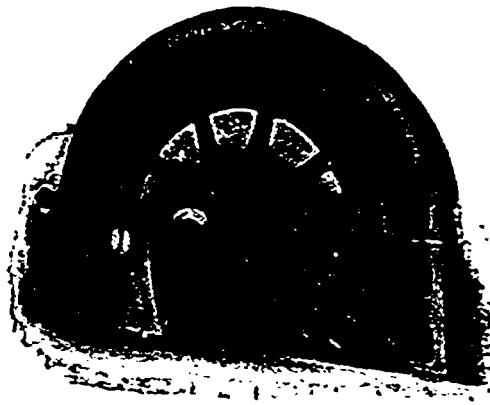


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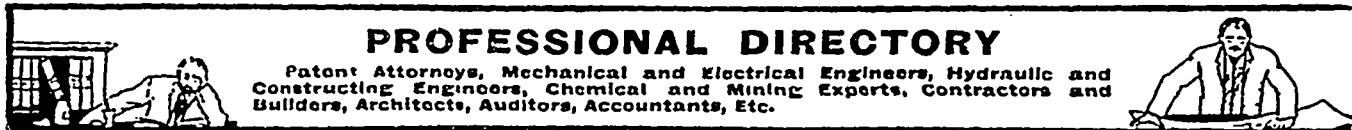
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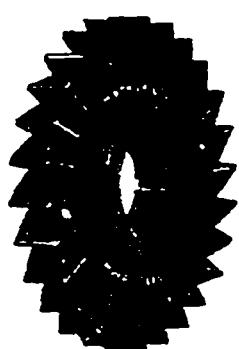
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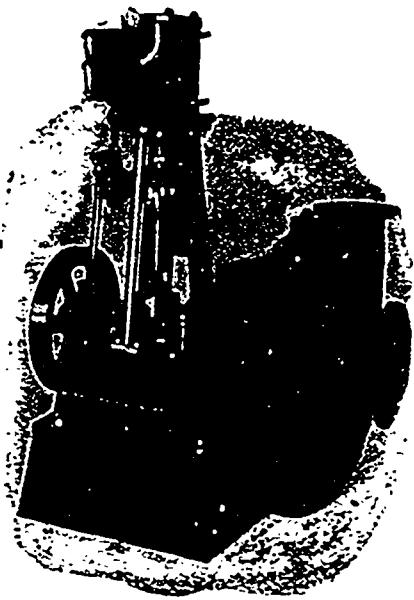
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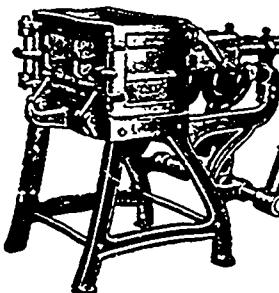
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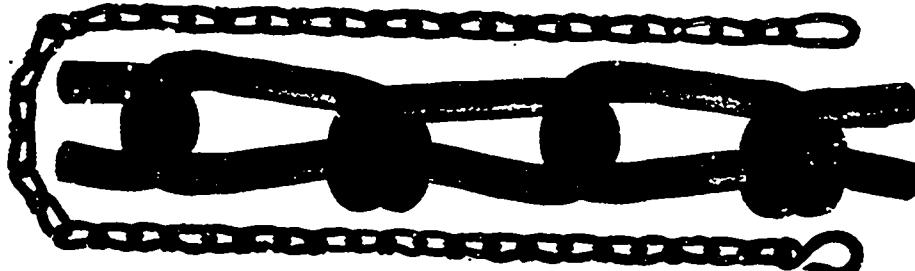
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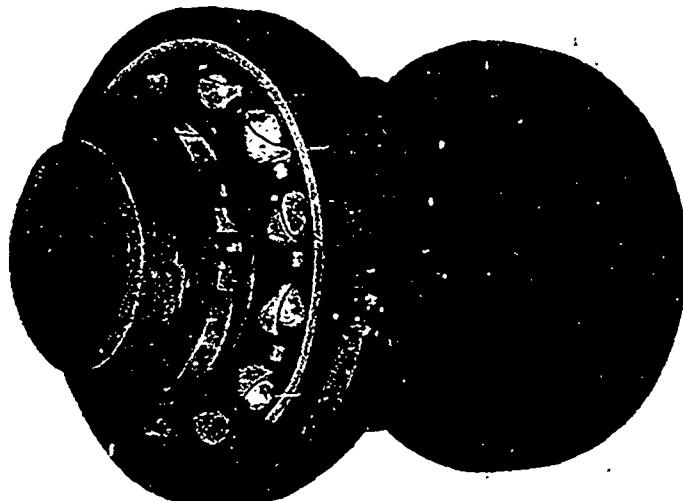
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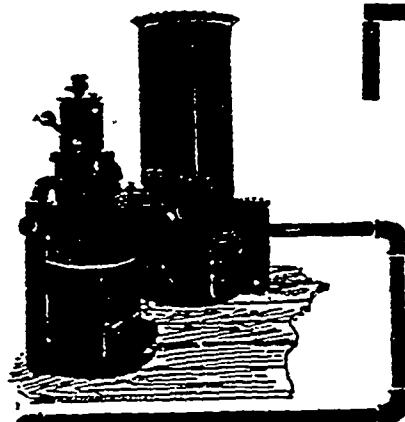
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2,000			
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H.P.	Hrs.	Days	Ibs.
$100 \times 10 \times 300 \times \frac{1}{4}$	=	112 Tons	
2,000			
Cost at \$5.00 = \$560			

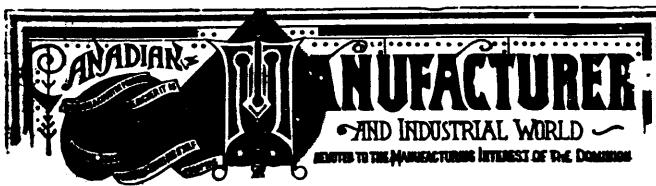
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SAIL ON! SAIL ON! AND ON!

We appreciate the complimentary allusion to this journal made by the Lindsay, Ont., Watchman-Warder:

Born on the first day of July, in 1880, that excellent and able trade journal, THE CANADIAN MANUFACTURER last week reached the twenty-eighth milestone of its interesting and useful journey through journalistic life. During the 27 years it has been in existence, THE CANADIAN MANUFACTURER has never missed appearing on its regular publication day, and it may truly be added that it has never been behind hand in any issue in advocating what it believed to be in the best interests of the manufacturing industries in Canada. Adequate tariff protection for the infant industries of the Dominion has been the policy ever and always advanced by this journal, and its efforts in this line, as in other departments, have been able and well directed. THE CANADIAN MANUFACTURER has safely come through the teething period of journalistic infancy; its wisdom teeth were cut long since. The customary "growing pains" of youth have also been safely passed; to-day the paper is enlarged, improved, bigger and better than ever. And now at twenty-seven, strong, independent, progressive and newsy, this journal is a credit to its publishers, its staff, and the constituency of readers which it represents so well. Many happy returns, and may your shadow grow bigger each day!

Such kindly references are stimuli to greater exertion in the interests of Canadian manufacturers and the policy of adequate tariff protection to their industries. That popular American poet, Joaquin Miller, writing of Columbus on his voyage of discovery, of which the continent of America was the result; and of the difficulties and discouragements that beset him, emphasizes the virtues and reward of persistent effort:—

Behind him lay the gray Azores,
Behind the Gates of Hercules;
Before him not the ghost of shores;
Before him only shoreless seas.
The good mate said: "Now must we pray,
For lo! the very stars are gone—
Brave Adm'r'l, speak; what shall I say?"
"Why, say: 'Sail on! sail on! and on!'"

"My men grow mutinous day by day;
My men grow ghastly wan and weak."
The stout mate thought of home; a spray
Of salt wave washed his swarthy cheek.
"What shall I say, brave Adm'r'l, say,
If we sight naught but seas at dawn?"
"Why, you shall say at break of day:
'Sail on! sail on! sail on! and on!'"

They sailed and sailed, as winds might blow,
Until at last the blanched mate said:
"Why, now not even God would know
Should I and all my men fall dead.
These very winds forget their way,
For God from these dread seas is gone.
Now speak, brave Adm'r'l, speak and say——"
He said: "Sail on! sail on! and on!"

They sailed. They sailed. Then spake the mate:
"This mad sea shows his teeth to-night.
He curls his lip, he lies in wait,
With lifted teeth, as if to bite!
Brave Adm'r'l, say but one good word:
What shall we do when hope is gone?"
The words leapt like a leaping sword:
"Sail on! sail on! sail on! and on!"

Then pale and worn he kept his deck,
And peered through darkness. Ah, that night
Of all dark nights! And then a speck—
A light! A light! A light! A light!
It grew, a starlit flag unfurled!
It grew to be Time's burst of dawn.
He gained a world; he gave that world
Its grandest lesson: "On! sail on!"

PULPWOOD.

We have much pleasure in announcing that the Toronto Globe has awakened to the fact that for some years past to many thoughtful people it has been manifest that the enormous consumption of pulpwood paper and the destruction of spruce forests in Canada and the United States is bringing rapidly near the time when there will be an irreparable scarcity of the papermakers' raw material. Those who have given thought to the subject comprehend how dire a misfortune such a scarcity would be; and we congratulate The Globe on its enterprise in investigating the matter in the hope that it may be able to suggest some feasible thing for Canada to do to prevent a worse condition than now prevails. As we point out, the situation has been obvious to observers for many years, and as in duty bound we have frequently shown what the Dominion government, in our opinion, should do, and it is rather late in the day for The Globe to wake up and wipe its spectacles; but its sending out of members of its staff to investigate for it can only verify what is already well known, and we trust that the knowledge thus obtained will enable The Globe to conclude that, contrary to its free trade theories, Canadian spruce forests are an asset of the country that it is the duty of the government to conserve for the use of Canadians, first, last and all the time.

In our opinion the Dominion government should pre-

vent entirely the export of spruce wood from Canada. If a good heavy export duty will not effect the purpose, increase the duty yet further, or forbid the export entirely, which would be a better way.

The government of Ontario has gone as far as it can in this direction. It has no legal right or authority to regulate the export trade of Canada—that is the sole affair of the Dominion government—and therefore it cannot prevent or interfere in the export of spruce wood cut on private land, but it has already required that all timber cut on Crown or public lands in Ontario shall be manufactured to some extent in the province, and that is why there are so many pulp mills now in operation in Ontario. The Dominion government can regulate or even prevent the export of sprucewood from Canada, even that taken from private lands.

Considering the slow growth of spruce trees, the forestry department should carefully investigate what the probable wants of the country are; and regulate the depletion of the forests accordingly. If there is more pulpwood available annually for the requirements of the country, the balance, when converted into pulp or paper, might be exported, but not otherwise; but under no circumstances whatever should a cord of pulpwood be allowed to be exported from Canada.

ANY EXCUSE WILL DO.

Captain Maryatt tells us that when Mrs. Easy found herself to be a mother, and required the services of a wet nurse in behalf of her new-born son, who, by the way afterwards became a midshipman in the British navy, a buxom young woman was found whom the good old physician thought would answer the purpose exceedingly well, for she herself was a mother. Mrs. Easy, be it said, was a strict Presbyterian, and determined that her first son should be reared up in the way he should go, and should therefore be saved from every appearance of evil and wrong-doing, and was consequently exceedingly disturbed in mind when she learned that the new nurse while a mother was no wife, a marriage formality that unfortunately had been neglected. When Mrs. Easy remonstrated with the nurse about the incident, it was explained by her that no great harm had been done—that her baby was "only a very little one."

The Toronto Globe has always preached against the sin of combines—that they are peculiar to countries like Canada and the United States where tariff protection prevails, particularly among manufacturers, from which condition free trade Great Britain was happily exempt. In this respect The Globe, like dear, good Mrs. Easy, has previously been very strait-laced and particular, and is therefore as painfully schocked as Mrs. Easy to learn that a most outrageous combine has been formed in Great Britain contrary to both precedent and propriety.

The Globe, however, instead of scolding over the lapsus, as Mrs. Easy did, apologizes for it as the wet nurse did, and offers the excuse 'It is only a little one,' and so unusual and unexpected. Telling of the event, and endeavoring to excuse it The Globe says:

It is reported that a gigantic combination of iron and

steel manufacturers has been organized in Britain, and that it will control about 90 per cent. of the British output. This result has been accomplished by nine big companies uniting and absorbing 26 smaller and formerly independent firms, the combined capital being over \$130,000,000. It is well for the British people that they are in a position to regard with complacency this and all similar gigantic combinations of productive industry. We are so accustomed to see combinations and trusts formed to unduly advance prices on the one hand and cut down wages on the other, that we have come to regard combinations as evils in themselves, and things that should be put under the ban of the law. But there is not necessarily any evil in a trust or combine, more than in a number of independent concerns. It is only by advancing prices or lowering wages that a combination becomes an evil. Any wrong it inflicts must be on its customers, its employees or both. Where it crowds out independent firms the public enjoy the benefit of at least temporary favorable treatment.

This, The Globe tells us, brings out clearly the essential difference between a combination in Britain under free trade, and one in any of the protected nations. In other nations the immediate effect of a combine is to enable the manufacturers, without the fear of competition, to advance prices above the natural or competitive level to the full extent of the duty. In Britain it says, the combine cannot charge prices higher than the bare competitive level of the world.

It is most remarkable that The Globe should have put such twaddle in its columns without previously having consulted its cyclopedia, if it has one printed within the last fifty years. A good one is one of the most indispensable and at the same time one of the most tantalizing possessions a person can have, and we can but conclude that the one The Globe has cannot possibly be up-to-date. If it possesses one that is good and not too antiquated, it would know that whatever prestige the British manufacturers of iron and steel possess it was gained under a system of protection in their country more, much more rigorous than ever characterized any other country of the world, which prestige has been diminishing and becoming non-effective in proportion to the advances of the manufacturing industries of countries whose wisdom has led them to adopt protection. The Globe's cyclopedia, if it has a good one, would tell it that although railroads had existed in both Canada and the United States for many years before any rails for their equipment had been made in either country, all such rails were made in Great Britain, and that the venture of manufacturing steel rails in the United States would not have been undertaken there until a tariff duty of \$28 per ton was imposed on imported rails. Since then, with a railroad mileage far in excess of the combined mileage of all other countries, the United States supplies her home requirement for rails and is an exporter of the article also; and now British manufactures of steel rails find strong competitors in the steel rail manufacturers of not only the United States, but also of Germany, France, Belgium, Italy and Spain, all of which countries practice protection. Perhaps the highest capitalized "combine" in the world is that which is known as the United States Steel Corporation, which has hundreds of millions of

dollars at its command, and controls about every steel rail mill in the United States, yet its policy is to prevent any undue expansion of prices for rails.

In fact the new British combine is formed to so control the steel business in their country as to enable them to combat American and German competition in the markets of the world, including the British market also. British free trade invites the unlimited competition of the protected countries of the world, and British manufacturers find it impossible to "hold their own" except by combining their capital and energies.

The *Globe* tells us that "the position of the employees (in the works of the British combine) is far better under free trade; that by keeping prices at the natural free trade level it increases the consumption of goods and consequently the demand for labor, and that it is the demand for labor that shortens hours and keeps up wages. This demand," it says, "is lessened by the decreased consumption resulting from the higher prices under protection—the British people can look on their new combine with complacency."

This will be news to the thousands of the best skilled mechanics and others in Great Britain who are fleeing the country because of lack of employment. It must be an old, old cyclopedia that *The Globe* consults now-a-days, but—why not tell the truth about the situation?

IMPOSE AN EXPORT DUTY.

In a recent issue of this journal was an editorial suggesting that the Dominion Government should impose an export duty on nickel ore and matte. Why not an export duty on pulp wood also! A few days ago the *Detroit News* published an article suggesting the starting of beet-sugar industries to take the place of the departed lumber industry in many towns in that once greatest lumber State in the Union.

That is a suggestion that should make Canadians sit up and think, says the *Toronto News*. A steamboat ride along even such a small part of the State of Michigan as that bordering the Detroit and St. Clair rivers is likely to cause some more thinking. Such a cursory examination shows many fine sawmills deserted and rotting away on their foundations.

On the Canadian side of the river, at Sarnia, the hum of an immense sawmill ceases not day or night. Up in what a few years ago were the solitudes of the north shore of Lake Huron there are other immense mills employing many hands, and building up thriving communities. Many of these mills are directed by United States brains, and financed by United States capital, and yet they are building up Canada.

Everybody recognizes the two pictures. What caused this state of affairs? An Act passed by the Ontario Legislature ten years or more ago prohibiting the export of timber in the log—that is, without being manufactured.

Once more, what gave renewed life to Sault Ste. Marie; what built up Sturgeon Falls and Espanola? The pulp mills located at these points, because of the Ontario Government regulation prohibiting the export of pulp-

wood from Crown lands except in the form of pulp or paper. Every concession granted by the Ontario Government which has been developed has either greatly helped an existing town or created a town outright with all that means, both to the farmers of the neighborhood and to the people of Canada generally.

What follows then?

That the regulations that have done so much for Ontario should be adopted by the other Provinces. Quebec has, like Ontario, immense sprucewood forests. How much better off would Quebec be if, instead of the people selling their pulpwood for \$6 to \$7.50 per cord, with nothing but stumps for a reminder, they had mills like those at Grand Mere or Windsor Mills scattered over the Province. Grand Mere, it is understood, has been practically created by the mill there, and the population of Windsor Mills has been greatly increased in the last few years. Hawkesbury, Ont., is another case in point.

Presented in the form of money, the selling of pulpwood to the United States means that the Canadian is left with, say, \$7 per cord to bless himself withal, while the selling of the same material in the form of pulp means that from \$20 to \$30 per cord is left in the country, according to the kind of pulp made.

There are some timid people who imagine that if the Canadian Provinces were to follow the lead of Ontario they would kill the goose which lays the golden egg. Unfortunately, we are the geese, and the United States gets the eggs. Reduced to its fewest terms, the situation is simply this. Spruce is the cheapest material known from which to make white paper. The world's supply is rapidly lessening, while the production is going up by leaps and bounds. In the five years, 1900-05, the production of ground wood pulp in the United States increased 78 per cent., and of sulphite pulp 94 per cent. Wisconsin is almost denuded of spruce, many of the New England States are in as bad a plight, and if the United States mills are to keep running they must have our wood. In 1906 the United States imported 721,322 cords of spruce wood against 1,785,680 cords cut in the United States. That was an increase in round figures of one hundred thousand cords over the previous year, and it is estimated that the increase this year will be double that amount. This does not include the fibre purchased from Canada in the form of pulp. The figures for this are not at hand, but, writing from recollection, the situation is this, that of the 3,646,000 cords of wood used in the manufacture of paper in the United States in 1906 about one-third, or 1,200,000 cords, came from Canada in the form of wood or pulp.

Here, then, is the situation. The United States paper industry is largely built on Canadian wood, and every year it is more dependent upon it. Are we going to continue giving our raw material away to build up Wisconsin, Maine and the New England States generally, or are we, by passing a simple regulation, going to see the great plants of those States transferred to Quebec and the Maritime Provinces and British Columbia just as the sawmills have been transferred from Michigan to Ontario?

COLONIAL TRADE WITH BRITAIN.

Mr. Harold Cox, M.P. for Preston, England, recently moved in the Imperial House of Commons for a return showing for the last year for which figures are available:

(a) The value of all articles imported into the United Kingdom from Canada, Australia, New Zealand and British South Africa, respectively, (i) free of duty, (ii) subject to duty;

(b) The value of all articles imported into Canada, Australia, New Zealand and British South Africa, respectively, from the United Kingdom, (i) free of duty, (ii) subject to duty, as follows:

Imports (consignments of merchandise into the United Kingdom) in 1906.

Colony whence consigned.	Duty free.	Subject to duty.	Total.
From Canada.....	£28,019,668	£15,368	£28,035,036
From Australia.....	29,178,609	106,537	29,285,146
From New Zealand...	15,618,850	163	15,619,013
From British South Africa*.....	6,327,476	16,894	6,344,370

*Including Rhodesia, Orange River Colony and the Transvaal. The figures given are exclusive of the value of diamonds from the Cape of Good Hope, which amounted to £9,179,333, according to figures supplied by the Cape government.

(b) Value of all articles imported into Canada, Australia, New Zealand and British South Africa, respectively, from the United Kingdom, (i) free of duty, (ii) subject to duty:

Imports of merchandise from the Colonies. United Kingdom.

	Free of duty.	Subject to duty.	Total.
Canada (year ended June 30, 1906) (a).....	£3,406,000	£10,815,000	£14,221,000
Australia (1905) (b).....	5,738,000	14,513,000	20,251,000
New Zealand (1905)	2,484,000	(d) 5,300,000	7,784,000
British South Africa(1904)(c)	6,506,000	(d) 14,335,000	20,841,000

(a) The figures represent imports for consumption.

(b) The figures represent imports of goods the produce or manufacture of the United Kingdom.

(c) Approximate figures, compiled from the returns of the various South African colonies. Later detailed figures are not yet available, but the total value of merchandise imported from the United Kingdom into British South Africa amounted to £16,938,000 (exclusive of colonial government stores) in 1906, this being the first year for which returns were compiled by the South African statistical bureau for "British South Africa as a whole."

(d) Inclusive of the value of certain goods which are free of duty when the produce of the United Kingdom, but subject to duty when the produce of other countries.

The figures in these statements are exclusive of the value of bullion and specie.

THE PHILOSOPHY OF THE LABOR MOVEMENT.

The labor arguments in favor of a short working day are, briefly, that it would result in an increase in the general rate of wages, an increase in the standard of

living, an increase in the demand for the produce of labor, a lessening of the number of unemployed, and the abolition of a great deal of the poverty that at present exists.

If the hours of a day in labor are shortened there will, of course, be more days' work to do. There will be more steady employment and more spare time for the employed, both of which conditions will be exceedingly beneficial. Men who work only part of the year will work during more days, or else more men will be employed. In either case there will be a lessening of the number of the unemployed. Mr. George Gunton, a writer on economic questions, discussing the effect of the shortening of working hours in Europe and America says:

"The immediate effect of the general adoption of an eight-hour workday would be to reduce the working time of over 8,000,000 adult laborers about two hours a day. This would withdraw about 16,000,000 hours' labor a day from the market without discharging a single laborer. The industrial vacuum thus created would be equal to increasing the demand for labor nearly 20 per cent. In other words, without increasing either home or foreign market, but simply to supply the present normal consumption, it would create employment for 2,000,000 laborers, which is nearly equal to 70 per cent. of the total number of able-bodied paupers and unemployed laborers in America, England, France, and Germany."

These arguments are strongly in favor of tariff protection in Canada. The laboring classes in this country are restless in striving for shorter hours of labor and higher pay for their services. When a manufacturer builds a factory and installs machinery, he takes into account the cost of the same and the interest cost of the investment. So much for land taxes and municipal and other taxes and cost of operation. These charges go on steadily, days, nights and Sundays, rain or shine. The expense is to be met by operating the work an average of ten hours of the twenty-four, constituting the day. It may be that if eight hours of labor constitute a days' work, and the workman is paid only for eight hours' work, he should remember that the money paid to him constitutes only a portion of the expense of operating; and that while it may be possible for the manufacturer to make money if he can operate his factory ten hours of the day and six days in the week, it may be impossible to succeed if there is a reduction of working time to eight hours per day for five days and only half time on Saturdays. A reduction of more than 20 per cent. in working time and opportunity to operate the factory, in view of the fact that all the expenses go regularly on, may mean the difference between profit and loss.

If there is a large demand for the products of labor, which the manufacturer is engaged in supplying, he may be able to pay good wages to his workmen for their services; and the services of the workmen may be well worth every dollar he receives; but if for any cause the manufacturer does not enjoy the large demand for his products, it is impossible for him to pay high prices for labor, and the workman must, perchance, go without employment. His intrinsic value may be high, but his

earning ability will be low. The good book tells us that the poor are with us always, and we all know that in some countries the poor are in excessive abundance. There are comparatively few poor people in Canada, but there are millions of the unemployed in Great Britain and other countries, and hundreds of thousands of them are now seeking in Canada the employment and the means to sustain life that they could not find in the land of their birth. At home those of them that find employment must perforce accept very small remuneration for their services, and of course their employers can well afford to manufacture goods and sell them in Canada at much lower prices than Canadian manufacturers can do who pay higher wages for labor. St. Paul tells us that the man who provides not for his own household denieth the faith and is worse than an infidel. This is as true regarding a nation as an individual. We have sympathy, it is true, for the oppressed and the distressed of all nations, but undoubtedly our first duty is towards those of our own country. How is this to be effected? How are the laboring classes of Canada to be guarded against the pauper labor of other countries? The only feasible way is to retard or prevent the distressing competition. Tariff protection will do it. If laboring men in Canada want to maintain good wages for themselves it can be accomplished by shutting out or retarding the introduction into Canada of the products of the pauper labor of other countries.

How can there be an increase in the general rate of wages, or an increase in the standard of living, or in the increase in the demand for the products of labor in Canada if Canadian labor is to be confronted with the products of the pauper labor of Europe? How can there be an increase in the demand for the products of Canadian labor if similar products, made in other countries by pauper labor, is admitted into Canada free of duty or at a low rate of duty? How can there be an abolition of poverty in Canada if the employment of labor is restricted by the introduction of the pauper labor of other countries? These are questions for Canadian workmen to consider.

EDITORIAL NOTES.

A good cyclopedia is one of the most indispensable and at the same time one of the most tantalizing possessions a person can have. He cannot do without the information it contains, but that information is always inadequate and often misleading. However up-to-date a cyclopedia may be at publication, it rapidly falls behind the state of knowledge on the various topics with which it deals. New scientific facts are discovered, explorers are correcting and expanding geographical knowledge; research discloses errors in published histories; philosophical systems are undergoing modification; the common stock of literature is perennially enlarging, and the honor roll of great men is for ever lengthening. A single decade greatly diminishes the value of the most carefully prepared cyclopedia as a magazine of knowledge classified for purposes of easy reference.—The Toronto Globe.

United States Consul Hale, of Coaticook, Que., furnishes the following pertaining to Canada: Canada's trade policy has built up a complete industrial system, the

invested capital of which is to-day about \$486,000,000, as against \$146,000,000 in 1881; 15,000 manufacturing establishments with 500,000 employees are turning out products valued at nearly \$486,000,000. The textile industry is represented by twenty-six cotton mills with 600,000 spindles, and 300 woolen mills; seventy-five mills are producing wood pulp and paper with excellent prospects of further expansion. Boots and shoes are being largely produced in Quebec and are fast rivalling in quality and style the American product; German beet sugar is being displaced by British West Indian cane sugar, imported under the preferential tariff, and the beet sugar industry is being successfully established in the West. Five years ago the population of the prairie provinces was 466,000 and the grain crop amounted to 43,000,000 bushels. In 1906 the population was 1,000,000 and the grain crop was 200,000,000, bushels, one-half of this being wheat, grown on less than 4 per cent. of the net area of land available for cultivation in that section. Between 1897 and 1906 nearly 900,000 immigrants have come to this country. The consumption of manufactured goods is about \$110 per capita; of this the home production supplied all except \$25 per capita.

President Roosevelt is having a great time with the trusts. He is proposing to have the courts order the sale of their plants, dissolve their combinations, abrogate their contracts, and put their walking delegates in prison. If he really wants to check the trusts he should adopt the Fielding method, and take authority to draw their teeth by removing their protection.—The Globe.

The Globe should discuss the recently formed steel trust in Great Britain. These virtuous free traders have pooled more than \$130,000,000 to control trade and regulate prices, but there seems to be no Roosevelt there to suppress their tyrannical operation.

It appears from the returns relating to American beet-sugar factories for the year 1906-7 that last season was extraordinarily productive, the output being half as much again as that of the preceding season. The figures show a production of 433,010 tons of sugar during the year, compared with 283,717 tons in 1905-6, an increase of 149,293 tons, or 52½ per cent. The area under cultivation was increased by 58,457 acres, or 17.1 per cent., and there were 10 new factories in operation. The average yield per acre of sugar during the three years previous to the last was 0.79 ton per acre, that of the 1906-7 season amounting to 1.08 tons, an increase of 37 per cent. The States engaged most extensively in the beet sugar production are Colorado, where there were 116,045 acres under beet-roots and 15 factories, producing 153,295 tons of sugar; and Michigan, with 99,500 acres and 16 factories, producing 79,189 tons of sugar. Next in importance are California, Utah, Idaho, Wisconsin and Nebraska. To summarize, the total area under beet-roots was 399,552 acres, which yielded 3,728,072 tons of beets, and the number of factories in operation was 63, producing 433,010 tons of sugar.

An airship has sailed over Paris, regarding which the Toronto Globe says that this modern invention will make it all the more difficult for nations to protect themselves from a devastating deluge of foreign goods. Thieves and

free traders are to be found in all countries, Canada and France not excepted. Put on more police, and do all possible to preserve the home market for the home producer.

The Canadian government has adopted stringent regulations to prevent coal lands in the Yukon from being held for speculative purposes. Leases for coal-mining rights will be granted for twenty-one years at an annual rental of \$1 an acre, payable in advance. No applicant shall be allowed to lease more than an area of 2,560 acres. The tract must be contiguous, and the area shall not exceed four miles in its greatest dimensions. Applications are to be made through the Dominion lands agent or a sub-agent of the district. In unsurveyed territory the application must be made within thirty days after its being located. Where a dispute as to location occurs, the right to the lease will be decided by the minister of the interior upon hearing evidence. The lease shall include coal-mining rights only, but the lessee, upon application, may be permitted to purchase at the rate of \$10 an acre whatever area of the available surface rights the minister may consider necessary for the efficient and economical working of the coal-mining rights granted in the lease. The lessee must begin operations in one year from the date of his being notified to do so, and shall produce the quantity of coal specified in such order. The order will not be given until the expiration of one year. In no case will the maximum quantity required to be mined during each year be over 10 tons an acre leased. If this order is not complied with then the lease will be subject to cancellation. The lessee can not assign his rights without leave of the minister.

Actual settlers shall be entitled to buy at the pit's mouth what coal they may require for their own use, but not for barter or sale, at a price not to exceed \$1.75 a ton. A fee of \$5 is charged for each lease. In addition to the rent a royalty of five cents a ton of 2,000 pounds will be levied on the output of the mine. A sworn statement of the output must be given by the person operating the mine. In default of this the lease may be canceled. In case of disputes provision is made for arbitration.

Speaking of the development of Canadian resources, particularly of the possibilities of the paper industry, Industrial Canada says:

In the province of Ontario the wisdom of developing a large industrial population is well understood, and she is accomplishing this by preventing the free exportation of her valuable deposits of raw materials. This policy has resulted in enormous investments of fixed capital with a corresponding growth of busy population.

Ontario has never exercised a right to prevent the exportation of raw material or anything else not prohibited by Dominion law. The levying of export duty is entirely within the province of the Dominion Government. The nearest approach in that direction is in the requirement that all timber cut on crown lands must be manufactured in the province.

The provincial government can exercise no authority

over the disposition of logs, pulpwood, etc., grown on private lands, no more than it can over grain, vegetables, etc., grown on such lands. The Dominion government has such right but not the provincial government.

Governor Cummins puts the tariff situation well when he says that in the United States they have gone mad in their zeal for the seller, and have abandoned the buyer to the tender mercy of monopoly, combination and greed.—The Globe.

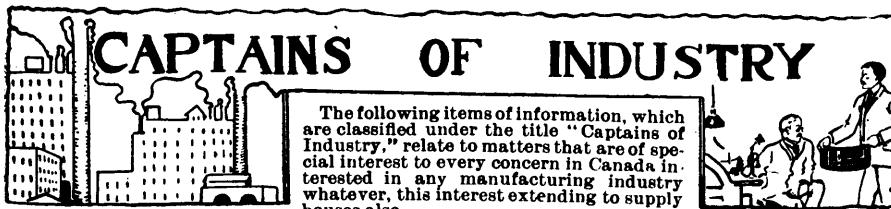
The buyer in the United States seems to be doing very well, and if he is painfully suffering from the tariff situation there he does not seem to be aware of it. The country never was in a more prosperous condition than under McKinleyism. Festus accused Paul of madness, even as Governor Cummins accuses the stand-patters of madness in upholding protection, but Paul, who was a good stand-patter, sized up the situation correctly when he denied the soft impeachment. Paul was the man who declared that he who provided not for his own was worse than an infidel. Governor Cummins and The Globe also, who deny protection, are the infidels.

The statistics of manufacturing in Canada indicate that the Fielding tariff is admirably suited to the wants of this country.—The Globe.

The Fielding tariff, like the fly on the wheel, has nothing whatever to do with the success of manufacturing in Canada. What about the general prosperity of the whole world? When stringent times come again, as come they will, the Fielding tariff will have to be revised upward or the manufacturing industries of the country will suffer severely.

The agreement under which the numbers and armament of war vessels on the Great Lakes are limited was made by Richard Rush, acting as Secretary of the Department of State for the United States, and Chas. Bagot, his British Majesty's Envoy Extraordinary at Washington. It was concluded April, 1817, consented to 1818, and proclaimed on April 28, 1818. It provides that: "The naval force to be maintained upon the American lakes by his Majesty and the government of the United States shall henceforth be confined to the following vessels on each side: that is, on Lake Ontario to one vessel not exceeding 100 tons burden and armed with one 18-pound cannon; on the upper lakes to two vessels not exceeding like burdens each, and armed with like force; on the waters of lake Champlain to one vessel not exceeding like burdens and armed with like force. All other armed vessels on these lakes shall be forthwith dismantled, and no other vessel of war shall be either built or armed."

"If either party shall hereafter be desirous of annulling his stipulation, and shall give notice to that effect to the other party, it shall cease to be binding after the expiration of six months from the date of such notice. The naval force shall be restricted to such forces as will in no respect interfere with the proper duties of the armed vessels of the other party."



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 new sand lime brick plant which A. Berg & Son, Toronto, have installed for Schultz Bros., Brantford, Ont., has been in operation for some days. Only one "Berg" press is installed but it works so steadily and smoothly that without any appearance of haste it can turn out 20,000 brick every ten hours, while the dryers do their work so thoroughly that brick can be placed in the yard for delivery one day after making.

J. F. Brown & Co., Toronto, are making a novel use of the telephone to facilitate the work of the freight hoist. A phone on each floor connects with the elevator enabling a person on any floor to speak at once with the elevator man, and likewise the elevator man may at all times connect with different floors or departments, thus saving many unnecessary trips. The installation was made by the Norton Telephone Mfg. Co., Toronto.

The new flour mill of the Lake of the Woods Milling Co., Limited, at Keewatin, Ont., was opened about the last of June. The elevator capacity is about 500,000 bushel. The new mill has a capacity of 5,000 barrels per day, and, with the other mill at Keewatin, and the one at Portage la Prairie, gives the company a total capacity of 10,500 barrels per day.

During the past six months the industrial growth of Hamilton, Ont., has been such as to create a record. During that time new factories and additions to those already built have been erected to a total value of nearly \$700,000. The most noteworthy addition to existing plant is that of a new blast furnace and buildings to cost \$300,000, and to be erected for the Hamilton Steel & Iron Co. The Canada Screw Co. are also contemplating additions to plant which will cost about \$150,000.

The amount of steel used in the new grand stand at the Canadian National Exhibition, Toronto, is 3,000,000 pounds. The number of individual pieces of all sizes used in its construction is 244,800. The aggregate length of all the pieces of steel placed end to end would equal 177,000 feet, or 33½ miles. The total number of rivets used in the stand is 206,400. The weight of the traveling crane used in erecting the stand, including engines, was 20 tons.

The Sacred Heart Church, Ottawa, which was destroyed by fire recently will be rebuilt.

The oil house of the Grand Trunk Railway Co., Niagara Falls, Ont., was slightly damaged by fire July 10. Loss about \$200.

The premises of Messrs. P. D. Dods & Co., color manufacturers, Toronto, were destroyed by fire July 9.

Contracts have been let for about \$1,000,000 worth of rolling stock for the Intercolonial Railway Co., including some twenty new locomotives and a large number of freight cars of various kinds. The locomotives will be built by the Kingston & Montreal Loco-

motive Works, and the cars will be built principally by the Crossen Car Co., Cobourg, Ont., and Rhodes, Curry & Co., Amherst, N.S.

A storeroom at Niagara Falls, Ont., used by the Gargarman Cap Mfg. Co., of Buffalo, N.Y., was destroyed by fire July 10. Loss about \$2,000.

The premises of the Manitoba Peat Co., Fort Francis, Ont., were destroyed by fire July 7.

The ratepayers of Sarnia, Ont., voted favorably on two by-laws to grant a bonus of \$12,000 each to the Standard Chain Co., Pittsburgh, Pa., and the Jenks' Dresser, Limited, manufacturers of iron bridges.

Toronto Stamp & Stencil Works, Limited, Toronto, have been incorporated with a capital of \$40,000, to carry on an engraving business. The provisional directors include D. C. Ross, I. C. Fell and G. C. Dowdell, Toronto.

Eisman Novelties, Limited, Toronto, have been incorporated with a capital of \$60,000, to manufacture wearing apparel, etc. The provisional directors include J. C. Wilgar, F. A. Mulholland, J. F. Hollis, Toronto.

The James Bay Lumber Co., Limited, Toronto, have been incorporated with a capital of \$40,000, to manufacture timber, lumber, etc. The provisional directors include T. R. Parker, A. M. Miller, Thomas Reid, Toronto.

The sawmill of A. Cooper, Ouimet, near Port Arthur, Ont., was destroyed by fire recently.

The Ontario Timber & Land Co., Sarnia, Ont., have been incorporated with a capital of \$1,000,000, to manufacture timber, etc. The provisional directors include J. W. Fairbank, Petrolia, Ont., W. D. Lummis, Toronto, J. H. Kittermaster, Sarnia, Ont.

The ratepayers of Fort William, Ont., voted favorably on a by-law granting a bonus to the Imperial Steel & Wire Co., of Collingwood, Ont. The company intend erecting a large factory immediately.

The Port Arthur Sand Lime Brick Co., Port Arthur, Ont., who have been shut down for the last few weeks for alterations and repairs, resumed operations a few days ago.

Somerville, Limited, Toronto, have ordered from the Robb Engineering Co., Amherst, N.S., a 200 h.p. 16x30 inch Robb-Armstrong Corliss engine, arranged for direct connection to an electric generator.

The congregation of St. John's Church, St. Thomas, Ont., will erect an edifice at a cost of about \$10,000.

The Canadian Pacific Railway Co. will erect subways over Henry and Elgin Streets, Brantford, Ont.

A valuable vein of copper has been struck near Larder Lake, Ont.

The Canadian Pacific Railway Co. will

erect a steel bridge over the Rideau River, at Merrickville, Ont.

The premises of the Kemptville Milling Co., Kemptville, Ont., were destroyed by fire July 13. Loss about \$50,000.

The Robertson Machinery Co., Welland, Ont., and Kischell & Co., Toronto, have amalgamated.

A new police station will be erected in Toronto at a cost of about \$24,000.

A High School will be erected at Smith's Falls, Ont., at a cost of about \$45,000.

The Diamond Glass Co., Toronto, will erect an elevator at a cost of about \$20,000. The Standard Chemical Co., Toronto, will erect a factory at a cost of about \$50,000.

A technical school will be erected at Sault Ste. Marie, Ont., at a cost of about \$20,000.

The ratepayers of Peterborough, Ont., voted favorably on a by-law to grant a free site and fixed assessment to the Colonial Weaving Co., who purpose erecting a large new factory.

The Supreme Heating Co., who are erecting new works at Welland, Ont., have so far advanced that they will be manufacturing stoves inside of a month.

A pumping station is to be installed in Cobalt, Ont.

The Canadian Machine Telephone Co., Toronto, have started work on the installation of their plant at Lindsay, Ont.

The National Spring & Wire Co., St. Catharines, Ont., are installing machinery for the manufacture of springs in their new premises.

The Colonial Engineering Co., Montreal, are installing a producer gas engine in the plant of the Frame & Hay Co., Stratford, Ont.

Colonial Weaving Co., Limited, have increased their capital stock from \$60,000 to \$110,000.

Trout Lake Cobalt Mining Co. have decreased their capital stock from \$3,000,000 to \$1,500,000.

St. Catharines and Niagara Power & Fuel Co., Limited, have increased their capital stock from \$100,000 to \$300,000.

Empire Cobalt Mines, Limited, Cobalt, Ont., have been incorporated with a capital of \$3,000,000, to carry on a mining, milling and reduction business. The provisional directors include D. W. Brooks, C. F. Mitchell, James T. Armstrong, Cobalt, Ont.

Cobalt Silver Bell Mines Co., Cobalt, Ont., have been incorporated with a capital of \$800,000, to carry on a mining, milling and reduction business. The provisional directors include T. A. Brownlee, Ray Turner, Cobalt, E. D. Kenyon, Erie, Pa.

Letters Limited, Toronto, have been incorporated with a capital of \$40,000 to carry on a printing and publishing business. The provisional directors include A. C. Bedford-Jones, F. H. Lytle, Mary E. Dickey, Toronto, Ont.

Cobalt-James Mines Co., Limited, Toronto, have been incorporated with a capital of \$250,000 to carry on a mining, milling and reduction business. The provisional directors include A. C. Bedford-Jones, F. H. Lytle, Mary E. Dickey, Toronto, Ont.

King Telephone Co., Limited, Temperanceville, Ont., have been incorporated with a

capital of \$10,000, to carry on the general business of a telephone company. The provisional directors include T. H. Legge, W. H. Glass, Albert Wells, King, Ont.

Toronto National Steel Plate Engraving Co., Limited, Toronto, have been incorporated with a capital of \$50,000, to carry on an engraving business. The provisional directors include T. R. Slaght, F. E. Curtiss, M. B. Peacock, Simeoe, Ont.

Crown Mfg. Co., Limited, Toronto, have been incorporated with a capital of \$100,000, to carry on the business of and manufacture confections, drugs and grocers' sundries. The provisional directors are G. F. Fenwick, D. D. Grierson, Wm. Worthington, Toronto, Ont.

The Maple Leaf Automobile & Electrical Mfg. Co., Limited, Galt, Ont., have changed their name to the Galt Electrical Mfg. Co., Limited, and will be hereafter known as such.

Winnett & Wellinger, Limited, Toronto, have been incorporated with a capital of \$40,000, to carry on a leather business. The provisional directors include Herbert Winnett, H. A. Laurence and Frederick Wm. Wellinger, Toronto, Ont.

The Conference Exploration Co., Limited, Cobalt, Ont., have been incorporated to carry on a mining and development business with a capital of \$500,000. The provisional directors include Messrs. C. F. Mitchell, J. J. Anderson and W. B. Graham, Cobalt, Ont.

The Sword Neckwear Co., Limited, Toronto, have been incorporated with a capital of \$40,000, to carry on a neckwear and clothing business. The provisional directors include A. M. Macdonell, A. C. McMaster and A. C. Bedford-Jones, Toronto, Ont.

The Bay Lake Mining Co., Limited, Ottawa, have been incorporated with a capital of \$1,000,000, to carry on a mining and development business. The provisional directors include Clifton A. Douglas, William Scott and F. T. Graves, Ottawa, Ont.

The British-Canadian Smelters, Limited, Toronto, have been incorporated with a capital of \$400,000, to carry on a smelting and bullion business. The provisional directors include John E. Wilkinson, John W. L. Forster, James E. Black, Toronto, Ont.

The Victoria Creek Mining & Developing Co., Limited, Ottawa, have been incorporated with a capital of \$40,000, to carry on a mining and developing business. The provisional directors include Messrs. P. Shaver, Alexander Beckett and Henry G. Ketchum, Ottawa, Ont.

The Ontario Timber & Land Co., Sarnia, Ont., have been incorporated with a capital of \$100,000, to carry on the business of buyers and sellers of manufactured articles in which wood is used. The provisional directors include W. D. Lummis, Toronto, Ont., C. O. Stillman and F. F. Pardee, Sarnia, Ont.

The Strong Lumber Co., Limited, Toronto, have been incorporated with a capital of \$200,000, to carry on the manufacture of timber and lumber. The provisional directors include Thomas F. Strong, Ogdensburg, N.Y., W. Foster and H. Vigeon, Toronto, Ont.

A large pipe mill will be erected at Welland, Ont., adjoining the plant of the Ontario Iron & Steel Co. All kinds of iron pipe will

be manufactured for water, gas, steam, etc. The company will use skelp from the Ontario Iron & Steel Co., and will have a modern plant in every respect.

The Hamilton Cataract Power, Light & Traction Co., Hamilton, Ont., will build a third transmission line from Hamilton to DeCew Falls.

Plans are being prepared for the erection of a new wing to the Provincial Parliament Buildings, Toronto.

The Rainy River Development Co., Fort Francis, Ont., are erecting a power plant to generate 65,000 h.p. It is expected that lumber, pulp and flour mills will be erected when power is obtainable.

Messrs. Black Bros. purpose installing an electric light system in Cobalt, Ont.

The Bell Telephone Co. are constructing a new switchboard in their exchange at Galt, Ont.

Surveys are being made with a view to developing a water power on the Madawaska River near Arnprior, Ont.

Extensions are being made to the electric light plant at Newmarket, Ont.

An enlargement to the electric light plant, Chatham, Ont., is being considered.

A. Delaplante, Toronto, have been incorporated with a capital of \$300,000, to manufacture and deal in lumber, pulp, etc. The provisional directors include L. A. Delaplante, James Baird, K. F. MacKenzie, Toronto, Ont.

The Imperial Oil Co., Limited, Petrolia, Ont., have increased their capital stock from \$1,000,000 to \$6,000,000.

The Acton Shoe Co., Acton, Ont., have been incorporated with a capital of \$20,000, to carry on the leather business. The provisional directors include A. Lambert, Montreal, David Lemay and J. A. Lemay, Acton, Ont.

The Gazette Printing Co., Limited, Montreal, have been incorporated with a capital of \$5,000, to acquire the business of the Gazette Printing Co., Montreal. The provisional directors include R. White, S. White and S. Kidd, Montreal, Que.

Dufresne & Locke, Limited, Maisonneuve, Que., have been incorporated with a capital of \$250,000, to carry on the business of tanners. The provisional directors include Oscar Dufresne, Thomas Dufresne, Maisonneuve, and Pierre de Grosbois, Montreal, Que.

C. A. Maher Co. have been incorporated with a capital of \$5,000, to carry on a brick manufacturing business. The provisional directors include J. E. Phaneuf, I. Phaneuf, Alphonse Lefebvre, St. Hugues, Que.

A new building of reinforced concrete will be erected by the Redmond Co., Limited, Montreal, at a cost of \$125,000.

The premises of the Academy Rollaway, the old Academy of Music, Quebec City, were destroyed and the St. Louis Hotel damaged by fire July 10.

A large part of the town of Arthabaska-ville, Que., was destroyed by fire July 7. Loss about \$35,000.

The contract between the Longueuil school commissioners and the Christian Brothers for the erection of a \$100,000 school at Longueuil, Que., was approved.

W. D. McLaren, Limited, Montreal, will be incorporated with a capital of \$40,000, to carry on the baking powder and spice business. The provisional directors include W. D. McLaren, C. H. McLeod and H. M. Marler, Montreal.

The Progress Mfg. Co., Montreal, have been incorporated with a capital of \$49,000, to manufacture fabrics, etc. The provisional directors include G. H. Harrower, J. P. Black and J. R. Gordon, Montreal.

The Argenteuil Lumber Co., Argenteuil, Que., have been incorporated with a capital of \$90,000, to carry on the lumber business. The provisional directors include G. H. Perley, G. A. Scott, H. Jekill, Montreal, Que.

The Standard Shirt Mfg. Co., Limited, Montreal, are erecting a large addition to their factory on Delormier Ave. The addition will be a five story brick mill construction building on concrete foundations, sprinkled, and modern in every respect. It will have a frontage of 225 feet on Delormier, and depth of 80 feet on Lafontaine. The total floor space will be increased five-eighths. The capacity of the plant will be increased 50 per cent. The work will be completed about December 1. Brown & Vallance are the architects, and E. G. M. Cape, Montreal, the contractor.

E. A. Wallberg, Montreal, is contractor for the following:—Intercolonial Railway shops, Moncton, N.B.; Intercolonial Railway shops, Halifax; Prince Edward Island Railway shops, Charlottetown, Prince Edward Island Railway, concrete wharf at Souris; Intercolonial Railway, engine house and freight yard, Pictou, N.S.: plant of National Rolling Mills, Sydney, N.S.

The Dominion Cartridge Co., Montreal, will erect a factory at Brownsburg, P.Q.

The Canadian Lithographic Stone Co., Limited, Montreal, have been incorporated with a capital of \$500,000, to carry on a mining smelting and reduction business. The provisional directors include Robert B. Hutcheson, F. W. Hibbard, Wm. J. Ross, Westmount, Que.

Chase & Sanborn, coffee millers, Montreal, have removed to larger premises at 9 and 11 St. Helen Street. The new building is six stories 100x50 feet, providing twice the former space, and with new machinery being installed, the capacity will be trebled. Handsome offices will be fitted up on the ground floor.

The Montreal Terra Cotta Lumber Co., Limited, Montreal, are equipping their plant at Maisonneuve with electric power.

The Canada Optical Co., Limited, 302 Lagachetiere Street, Montreal, are installing equipment for the manufacture of spectacle frames, which they expect to be ready to turn out within about three months.

The Electric Repair & Contracting Co., Montreal, will move to larger premises about October 1.

William Stewart & Co., Board of Trade Building, Montreal, freight brokers, forwarding agents and commission merchants, are opening a new department to handle mechanical and general specialties.

The Dominion Engineering & Construction Co., Montreal, have completed the machine shop of the Canada Foundry Co., Dartmouth, Ont., and the new transformer build-

ing for the Canadian General Electric Co. at Peterborough, Ont.

The R. W. Oliver Milling Co., Limited, Montreal, are installing machinery to treble the capacity of their mill at Mile End. Installation will be completed about the middle of August.

The Toronto Auto-Transit Co., Limited, Montreal, have been incorporated with a capital of \$45,000, to carry on the business of a manufacturer of vehicles of conveyance. The provisional directors include G. W. Verral, Sarah Elliott and James Balsdon, Toronto.

Resources Publishing Co., Limited, Montreal, have been incorporated with a capital of \$100,000, to carry on the business of printers and binders. The provisional directors include J. W. Weldon, E. M. McDougall and S. J. Le Huray, Montreal, Que.

The Montreal General Hospital, Montreal, have ordered from the Robb Engineering Co., Amherst, N.S., two 150 h.p. 72-inch by 20 foot return tubular boilers.

The construction of a street railway at Moncton, N.B., is being considered.

R. J. Graham, Belleville, Ont., manager of the Canada Lands, Produce & Cold Storage Co., has announced that a cold storage warehouse and plant will be erected at St. John, N.B.

The premises of the St. Croix Cotton Co., St. Stephen, N.B., were damaged by fire July 12.

The Cobbler Sexton Mining Co., Limited, Woodstock, N.B., have been incorporated with a capital of \$1,000,000, to carry on a general mining business. The provisional directors include William A. Haywood, John McClement and Edward L. Greer, Woodstock, N.B.

The Chestnut Canoe Co., Limited, Fredericton, N. B., have been incorporated with a capital of \$48,000, to manufacture canvas canoes and boats etc. The provisional directors include Henry Chestnut, William Chestnut, Harry Chestnut, Fredericton, N.B.

The Saint John Fuel Co., Limited, St. John, N.B., have been incorporated with a capital of \$24,000, to carry on a fuel business. The provisional directors include Francis Kerr, Alice Kerr, C. H. Green, St. John, N.B.

A large part of the business section of Hartland, N.B., was destroyed by fire July 15. Loss about \$250,000.

A large rink will be erected at Halifax, N.S., at a cost of about \$35,000.

The Commercial Cable Co., Halifax, N.S., will build a cable tank at a cost of about \$9,000.

The ore pier of the Dominion Iron & Steel Co., Wabana, Nfld., was destroyed by fire July 4.

The council of Morden, Man., have passed a by-law to borrow \$20,000 for the purpose of constructing or purchasing an electric light plant.

The ratepayers of Stonewall, Man., voted favorably on a by-law to raise \$18,000 for additional school accommodation.

The Gurney Northwest Foundry Co., Winnipeg, Man., have been incorporated with a capital of \$250,000, to carry on a metal manufacturing business. The provisional

directors include W. S. Evans, Wallace Helliwell, Winnipeg, Man., and Edward Gurney, Toronto, Ont.

The Acme Brick Co., Limited, Winnipeg, Man., have been incorporated with a capital of \$100,000, to carry on the business of manufacturers of bricks, tiles and pipes. The provisional directors include Jno. Erzinger, Louis Serkan and A. D. Sproule, Winnipeg, Man.

The Morris Brick Mfg. Co., Morris, Man., have been incorporated with a capital of \$20,000, to carry on the business of manufacturers of bricks, tiles, and pipes. The provisional directors include F. Mackenzie, W. M. Galbraith, J. M. Phillips, Morris, Man.

The Port Arthur Elevator Co., Limited, Winnipeg, Man., have been incorporated with a capital of \$100,000, to buy, sell, or exchange elevators. The provisional directors include L. O. Downing, R. H. Moore, R. T. Evans, Winnipeg, Man.

The Winnipeg Casket Co., Winnipeg, Man., will erect a large factory.

W. H. Stone, Winnipeg, Man., is erecting a large store at a cost of about \$40,000.

The Manitoba Government will erect a telephone exchange at Brandon, Man.

C. A. Crump, Riverside, Cal., will erect a business block in Winnipeg, Man., at a cost of about \$45,000.

The congregation of the First German Baptist Church, Winnipeg, Man., will erect an edifice at a cost of about \$27,000.

The Guelph and Goderich branch of the Canadian Pacific Railway has been opened as far as Blyth, Ont.

Canadian Distillers, Winnipeg, have been incorporated with a capital of \$1,000,000, to carry on a whiskey business. The provisional directors include W. A. Faulkner, F. A. Emmerson, H. A. Wise, Winnipeg, Man.

The Dauphin Herald Co., Limited, Dauphin, Man., have been incorporated with a capital of \$5,000, to carry on the printing business. The provisional directors include W. D. King, R. G. Ferguson, W. Arnett, Dauphin, Man.

E. W. B. Snider, president of the Waterloo Threshing Co., Waterloo, Ont., and J. H. Herron, western manager of the company, are looking for a site in Portage la Prairie, Man., on which to erect a large warehouse and repair shop.

A factory has been erected at Portage la Prairie, Man., by Messrs. Beamans & Co., of Minneapolis, Minn., and Winnipeg, Man. Steel office supplies and grain cleaner will be manufactured.

The United States & British Columbia Timber Co., Limited, Calgary, Alta., have been incorporated with a capital of \$2,500,000, to manufacture pulpwood, timber and lumber. The provisional directors include R. B. Bennett, W. P. Taylor, W. H. McLaw, Calgary, Alta.

North Battleford, Sask., will install water works sewerage and electric plant at a cost of about \$100,000.

Raymond, Alta., are making improvements on the waterworks system, and are installing an electric light plant.

Vermillion, Alta., is calling tenders for the

construction of an eight room schoolhouse at a cost of about \$20,000.

The farmers at Strathclair, Alta., are contemplating the erection of an elevator at that place.

A new brick and stone apartment block will be built by G. McNeil, Calgary, Alta., at a cost of \$150,000.

Work has been begun on the waterworks and sewerage system at Yorkton, Sask., estimated expenditure \$60,000. A compressed air plant is being installed.

The Saskatoon Milling & Elevator Co., Saskatoon, Sask., purpose commencing immediately the erection of a new elevator having a capacity of 30,000 bushels.

Mr. Steffes, Morinville, Alta., is establishing a saw mill at Lac La Nonne, on the Paddle River. It will have a capacity of 12,000 feet per day and will be run by steam power.

The Saskatchewan Elevator Co. will erect an elevator at Kennedy, Sask.

Sidney Smart, contractor, has installed a compressed brick plant in Melfort, Sask., which has a capacity of 5,000 bricks per day.

Complete plans have been drawn for the erection of an abattoir by Gordon & Sparling, Saskatoon, Sask., at a cost of about \$48,000.

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

The Bank of British North America will erect a branch at Duck Lake, Sask., at a cost of about \$4,000.

The Alberta Government are building telephone lines from Edmonton to Lloydminster, Wetaskiwin to Daysland, Lacombe to Stettler, Blairmore to Calgary and Calgary to Banff, Alta.

The ratepayers of Moose Jaw, Sask., will vote on a by-law to raise \$90,000 to extend the power plant.

The British Columbia Telephone Co. have secured a site in New Westminster, B.C., on which they will erect a new exchange.

The British Columbia Electric Railway Co. will commence work immediately on the railway line to be built between New Westminster and Eburne, B.C.

Messrs. Moscrop Bros., formerly of Revelstoke, B.C., have purchased the establishment of Kemp Bros., Vancouver, B.C.

The Pacific Whaling Co. have commenced work on their whaling station at Page's Lagoon, near Nanaimo, B.C.

Messrs. P. Burns & Co., Vancouver, B.C., have purchased from the Canadian Westinghouse Co., Hamilton, Ont., a four panel switch-board for their new abattoir. The board will be used for receiving and distributing current for light and power purposes, and is equipped with the latest type of instruments for measuring and recording.

The British Columbia Power & Electric Co., Vancouver, B.C., are looking into the possibilities of developing water power on the Cheakamus river, at the head of Howe Sound. Messrs. Hermon & Burwell, hydraulic engineers, have made a report on the power. Three development schemes are outlined in this report, one by means of which 100,000 h.p. can be secured under a head of 565 feet; another, which will give 75,000

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h.p. at a head of 400 feet, and a third whereby 20,000 h.p. at a head of 115 feet can be secured. The report shows that the power plant will be located 16 miles from tide-water and two routes are open for the transmission line to Vancouver, one along the eastern shore of Howe Sound and northern shore of the English Bay and the Inlet to the Second Narrows, and the other via the valley of Seymour Creek to the Second Narrows. The distance is 61 and 47 miles respectively. It is proposed to transmit at 50,000 volts.

Messrs. Jonas & Colver, Limited, Sheffield, England, have put on the market "Intra" steel, a new feature in steel for tools, which bids fair to obtain a standing in the mechanical world. This company are also makers of the famous "Novo" steel. William Abbott, 334 St. James St., Montreal, is the Canadian representative.

RAILWAY ACTIVITY AT SMITH'S FALLS.

A roundhouse of immense size, is being constructed at Smith's Falls by the Canadian Pacific Railway under the supervision of a well known architect. Great care was taken with the plans to make the building one of the finest and complete in the country.

It is of cement foundation, reinforced in the weak places by stone. The inner steel structure is enclosed in cement to insure it against fire.

The circumference of the building is 550 feet and its capacity is 22 of the Canadian Pacific Railway's largest engines. The roundhouse is one story high. In addition to the roundhouse a machine shop the dimensions of which are 90 47 x feet, is being built, and a shunting yard acquired to accommodate the ever increasing requirements of Canadian Pacific Railway patrons.

MANUFACTURERS MEET.

The annual meeting of the Toronto branch of the Canadian Manufacturers Association was held on July 11, the feature of which was the address of the retiring president, Mr. John Firstbrook.

Referring to the great commercial expansion of the country he pointed out that in nine months the imports had increased \$47,506,476, or 23½ per cent, while the exports for the same period had increased but 2½ per cent. The increase in the domestic trade during the past short term had been 48 per cent. The condition and the value of the home markets might be realized from the fact that our manufactured products represented \$712,664,835, and out of this only \$142,917,250 or 20 per cent. was exported.

"Skilled help," he said, "is even more difficult to obtain now than a year ago, and the situation is indeed acute, vitally concerning the welfare of our city and province and Dominion as a whole. Factories have expanded beyond the increase of this number of available mechanics. Notwithstanding repeated agitations the government persists in confining its efforts to the encouragement of the immigration of agriculturists and railroad labor, while the importation of skilled labor and factory hands is left to private initiative. This policy is deeply regretted by all who have the development of Canadian industry at heart. So great was the suffering from this one sided

policy of the government, which will inevitably throw the splendid markets of our rapidly developing North-West into the hands of United States manufacturers, that the Canadian Manufacturers' Association on February 1 last, opened a labor department in London, England. In five months through the efforts of the association, 800 skilled workmen had made contracts to come to Canada, and 300 of these have arrived to date. From investigation carried on by the local branch it has been ascertained that in Ontario 25,000 additional girls could secure employment in the industrial establishments and 10,000 of these could easily be put to work in Toronto.

ANOTHER INDUSTRY FOR WELLAND.

Bemiss Bros. Bag Co., Boston, Mass., have secured a site of eighty acres in Welland, Ont., on which they will erect a large factory. They will import raw cotton and from it will manufacture all kinds of bags, such as grain bags, etc. They will start with a plant costing \$400,000 and employ 500 hands the first year. Three years will be required to build the entire plant, the total cost of which will be \$1,500,000, employing 1,500 hands. The mill will contain 15,000 spindles.

From Welland the company will require only sewerage and water. They agree to pay for all the water they use at 6c per 1,000 gallons. From the township of Crowsland they ask a fixed assessment of \$20,000. They also require a free site of 25 acres. An agreement has been given in writing offering the company the site they require absolutely free of charge. This site is on the Hilsle farm in Crowsland, immediately adjoining Welland, east of the Grand Trunk Railway and north of the Michigan Central Railroad track.

Besides the twenty-five acres required for the plant, the company now hold under option 55 acres more, which includes every foot of land to the Michigan Central Railway tracks.

PUBLICATIONS.

TESTING FOR SAFETY.—A booklet describes the strenuous test grinding wheels must undergo before leaving the factory of the Norton Co., Worcester, Mass. Every wheel is tested at a peripheral speed of 9,000 feet per minute, giving a stress of not less than 250 pounds per square inch. It will be new to most readers to learn that a complete record of all the wheels tested in one day is brought before a justice of the peace on the following day and the testor makes oath that he has tested each wheel at the number of revolutions indicated against it.

A WESTERN SUNSET.—Starting out in rather an ambitious manner the Saturday Sunset, of Vancouver, B.C., has reached its fourth issue, maintaining its high initial standard. It is modelled from the Toronto Saturday Night and already has the appearance, judging from the generous advertising support, of an old established journal. The editor is John P. McConnell, whose editorials are sane and thoughtful while breathing of the throbbing spirit of optimism so noticeable from Winnipeg to the coast. This paper should have a successful future ahead of it.

GRINDING MACHINES.—The Norton Co., of Worcester, Mass., are sending out a new 146 page catalogue describing Norton grinding wheels and machinery. The wheels are all made of alundum, the various shapes and sizes being shown by sectional views. Norton grinding machines are also illustrated and prices and descriptions given.

PERSONALS.

Mr. R. McGregor, of the McGregor-Gourlay Co., Galt, Ont., is at present in Europe. He, with his daughter, left some months ago for a trip around the world and has already visited many of the principal countries in Asia. When last heard from he was in England but intended visiting Germany, France and Italy before returning in November.

Mr. F. O. Wells, of Wells Bros. Co., Greenfield, Mass., recently paid a visit to the company's Canadian branch, the Canadian Tap & Die Co., Galt, Ont. Mr. Wells states that his firm are very busy, large additions to their Greenfield plant being under construction, while the Canadian plant is now in full operation.

Mr. E. D. MacKenzie, who has for many years been connected with the traffic department of the Pennsylvania Railroad and since 1901 Canadian freight agent with headquarters at Toronto, has resigned his position to settle in business for himself in Oil City, Pa. He has been succeeded by Mr. W. A. Willis, formerly special agent traffic department P.R.R. Pittsburg, who has been with the company fourteen years, having had valuable experience in Washington, Philadelphia, Baltimore and Pittsburg.

SIX AND A HALF MILLIONS IS CANADA'S POPULATION.

If Canada keeps on growing at her present rate, in one century the population will be 114,492,085 inhabitants. This figure is far in advance of the United States' present population which started to grow just 107 years ago.

Canada's total population just now is estimated at 6,504,900 inhabitants, a growth of 1,133,585 over the census of 1901.

Since April 1, 1907, 100,000 immigrants have entered Canada.

NEW ENGINEERING BUILDING.

Plans have been completed for the construction of the new engineering building at McGill University, to take the place of the one destroyed by fire in April. The building permit was granted to the McGill authorities recently. The new structure, which will be one of the finest of the kind on the continent, will be fire-proof, and it is estimated that the cost will be in the vicinity of \$275,000. The architect is Prof. Percy E. Nobbs, professor of architecture at the university, and the contractors are Messrs. Byers & Anglin of this city. Construction will be started just as soon as the necessary materials can be obtained. The new building will, in every way, be up-to-date, and nothing will be spared in the way of expense to make it as well equipped as possible for the purpose. The new engineering building will be somewhat larger than the one destroyed.

Industrial Galt.

The moulding shop of the Stevens Co., Galt, Ont., is in full operation, the jib crane now being in place. The firm are now doing jobbing work in castings as well as making all necessary for their own requirements.

The Canadian Brass Co., Galt, Ont., have their factory almost completed. Most of the machinery and power equipment has been purchased and is now on its way to the plant. The factory is of brick, of exceptional solid construction and will be equipped with the most modern machinery throughout.

SHELDONS, LIMITED, ARE BUSY.

Sheldons, Limited, Galt, Ont., are installing hot blast heating system and 72 inch cupola in the new moulding shop for the McGregor-Gourlay Co., Galt; hot blast heating system in new weave shed for Geo. Pattison & Co., Preston; are supplying heating and ventilating systems to the A. E. Baxter Engineering & Appraisal Co., who are installing same in new plants of the Canadian Bronze Co., Montreal, and Northwestern Brass Co., Winnipeg; are supplying heating apparatus for the Hamilton Bridge Co.'s new structural steel works and for the Sawyer Massey Co., Hamilton. Sheldons, Limited, also have orders for several shaving exhaust systems and natural draught dry kilns and brick dryers. Among the orders recently filled was one for a fan 16 feet diameter, 6 feet wide, operated by 75 h.p. motor for the Diamond Coal Co.'s mine near Lethbridge, Alta.

GOLDIE-MCCULLOCH GAS ENGINES.

The Goldie & McCulloch Co., Galt, Ont., have decided to start the manufacture of producer gas plants and engines. At present patterns are being made for a 160 h.p. engine which will be given a thorough trial at the north works of the company. The reputation this company has attained in steam engine construction is sufficient promise that nothing but a high grade producer plant and gas engine will be made by them.

MAKES METAL LATHES IN ONE OPERATION.

The Stevens Co., Galt, Ont., have just finished the construction of an ingenious machine for the manufacture of expanded metal lathing for the Galt Art Metal Co., Galt, Ont. The machine is in the shape of a long table, in which are thirty-six sets of revolving cutters, four to the set, two of them set in pockets on the bed, the upper ones on shafts set across the machine. Each upper pair of cutters are driven on their own worm gear engaging on a long worm shaft at side of the machine.

The sheet steel enters the machine in strips $4\frac{1}{2}$ inches wide and 8 feet long. When the strips enter the machine the cutters are $4\frac{1}{2}$ inches apart, so that the first operation is the cutting off of each side of the sheet a strand 1-16 inch wide. These cutters have notches at certain distances on their periphery, each notch leaving uncut portion of the steel, thus uniting one strand to the next. Each set of cutters is 1-8 inch closer together than the one before it, so each set cuts two new strands of 1-16 inch width. Not only does the machine cut the sheets into strands but

it stretches each to the limit so that the sheet comes from the machine in a strong steel mesh 16 inches wide and 8 feet long. It is ready for the market when the one operation is completed.

BONUS FOR CAR WORKS.

The ratepayers of St. Thomas on July 16 carried a by-law to grant \$50,000 bonus to the St. Thomas Car Co., the vote being 1,647 for and 72 against; 1,442 votes were needed to give the by-law the necessary three-fifths vote. The company, which is promoted solely by local capital, agrees to erect works in the city to employ at least 150 men at an average of \$2 a day, to turn out five standard box cars per day, to pay \$2,000 taxes for ten years, and to operate the plant at least fifteen years. The company expects to build at once and to be in operation by the fall.

LARGE "IDEAL" CONTRACT

A few months ago an announcement was made that the Ideal Concrete Co., of South Bend, Indiana, had closed the largest contract for concrete machinery ever secured. The contract involved \$250,000 worth of Ideal block machines. In one half year they have shipped to one quarter six full carloads of Ideal machinery. It is interesting to note the last shipment included eight Ideal continuous batch mixers fully equipped with power. The shipment included also two large sill machines 10-24 inches, block machines, six brick machines and numerous smaller requirements were sold to one concern.

LIFT-LOCK OPENED.

July 6, 1907, marks the date of the opening of the second lift lock in Canada. The event is very important insomuch as it will not only increase the population of all the surrounding country, but adds another link to Canada's great inland waterways.

The steamer Stoney Lake, which contained the government party, left Lindsay, preceded by the Bob Hall, which contained the engineering staff, followed by the Manitoba, followed by the Sovereign, in which were the press representatives. The Stoney Lake reached the lock first, and waiting until the press were transferred to it, dropped 47 feet without the smallest kind of jar and thousands of people saw the official boat make the descent in the wonderful structure.

When the lock subsided, prominent speakers sought the wheel house and referred to the benefit of the lock to Ontario. The most important address was of the Hon. Rudolph Lemieux, which was apparently a little too serious for the conditions under which it was delivered. When he touched on points of more immediate interest, however, he was generously applauded.

The completion of the lift lock, he said, meant that the level of the canal had been lifted 50 feet towards the level of navigation in Georgian Bay. The completion of the canal could only mean added prosperity and higher ideals for the people living along the shores of the waterway. The speaker then plunged at some length into an historic review of the development of transportation by water.

Proceeding, Mr. Lemieux said that although Canada's expenditure on improving

waterways had touched \$114,000,000 before and since Confederation, the Dominion was probably only at the threshold of its work. As the present century grows older Canada will make history faster and faster. The time is approaching when it will be necessary to construct the Georgian Bay canal, and middle-aged men of to-day may live to see the time when large vessels will sail from Port Arthur to Liverpool.

In conclusion, the Minister had a word to say about militarism, declaring that the completion of every such work as the Trent Valley Canal was a guarantee that the people of the present day would create no new feuds on their own account. The British Empire, he declared, in conclusion, was the greatest single agency for good in the world, and the cause of Imperialism could best be promoted by the construction of works which tend to develop the arts of peace.

The following figures respecting the lock were furnished by J. H. McClellan, superintendent of the Trent Valley waterway system:

Height of lift, 48 feet 6 inches.

Dimensions of the presses—External diameter of cylinders, 8 feet; diameter of ram, 7 feet 6 inches.

Working stroke, 58 feet 6 inches.

Depth of water in chambers, 8 feet.

Height of guide tower (steel) 54 feet.

Dimensions of chambers, two each, 100 feet long by 33 feet wide.

Depth of chambers, 9 feet 10 inches.

Approximate weight of water in each chamber, 1,385 feet.

Cost of structure, exclusive of concrete walls and breast walls, \$298,000.

There are only five hydraulic locks in the world, viz., the Anderson lock in England, the La Lieuvier lock, in Belgium, and the La Fontainette lock in France, each with a capacity of 500 tons, and in Canada one at Peterboro and one at Kirkfield, each with a capacity of 1,000 tons.

A 250 H.P. GAS ENGINE IN BRANTFORD.

The Brantford Screw Co., Brantford, Ont., are operating their machinery by gas engine supplied by natural gas and Mr. J. B. Detwiler, manager of the company, is quite enthusiastic over this kind of power plant. Mr. Detwiler was at one time interested in the sale of gas engines and when at the Pan-American Exposition at Buffalo some years ago, became interested in engine exhibited by Struthers & Wells, Warren, Pa. When securing equipment for the new works for the screw company he decided to buy one of these engines. The engine is horizontal, of the throttling type and is 250 h.p.

"We are running a larger factory with twice the amount of shafting that we had in the old plant at less expense than was necessitated by a steam engine of first-class make in our old works," said Mr. Detwiler.

"Of course," he continued, "the fact that we have natural gas in Brantford is a factor. The general rate here is only 30 cents a thousand, and large users like we are get an even better rate than that. If anything were to happen to our natural gas supply we can install producer plants."

Two other plants, the Adams Wagon Co., Brantford, and the Woods Milling Co., St. George, Ont., have installed similar engines of smaller size.

Admission and Exhaust Valves Used in Petrol, Gas and Oil Engines.

BY EDWARD BUTLER.

In view of the universal interest in internal combustion engines in which the valve operation plays such an important part, the following article from the Engineering Review will be of value to all seeking fuller information on the subject.

On the expiry of the "Otto" patent in 1900, the 2-cycle engine with piston-controlled exhaust went into disuse on account of its rather greater cost of construction, but for large powers this engine has recently been again adopted with considerable success. Very large engines in considerable numbers are now being made with a single and double piston for use with furnace and producer gas; separate charging pumps being used for the supply of the air and gas to the admission ports. In order to further reduce the back pressure of the exhaust

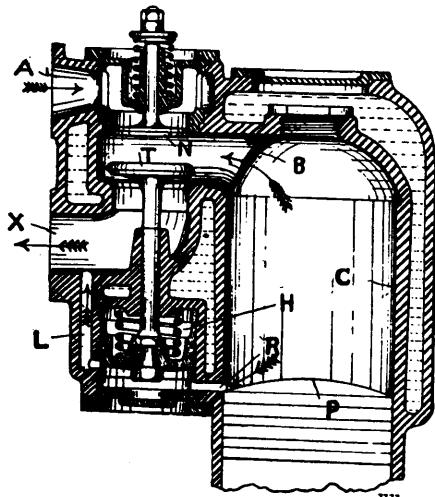


FIG. 1—(4 CYCLE) MOTOR WITH AUTOMATIC ADMISSION AND EXHAUST VALVES.

gases, it is sometimes the practice to use a water spray injection in the exhaust pipe immediately under the exhaust jacket round the ports communicating with the cylinder; this being done for the dual purpose of reducing the temperature around the ported belt surrounding the cylinder, and to diminish the volume of the gases.

By the use of piston-controlled ports for the admission and exhaust, the area for the flow of the gases to and from the cylinder can be increased from the customary proportions used in the 4-cycle class of engine, i.e., from one-tenth to one-seventh, which latter proportion is shown in the table of cylinder and valve diameters given at the commencement of these articles—to an area approaching to one-fifth or even to one-fourth of the cylinder area. The portways being arranged around the full cylinder diameter, the area for a 20 inch diameter cylinder, for instance, will be some 70 inches with a width of 2½ inches only; with the ports extending right round the cylinder and with spaces between of equal length to the openings, it will be seen that a total length of 30 inches can easily be obtained. It is questionable, however, if any material benefit can be derived from the use of port areas larger than one sixth the cylinder area, which give a velocity of inflow or outflow of the gases

of less than 90 feet per second, corresponding to a piston speed of 850 feet per minute, and results in a back pressure of very little more than one pound per square inch, provided short lengths of pipe connections are used with few obstructions and of a slightly amplified capacity.

The 4-cycle engine does not lend itself for working without valves as in the case of the 2-cycle engine, the nearest approach to the automatic working of the latter being obtained by a method of pressure actuated valve mechanism as shown in Fig. 1. Here it will be seen that a 4-cycle motor can be made without side-shaft or gear actuated mechanism of any sort, and, although not valveless, is entirely automatic in its working. The sectional drawing illustrates a vertical single-acting cylinder of the automobile pattern, the cylinder being provided with a port opening as in the 2-cycle type of engine, but on a smaller scale, and in this case serves to admit a small proportion of the gases under pressure at the termination of the power stroke, to flow under a piston H, fitted on the end of the exhaust valve stem T. The valve is shown thus lifted off its seat, the pressure under the piston being sufficient to open the valve, which is of a smaller diameter, against the spring fitted inside the piston used for closing the valve as soon as the motor piston P has arrived at the termination of its exhaust stroke, when it uncovers the port R to the crank chamber, and so liberates the penned-up gases under the valve piston H.

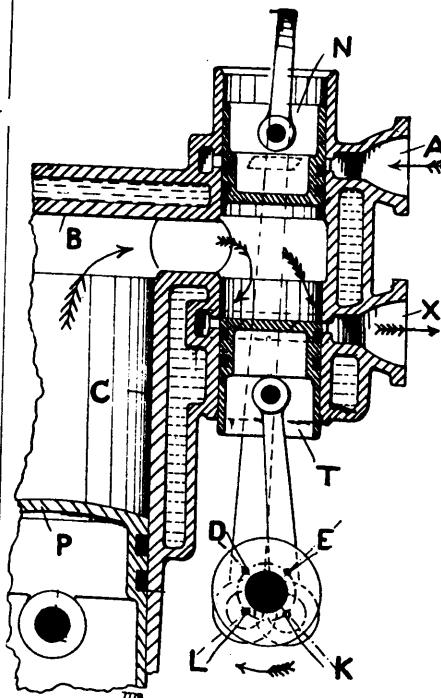


FIG. 2—4 CYCLE ENGINE WITH PISTON VALVES FOR ADMISSION AND EXHAUST.

Another method of working a motor without cams or springs is shown in the illustration Fig. 2. In this case piston valves are used which open to the admission and exhaust in a similar manner to the working of the 2-cycle engines previously described. In

this construction, the motor, which has a vertical single acting cylinder C, is provided with two smaller valve pistons, N and T, which are actuated by rods working from eccentrics on a half-speed side shaft. The motor piston is shown at the termination of its working stroke, and the piston valve T to be uncovering a belt of ports leading to the exhaust outlet X. At the end of the exhaust stroke the eccentric will have moved into the position L and K, and be about to close the exhaust, and during the admission, compression and explosion strokes, the exhaust valve piston eccentric will move round from L to K, and so be in a position for again releasing the exhaust. The admission valve piston N is now at L, and during the admission stroke will move from D to E. A motor constructed in this manner, although not so simple nor cheaply made as the ordinary cam-opened and spring-loosed poppet valve motor has some features in its favor, i.e., an absolutely definite timing of the valve movements with quiet action at any speed.

The exhaust valve is generally considered the most important part in a 4-cycle engine of large size, it being necessary to always water-cool both the seat and the valve itself, and is also thought by many makers advisable to balance the force required to open the valve against the pressure in the cylinder at the end of the power stroke. The wear on the mechanism is very considerable unless some means, either for reducing the resistance opposed to the valve, or for giving it a preliminary small degree of lift so as to release the cylinder pressure, is adopted. In the case of a cylinder of 43 inches diameter, having an exhaust valve of 14 inches diameter, the pressure opposed to the valve's lift is over 3 tons. However, in many engines of large power no balancing action is provided, and the actuating mechanism is relied on for

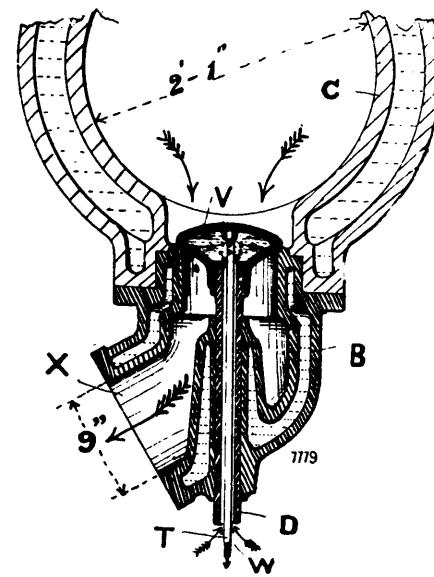


FIG. 3—WATER COOLED EXHAUST VALVE.

entirely opening the valve against the full terminal pressure. In the "Dingler" gas engine, for instance, with a cylinder of 25 inches diameter, a simple water-cooled exhaust engine, the water is further utilized to

cool the valve. In the illustration (Fig. 4) the valve V shown cast in one piece with a balancing piston, which makes a gas-tight fit in a cylinder bored in the cover R. The valve is hollow and controlled by a stem passing up through the water space to the cam lever M. The water from the cylinder jacket is forced into the nozzle over the valve, and thence flows down the inside of the valve and balancing piston and exits into the exhaust passage by the nozzle Z. The valve thus serves as a sort of water-pipe, and is kept nearly at the same temperature as the water itself. The drawback, if any, is that the water, in flowing round and over the valve piston head, prevents lubrication of the rings, and is liable to leak into the cylinder under certain conditions; but the chief objection is the liability to rusting of the valve piston, rings and cylinder.

In one form of "Crossley" balanced exhaust valve, shown by Fig. 5, and arranged in a casing forming part of the combustion chamber, the valve V is cast in one piece, with a balancing piston forming, as it were, an enlarged valve stem N. This stem piston is of an equal area to the valve V, and fits gas-tight in a cylinder bored out of the valve casting. Communicating with the underside of this piston N is a portway R, which opens to the under-side of a small pilot valve P. Just before the time for opening the main valve V, the pilot valve is opened by the cam lever M, which action places in equilibrium both ends of the large valve, which is then easily raised off its seat by the cam lever K and steel stem T. In order to circulate water through the interior of the valve and balancing piston, the end

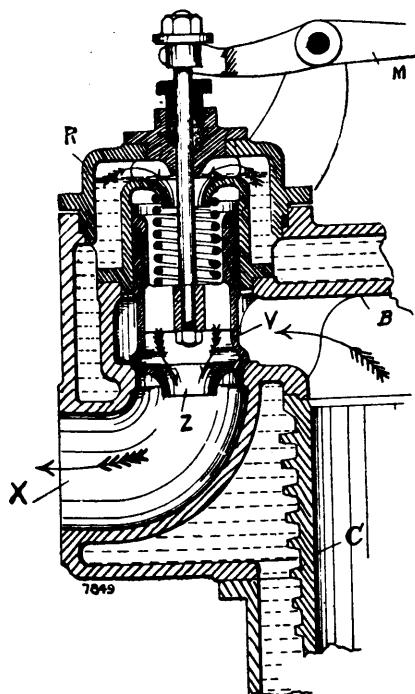


FIG. 4—WATER-COOLED BALANCED EXHAUST VALVE.
of the stem T fits in a water case, which is connected to the inlet for water at W and outlet at the bottom, the water passing up the stem and returning by the inner tube in the usual way. The valve which is held down on to its seat by the tension spring G, is always kept full of water, and thus prevented from overheating.

In the illustration (Fig. 5) is shown a section of a type of balanced exhaust valve of or-

dinary construction, and adopted in certain engines of British manufacture, for example,

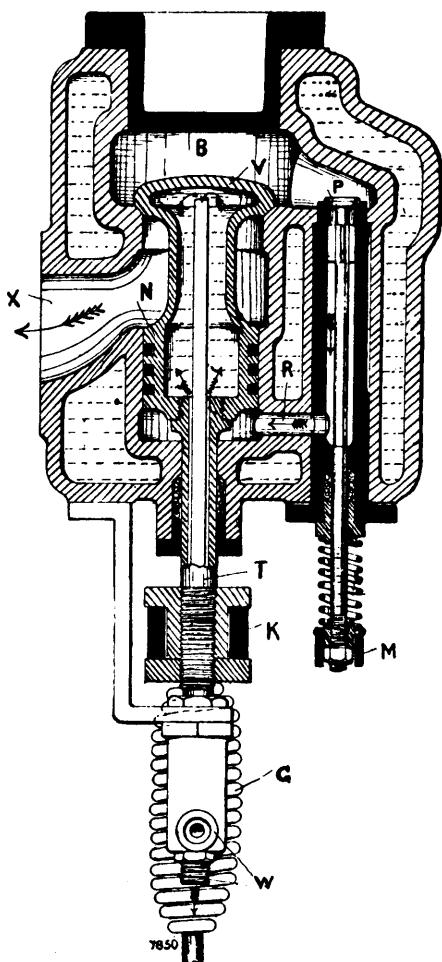


FIG. 5—WATER COOLED EXHAUST VALVE WITH BALANCING PISTON AND PILOT VALVE.

the "Crossley," "National," and others. This is, perhaps, the simplest form of balanced exhaust valve, and has the merit of requiring no valve cover, the balancing piston P taking its place. The valve T is cast as before in one piece, with a piston head P, which is held down by a compression spring under simple adjustment from the crosshead placed over it. The valve is screwed on to a steel stem D, which fits water-tight in the water case G, supplied with water at W, whence it flows up the stem D and around the inner tube E, by which it returns to the outlet union nut at the under-side of the case G. All that is necessary in order to remove this form of valve is to slack back the cam collar on its stem and take off the spring head, when the valve is free to be taken out without breaking any joint. Another point in its favor is the free accessibility of the piston head for lubrication and detection of leakage.

The largest valve illustrated is the "Otto-Deutz" balanced exhaust valve, shown by the section at Fig. 7. This valve, as is usual in Continental practice, is arranged on the under-side of the horizontal cylinder C. The valve seat L forms a separate casting, and is separately water-cooled to the casing A, which is in turn bolted to the cylinder-jacket, and carries the exhaust pipe of 14 inches diameter at X. The casting forming the valve seat and guide is held up to the cylinder—a gas-tight fit—by spring washers and bolts to allow for any difference of ex-

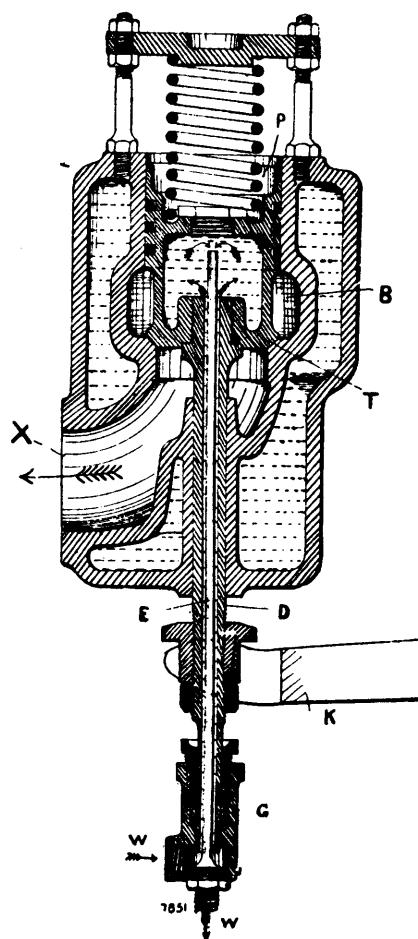


FIG. 6—COMMON TYPE OF BALANCED EXHAUST WATER COOLED POPPET VALVE.

pansion. The valve itself is cast hollow, and is provided with a balancing seat at S, by which the valve V is placed in a state of equilibrium by the passages B.

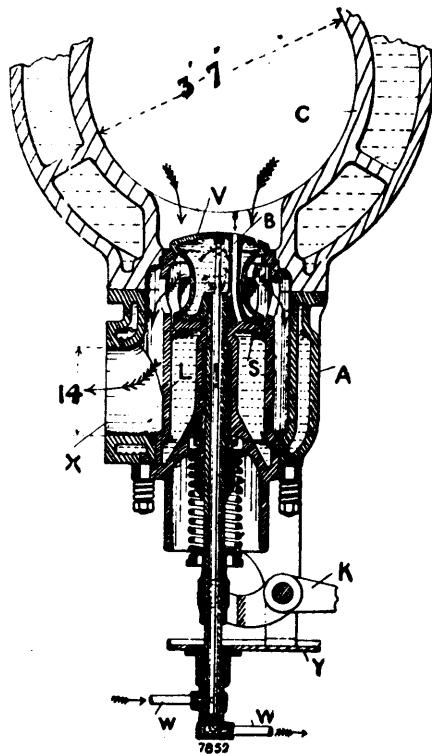


FIG. 7—WATER COOLED AND BALANCED EXHAUST VALVE.

Modern Methods of Producing Power.

BY ERNEST MARRIAGE. AN ENGLISH ENGINEER.

In an article I wrote under the heading, Niagara Power in Toronto, that appeared in your issue of April 19, 1907, comparisons were made between cost of power from Niagara, and that obtained from producer gas when used in a gas engine. The present article will endeavor to take a wider view of the power question, and will deal with various methods of producing power which are at present little used in Canada but are in successful use in other countries, without any idea of boosting up any particular make or type of prime mover.

PREDICTION FULFILLED.

The prediction made, that owing to the high price that would have to be paid for the interests, etc., of the Toronto Electric Light Co., its purchase by the city would be unlikely, turned out correct. Directly the cost, etc., was investigated it was found to be a proposition that was impracticable.

THE HYDRO-ELECTRIC COMMISSION.

I stated in my previous article that it would be better for every one concerned if the Hydro-Electric Commission would take its energies elsewhere and leave Toronto alone, but they seem to have got an idea that the Toronto-Niagara Power Company intend to charge Toronto manufacturers and power users an extortionate price for their power, and that the only way to stop this is to come to Toronto with another transmission line at the tax payer's expense and compete with them. There is a very simple way to stop this extortion if it is contemplated, and that is to ask the Toronto Electric Light & Power Co. at once to publish their scale of charges for power to Toronto citizens that they intend to make when they have their power transmission system in full working order, and if these charges are considered unjust to at once give permission to any other responsible Niagara power company to come to Toronto and compete with them.

It is well known by the Toronto Electric Light Co. that they have a very serious competitor in the producer gas power, as the Canada Foundry Co., who had a good deal to do with carrying out the work at Niagara, and also the building of the transmission line, have made arrangements with the builders of large gas engines in England to introduce or manufacture these gas plants for use in Canada, and one of the claims they make for them is, that "They are cheaper than water power and simpler than steam engines."

Finally, from the statement of Ex-Mayor Wood, of Brantford, chairman of the Electric Energy Committee of the Board of Trade, published in a Canadian newspaper on May 31 last, it appears that the Hydro-Electric Commission still have some practical difficulties to contend with, although about two months previously they distributed to possible Toronto power users the rates per h.p. per hour for Niagara power worked out to the 1-100 part of a cent. The Ex-Mayor among many other things states:—"It is five years since we began on this question, and we have nothing to-day that is in any way complete. We are told that on the vital question of

transmission the commission is just now about to commence to make other estimates of the right-of-way, buildings, transformers, cost of line, and many costly and difficult features; and one wonders how with these the vital features unsettled, we are to enter into contracts with it. I hold that the commission should have been able, ere this time, to have told us what was the best way to accomplish the transmission. It has the benefit of a staff of engineers and financial experts, and it is quite time that we stopped the parading of this question before the public until we know something of the solid facts concerning it."

CANADA LEADS IN POWER DEVELOPMENT.

The most modern method in use in Canada to-day is that of electric power as transmitted to Toronto and other places from various water-falls, and in this respect Canada has accomplished more than any other portion of the British Empire, and great credit is due to those who have successfully carried out these great undertakings. It is, however, necessary, to consider other methods of producing power, because even the water powers of Canada have their limitations, and also there are districts where they are not available, and there are manufactures in which it is not convenient to use them. In many cases steam is required in large quantities for heating or drying purposes, or there may be refuse as in the wood working trades that has to be got rid of, and in blast furnaces there are large amounts of combustible gases, that can be successfully used in gas engines, or under steam boilers to produce steam, and finally there are not only the crude petroleum oils found in Canada, but there are liquid fuels of various kinds that have good heating value that are the residuals or bye products of other manufactures, these latter can be used in internal combustion engines to be described. These three systems of producing power by steam, gas, or oil engines are all in successful use for large powers in England, Germany and the United States, and therefore it is reasonable to suppose that in efficiency and economy there is not much to choose between them.

To show how quickly improvements are taking place, I may state that in London, England, there has been erected an electric generating station using steam power, which, when commenced, was thought to be up-to-date, but when completed it will have difficulty in competing with modern methods of using steam for power purposes now in successful and general use.

The directions in which improvements have taken place in above three prime movers is in using, higher pressures, higher temperatures, and higher speeds, to which must be added many improvements in the auxiliary machinery connected with them, that have lessened labor and also have made possible their continuous and regular operation. Probably there are in Canada to-day few engines of any kind of 50 h.p. or upwards that are not using 30 per cent. to 50 per cent. more fuel than they ought to, unless they have been installed within the last year or so.

IMPROVEMENT IN USE OF STEAM POWER.

Dealing with steam power first, here the pressures have jumped up from 80. or 100 pounds to 150 or 200 pounds per square inch. In order to safely carry these pressures water tube boilers, or boilers of the marine type with dry instead of wet backs are largely used, the return tubular cylindrical boiler with the fire underneath it being unsuitable for such pressures. After steam is produced in the boiler it is superheated which means, that steam at 150 lbs. gauge pressure which would have a temperature of about 365 degrees Fh., would, after leaving the boiler, be still further heated, until it was between 500 degrees or 600 degrees Fh., by doing this the condensation which always takes place when ordinary steam enters an engine cylinder, is prevented, and is therefore much more effective. In modern steam plants the water is treated chemically if necessary, before entering the boiler to eliminate the scale forming substances in the water. This not only ensures that the boiler will be preserved from the overheating of the boiler plates and tubes, but will also make it a more effective steam raiser and also does away, to a very large extent, with the expensive and disagreeable task of boiler cleaning. To deal with these high pressures and temperatures, the engines and their connections are constructed in a special manner. In some cases steam turbine is used, where there are thousands of blades fixed on the main shaft, which, although very close together, do not touch the fixed blades that are carried by the casing. These turbines run at very high speeds and have the armature of the dynamo, centrifugal pump, or fan, fixed on the same shaft as the turbine blades. They are so perfectly balanced that they can be placed on any level floor and the usual heavy foundations built under ordinary steam or gas engines are not required. In the London generating stations they are in use up to 10,000 h.p. units, and of much larger sizes in steamships. They are built in all sizes from 50 h.p. upwards, and there are also other steam turbines of various makes in use.

The ordinary reciprocating engine is also used with high pressure and high temperature steam, but the flat D slide valve, or the Corliss valves do not work satisfactorily at the higher temperatures. Piston valves are used instead, or if the temperature is very high, a mushroom valve similar to that used in gas engines becomes necessary. Special lubricating oil is used in the cylinders, and if it is a high speed engine, forced lubrication is employed, which means that the oil is kept at a pressure of about 15 pounds to the square inch on the bearings and parts in moving contact with one another. If the engine has a very high speed of rotation, there is no means of obtaining a perfect balance except by using three cranks set equidistant or 120 degrees from one another round the crank circle. Engines as described, when made condensing, will give out a brake h.p. for one hour taking only 12½ pounds of steam for same, as the usual

allowance is 20 to 30 pounds of steam per h.p. it will be seen what advances have been made.

MODERN GAS ENGINES.

The general operation of these are well known and on the continent of Europe in large sizes, greater progress has been made than any where else. In the suction type, the usual fuel is anthracite coal, coke, or charcoal. This is necessary as in all other fuels there is a certain amount of tar which tends to clog up valves, etc., of engine unless specially dealt with. If bituminous coal, containing tar is used, arrangements must be made to get rid of it. This can be done by extracting it as in an ordinary gas works, which is rather a complicated process, but it is now claimed that it can be done in what is called a double zone producer. In this case the gas, instead of being taken from the top of the producer, after having passed up through the incandescent fuel from the bottom, is taken from near the centre of the burning fuel. The arrangement is such that the gases that contain tarry matter are caused to pass downwards through the red hot fuel toward the centre outlet, which turns them into fixed gases, and the air and steam pass upwards through the fuel, the same outlet producing the carbon mon-oxide and hydrogen as in the ordinary suction gas producer.

Improvements in producer gas plants are continuously taking place. It was stated recently in one of the technical journals that there are now 40 installations of gas producer plants at work in Germany that total up to 7,000 h.p., which are successfully working on lignite coal, and there is little doubt that peat, saw dust or wood will also shortly be brought into service in this respect. Some of the largest gas engines in existence are using the waste gases from blast furnaces. One of the principal difficulties here was the fine dust that was carried along by the gas, injuring the engines. This was overcome by spraying water into the gas.

The fault of most gas engines built on the American continent is that they are too lightly constructed. The crank pins, connecting rods, and connection between the cylinders and the engine frames should be considerably stronger than in similar sized steam engines owing to their having to sustain greater and more sudden stresses, but when their economy, safety and automatic action is considered, especially in the smaller sized powers, they are in some respects difficult to beat by any other kind of motive power.

THE DIESEL OIL ENGINE.

This is a successful German invention. It is constructed in Germany, England, and the United States, and it is undoubtedly the only engine that will use almost any kind of liquid fuel, if it does not contain a residue of incombustible matter such as sand, or any other mineral substance that would tend to clog up the engine. It works on quite different lines to gasoline or coal oil engines of usual construction, where the oil vapor and air are mixed together in the cylinder, and then compressed until piston arrives at end of its stroke, when the charge is ignited by an electric spark or some heated part of the engine. Here we are up against a serious proposition, as economy

of fuel in all internal combustion engines largely depends on getting a high compression before the charge is ignited. The compression of gas or air causes it to rise rapidly in temperature, with the result if the igniting point of the gas is low, ignition will take place before desired compression is reached. I have tried crude oil raised from a Canadian oil well in an ordinary oil engine in England, and found that, owing to the gasoline or light oils contained in it, it would only work with a very low compression. The Diesel engine gets over this difficulty in this way. Only air is drawn into the cylinder on the suction stroke, and compressed to about 400 pounds per square inch, with the result that the temperature rises to a high point, at the end of the stroke the charge of liquid fuel is injected into the cylinder, and owing to the high temperature that then exists in same, ignition of the fuel takes place, which in burning expands the compressed air so driving the piston forward on its working stroke. It will thus be seen that in this engine two serious difficulties are got over at once. Too early firing of the charge is impossible, and no electric or other means are required to ignite the charge, and as long as liquid fuel is supplied to this engine, it continues to run without attention.

It will be easily understood that in order to comply with the conditions under which the above three different heat engines are operated, that only the very best workmanship or materials can be used in their construction, and therefore the first cost of these engines may appear high to people who have been used to the much cheaper and less economical methods of producing power in general use, but the fact remains that these improved methods are everywhere replacing the old way, and they will ultimately succeed them entirely, where efficiency, safety, and economy of power production becomes a necessity.

A CORRECTION.

I shall here refer to the previous article I wrote to correct an error that somehow got into it. In comparing the costs as mentioned above, the cost of labor for looking after a 20 h.p. producer plant, which was stated to be not more than 2 hours per day, was put at \$1.00 per day or \$300.00 per year. This is at the rate of 50 cents per hour, which no one would pay for such work as the total amount of fuel to be handled per day in such a plant would be only 200 pounds. It should have read "66 cents per day or \$200.00 per year," which will be admitted as a generous allowance for such work. The \$300.00 per year is the estimated cost of labor for attending a 50 h.p. producer plant that was mentioned as having been worked out.

Robert W. Hunt & Co., general offices 1121 Rookery Building, Chicago, Ill., have been given the inspection of the material for the Southern Pacific Co.'s rifled pipe line. This embraces 256 miles of 8 inch rifled pipe, and is being manufactured at the Lorain plant of the National Tube Co., and the machinery for 24 pumping stations, covering 46 duplicate pumps to be manufactured by the Janesville Iron Works, Hazelton, Pa., and 72 boilers to be furnished by the Edgemoor Iron Co., Edgemoor, Del.

Gas Engines to Supercede Steam

The cost of the production of steel may be reduced a few cents a ton. Millions of dollars are to be spent in machinery for the plant of the United States Steel Corporation, and almost a hundred engines are to be relegated practically to the scrap heap. This step will probably take two or three years to complete, but it is assured by the experiments which have been carried on at the Edgar Thompson plant of the corporation at Bradford, where the experiments have been along the lines of using gas instead of coal as fuel, and using the gas that blows from the blast furnaces.

In one of the great sheet-steel sheds which answer as engine houses of the corporation's great rail-making plant, stand two vertical engines which, with two others like them, in 1904, supplied the power needed at the World's Fair in St. Louis. They were built in East Pittsburg and at that time represented the best known in engine building. After the exposition, they were purchased by the steel corporation for the Edgar Thompson plant, and have since supplied most of the electric power there.

It will be but three or four years at most in all probability before these monsters have been discarded, sent to the scrap heap or sold. Throughout the various works of the corporation plants, there are many engines that will meet a similar fate.

Fifty-two engines, older and smaller than the great machines that were the pride of the St. Louis Exposition, are now blowing blast furnaces at the Edgar Thompson plant, and in a few years all will have been displaced and a third of the number or less of monster gas engines, which are to take their place, will be doing their work.

The experiments at the Edgar Thompson plant, it is said, have determined the policy of the steel corporation for all its works, and gas engines will be installed as fast as they can be built at all the plants.

HOW ADVERTISING PAID.

Don't advertise if you believe you are wasting money. Let your competitor waste his money on advertising, and perhaps in this way you'll soon "put him out of business." Fix his clockwork for him. Just stand back and laugh at him when you see him squandering his money for printers' ink. Once there was a boy named John—we think his last name was Wanamaker, or maybe it was Moneymaker, anyhow his name was John with some sort of a maker attached to his last name. He owned 500 yards of calico, three pairs of jeans, a half dozen pairs of boots. He called this a dry goods store through a Philadelphia newspaper and offered to sell a pair of socks for thirty-seven cents. The don't-believe-in-advertising merchants laughed. Young John spent sixty-five dollars with the Philadelphia Ledger to advertise just one time and had less than \$100 worth of goods. He was cautioned by the merchants who "knew it didn't pay!" It was through sympathy that they offered him advice. But John didn't listen to them, and went and blew his money in foolishly; and to-day poor John sees the result of his misdoings—he has so many large dry goods stores that he can hardly find time to study his Sunday school lesson.—Baldwin Bulletin.

Producer Gas Plant at Stayner, Ont.

J. Knox & Co., of Stayner, Ont., who own the flouring mill and chopping plant at that place, also operate the electric light plant. Recently it was thought advisable to make a change in the power plant and the final decision resulted in the old steam system being superseded by a producer gas power plant.

where it is distributed by individual oilers to each bearing. It is afterwards collected and filtered and used over and over again, thus affecting considerable economy in oil consumption.

Stayner can claim to be one of the first places in Canada to have municipal lighting from power supplied by a gas engine. The

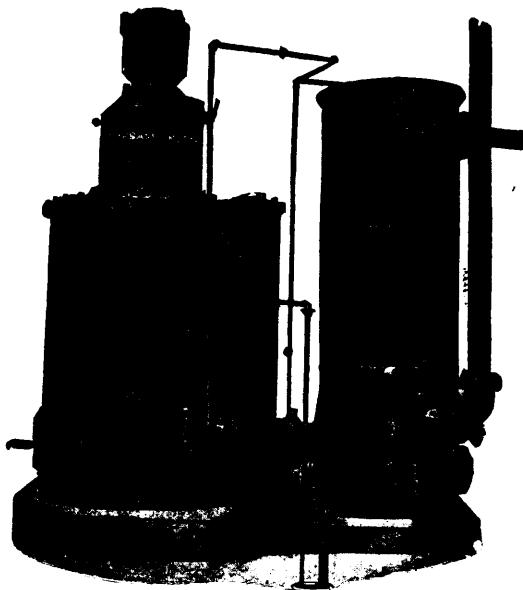


FIG. 1—GAS PRODUCERS AT STAYNER, ONT.

This plant consists of a 100 h.p. Fairbanks-Morse vertical multi-cylinder engine and a 100 h.p. Fairbanks-Morse suction gas producer. The engine being of the vertical type, takes but little room, is perfectly balanced and gives regulation quite as close as can be obtained by the best steam engine.

plant in question has been in operation some time now with most satisfactory results.

Tenders were received by the Canadian Pacific Railway Co. for the construction of the substructure at Lethbridge of a large

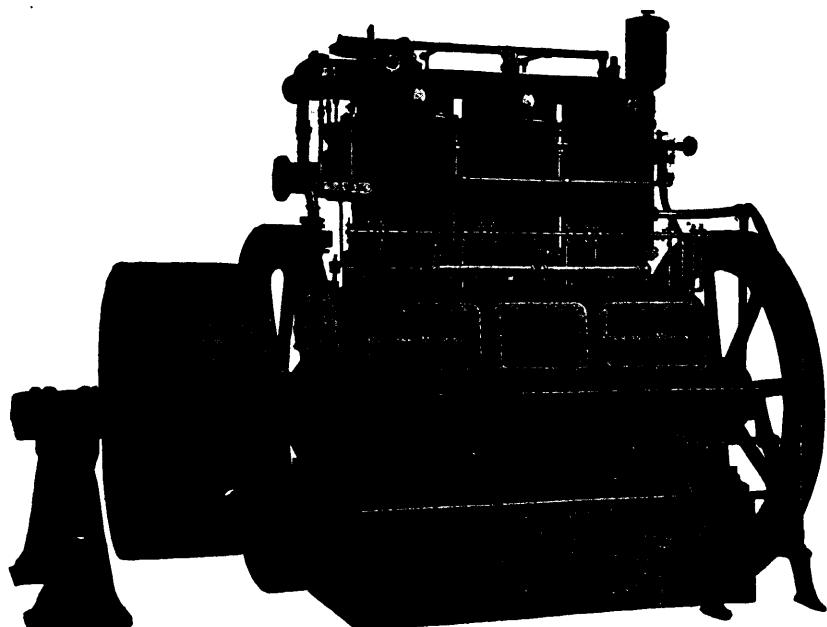


FIG. 2—100 H.P. GAS ENGINE AT STAYNER, ONT.

The oiling system is very complete, consisting of a pump operated by the engine which delivers the oil to a reservoir from

bridge. J. E. Switzer, of Winnipeg, Man., is engineer in charge of the undertaking. The estimated expenditure is \$1,000,000.

HISTORY AND USES OF SOAP.

History does not record the name of the inventor of soap, and it is likely that none ever existed. The accidental combination of the potash in wood ashes with an animal fat probably happened wherever nomads roamed through the countries; but the resulting product was valued little and played no part in their primitive households. In the old sacred records the word "soap" is mentioned twice, once in the book of Jeremiah and once in Malachi; but probably that refers to the juice of a plant that was then as well as centuries later, used by the dyers of woolens. Nor did the old Greeks know soap. Homer, who gives us minute accounts of domestic life and customs, did not mention the word, nor has any mention been made of it in the discovered records of the Assyrians and the Egyptians. Soap was also an unknown thing in Chinese civilization, which has flourished to high degree for thousands of years in spite of Baron Liebig, who says that the state of a nation's civilization is indicated by its consumption of soap. Speaking of past periods, we can only ask the question: "What substitutes did the old Chinese use for soap?" There was in the first instance, the native soda from the north of China and Tibet, called "kien" in Chinese, for which reason European soap is now called "fan-kien," i.e., "foreign soap." The old Chinese further used a preparation called "fei-t'sau-to," made from the pods of the Acacia concinna. Finally, rice-water was used for cleansing clothes.

The first authentic mention of soap is found in the works of Pliny the Elder, who speaks in a scientific way of a remedy for tumours, made from ashes and oil. At another place he describes a process for the preparation of soap, differing but little from that pursued at the present day, and ascribes its invention to the Ghouls, who made it from tallow and beechwood ashes, and used it to make their hair blond. He also makes mention of a hard and a soft soap. The remnants of a fairly well-equipped soap factory have been unearthed in Pompeii, containing pieces of soap in perfect condition, although more than seventeen hundred years old. As Pliny died in 97 A.D., at the eruption of Vesuvius, a victim of his desire to study the phenomenon more closely, we may infer that soap was used by the Romans in the last two or three centuries before Christ.

From this early time but little progress, if any, was made in its preparation. The Middle Ages, with their discouragement of original thought, were not productive of new inventions, and we at once pass to the first part of the last century when a new impulse was given to soap manufacture by the investigations of Chevreul. After this scientist had determined the chemical properties of soap, and showed that it was the salt of an alkali and a fatty acid, industrial enterprise seized this article and soon brought it to its present form of perfection. When the manufacture of soap became a prominent industry, additions of various natures were made, first to impart an agreeable odor and make the soap more attractive and desirable as a toilet article, and later other ingredients with a view to giving some varieties medicinal virtue.—Society of Chemical Industry (New York Section.)

Steam Power vs. Gas Power.

By L. G. FINLAY.

With a desire to get at the truth of the whole question, which is, I take it, the desire of this association; therefore, while many of my remarks are trite, I will endeavor to set forth the limitations which beset gas engines and then bring their merit before you. Where a small amount of power is required and natural gas is available, regardless of the number of hours the plant is to be operated, put in a gas engine, for it is economical, and, in the long run, just as reliable as a small steam plant. It is in the larger plants, ranging in size from 60 to 300 h.p., that I think this argument should cover, as I think you will agree with me that, above 300 h.p., the proposition becomes one of the central station or central power plant, where the primary object should be to reduce the cost of power to a minimum.

The limitations which govern the installation of an engine, whether it be of the external or internal combustion type, are many, and have to be fully and carefully considered before the correct solution is arrived at. For instance, a gas engine installation which has to do a certain amount of heating in a building is more economical under certain circumstances; these being where the heating surface does not exceed a certain number of feet per h.p. hour, which figures I will give later on.

Under other circumstances, where a greater amount of heat is required, one may put

in condensing compound engines, taking the steam from the receiver between the two cylinders. The next step would be to take non-condensing compound engines, using all the exhaust steam for heating purposes; the next would be to install simple Corliss engines, using all the exhaust steam for heating; the next step would be a simple slide valve engine, and the next step may be where even this engine does not give sufficient heat and where one has to take high pressure steam direct from the boilers for heating purposes. In this case, again, it is a question in my mind whether it is not better, and I believe I can prove that it is, to throw out steam engines altogether, install a high-grade gas engine and use low-pressure boilers for supplying the heat.

These are only a few of the many steps which have to be carefully considered by a consulting engineer who has charge of both the power and heating equipment. If these two duties are separated and placed in the hands of different men, each man will naturally endeavor to get the best for his own department, and a compromise is generally arrived at, which is invariably unsatisfactory to the man who has to pay up, viz., the owner. In other words, I believe the question should be discussed on the basis of whether the primary object is power or heating. If the former, then it is outside this discussion; if the latter, then it should

be adjusted on one or the other of the above steps, always remembering, however, that as a rule heating is required for only about five months every year.

We are arriving at a period—in fact, I say with truth, have arrived—where a gas power installation can be installed with absolute certainty of its successful operation under the guaranteed conditions. That this statement is correct a large number of plants testify which are in daily operation and have been so for years.

To my mind, the weak link of gas engine development has been the lack of a good producer which would successfully gasify the cheaper grades of fuel. A number of eminent chemists and engineers have endeavored for years to bring about the success of this type of producer, and after long struggles and serious setbacks, have succeeded, or at least some of them have, and I know personally of at least two makes of producers which are gasifying the cheaper grades of bituminous coal successfully and under the ordinary conditions which would be imposed upon a boiler plant, and with an efficiency ranging from 72 to 77 per cent.

It is needless to cite examples here of engines which are successfully operating on blast furnaces and natural gas, for every one at this meeting knows of such, and furthermore, I consider that the discussion touches only such plants as are of interest to the ordinary manufacturer; for it is obvious that a central power plant does not require any heating. And now we come to the great question of cost of the different installations, which is given in the accompanying table.

COST OF 200 H. P. AND 1,000 H. P. STEAM AND GAS PLANTS.

Assuming the 1,000 h. p. engine is compound condensing and the 200 h. p. is a simple automatic cutoff engine; that the coal with steam plants and bituminous coal producer costs \$2.00 per short ton, while anthracite is \$4.50 per ton. Bituminous coal averaging 11,000 B.t.u. per lb. and the anthracite 13,000 B.t.u. Lower heat value.

	STEAM.						PRODUCER GAS.						ANTHRACITE.					
	1,000 H.P.		200 H.P.		1,000 H.P.		200 H.P.		1,000 H.P.		200 H.P.		1,000 H.P.		200 H.P.		1,000 H.P.	
	FULL	50%	FULL	50%	FULL	50%	FULL	50%	FULL	50%	FULL	50%	FULL	50%	FULL	50%	FULL	50%
1 COST OF ENGINE PER RATED HORSEPOWER.																		
2 " PIPING	"	"	"	"														
3 " CONDENSERS	"	"	"	"														
4 " PUMPS ETC.	"	"	"	"														
5 " AIR STARTING APP	"	"																
6 TOTAL OF ENGINE PLANT,																		
7 DEPRECIATION 4 % ON TOTAL																		
8 REPAIRS 2 "																		
9 INTEREST 5 "																		
10 TOTAL OF LINES 7, 8, 9																		
11 BOILERS PER RATED HORSEPOWER.																		
12 PRODUCERS "	"	"	"	"														
13 CHIMNEYS & BREECHING "	"	"	"	"														
14 HEATERS, FEED PUMPS "	"	"	"	"														
15 AUTO. STOKERS OR COAL MCHY.	"	"	"	"														
16 TOTAL OF FUEL PLANT																		
17 DEPRECIATION 6 % ON TOTAL COST.																		
18 REPAIRS 3 "																		
19 INTEREST 5 "																		
20 TOTAL OF LINES 17, 18, 19																		
21 COAL USED IN B.H.P. TON IN LBS.																		
22 COST OF COAL PER B.H.P. PER DAY OF 24 HRS.																		
23 ATTENDANCE OF ENGINE "	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
24 " FUEL PLANT " " " " CTS																		
25 OIL WASTE & SUPPLIES.																		
26 TOTAL DAILY EXPENSE PER B.H.P. PER 24 HR. DAY.																		
27 YEARLY OPER. EXPENSES 309 DAYS PER B.H.P. DOLLARS																		
28 COST OF COAL PER B.H.P. PER DAY OF 10 ^{1/2} HRS.																		
29 ATTENDANCE OF ENG. "	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
30 " FUEL PLANT " " " " "																		
31 OIL WASTE & SUPPLIES " " " " "																		
32 TOTAL DAILY EXPENSES "																		
33 YEARLY OPER. EXPENSES 309 DAYS PER B.H.P. "																		
34 " EXPENSES LINES 10, 20, 21 = 24 HR. DAY.																		
35 " 10, 20, 21 = 10 ^{1/2} " "																		
36 COST OF POWER, ALL EXHAUST STEAM USED FOR HEATING.																		
37 " " " SAME AS LINE 36 BUT.																		
38 " " " 50% EXHAUST STEAM FOR HEATING.																		
39 " " " SAME AS LINE 38 BUT.																		
TOTAL COST. LINES 6 + 16 FOR ENTIRE PLANT.	\$51000.00		\$72000.00	\$61500.00	\$134000.00		\$56500.00		\$12500.00									
WATER EVAPORATED PER LB. COAL	2120		10.00		8.00													

COST OF 200 AND 1,000 HORSEPOWER STEAM AND GAS PLANTS.

When writing to Advertisers kindly mention THE CANADIAN MANUFACTURER.

I have been conservative in all figures relating to the steam plant and have not taken into account the stand by losses of a boiler plant. There is one statement I wish to make about the heating power of a gas engine—if we take the jacket water and heat it with exhaust gases to about 180 degrees F., making a hot water system, we can heat about 3,000 cubic feet of space per brake h.p. hour up to 70 degrees F., by rejecting the greater part of the jacket water and raising the rest to steam, say at 5 pounds, we are able to make 2.48 pounds of steam per brake h.p. hour. Beyond this we can not go, except with an uneconomical engine.

High-grade gas engines, without doubt, cost far more to build than high grade steam engines; probably one of the reasons for this is that the higher grade gas engines have not been purchased in sufficient numbers to enable their builders to reduce the cost of building to a minimum, whereas the builders of low-grade gas engines, owing to the low price at which they are sold, have been able to sell large quantities of them, and, therefore, have been able to affect those economies in manufacture which we are all striving for.

The cheap low-grade gas engine is both the best friend and the worst enemy of the internal combustion engine business. The best friend, because by its cheapness it has been placed in large quantities all over the country and has thus brought before a large number of people the question of economy in fuel which can not be obtained any other way. The worst enemy, because by its cheap construction it has given purchasers a great deal of trouble and has caused numbers of people to think that the only good gas engine is the one on the scrap heap—taking the liberty of paraphrasing that old story about the only good Indian being a dead one.

All praise is due to the manufacturers of these cheap engines for their struggles to get in the path which leads to success, and I trust they may ultimately attain it. One great trouble in the internal combustion engine business is the great lack of faith which is displayed by the general public in this type of engine; to such an extent, for instance, that, if a man buys a cheap engine and it fails in its work, he will condemn the whole tribe of gas engines and go back to steam, instead of trying another make; whereas, if he purchased a poor steam engine, he would simply condemn that particular make and buy of another maker. This lack of faith has been due, in a great measure, to the promises of a certain class of gas engine salesmen who are without technical knowledge, who have been taught a certain amount about the particular gas engine which they sell, regardless of conditions, and go out like parrots and repeat what they have been taught. They talk glibly about heat units, and yet many of them do not know what a unit is. For instance, the writer saw an advertisement in a paper some time ago, in which the maker of a certain producer guaranteed that his producer would produce a brake h.p. hour per pound of coal, disregarding altogether the other and most important factor in the installation—viz., the economy of the gas engine to which the producer would be attached. Such a guarantee is absurd on the face of it, and yet doubtless it has attracted the attention of many a man who did not know anything about efficiency.

The Limits of Thermal Efficiency of Internal Combustion Engines.

BY DUGALD CLERK.

Mr. Dugald Clerk read a paper before the Institution of Civil Engineers recently, in which he summarized the report of the Institution Committee on the standards of efficiency of internal combustion engines. He stated that the committee were satisfied that with good engines, giving their best economy, the actual efficiency divided by the idea, efficiency determined by a standard recommended by them, could be expressed by a ratio which varied between .5 and .7. This was deduced from separate tests made by Prof. Meyer and Prof. Burstall. Prof. Burstall's tests also showed how inefficient design would decrease the ratio, as in some of his tests means involving greatly increased cooling surfaces were employed to increase the compression, and were found to considerably diminish the ratio. These tests showed further how too high-flame temperature also decreased the ratio. The committee required, however, further knowledge as to the effect of 5 inches, 9 inches and 14 inches, diameter cylinders respectively, giving indicated powers of 6, 24 and 60. In these engines, taking the mechanical efficiency to be 88 per cent., and calculating the i.h.p. they found that the efficiency ratios were .61, .65 and .69 in the three engines. The tests showed, therefore, that by bearing in mind the slight changes in the ratio due to difference in dimensions, a close approximation to the best indicated efficiency to be expected from a given compression could be obtained by the use of a factor varying between .61 and .70, according to the dimensions of the engine. The tests also showed very clearly the small increase in economy of large engines in comparison with small ones, there being only 12 per cent. increase between 6 h.p. and 60 h.p. The author has examined the results of the tests made by the committee, and has made some further experiments on the large engine used in the test, with a view to finding the true heat distribution in the engine.

The balance sheet given by the committee is as follows:

	L.	R.	X.
Exhaust waste...	35.3	40.0	39.5
Jacket waste....	23.5	29.3	25.0
Radiation.....	7.6	10.0	7.3
B.H.P.....	26.7	28.3	29.8
	93.1	107.6	101.6

In obtaining this balance sheet the exhaust waste was determined by calorimeter, jacket waste measured, and the radiation includes friction of the working parts. The B. H. P. was determined by rope brake. In order to reason as regards properties of the working fluid, it is necessary to know the I. H. P., the loss of heat during explosion and expansion, and the heat in the gases at the end of expansion. These quantities are not given in the ordinary balance sheet as determined above. In the ordinary test the jacket loss is always overestimated, because some heat which ought to go to the exhaust calorimeter flows to the water jacket after the opening of the

exhaust valve and all through the exhaust stroke of the engine. The piston friction also will appear in the water jacket. The author has therefore attempted to adjust the balance from data given in the committee's report. Taking the mechanical efficiencies for the three engines, L, R and X, as .84, .85 and .86, the friction percentage of total heat is 5.1, .5 and 4.9, respectively. Deducting this from the jacket waste, corrected values for heat to water jacket, 21, 26.8 and 22.6 per cent. are obtained. Using these values, and reducing to percentage, assuming the error in total heat is not in the I. H. P. item, a new balance sheet is obtained:

	L.	R.	X.
Exhaust waste...	41.1	37.1	39.9
Jacket waste....	27.1	29.6	25.4
True radiation....	31.8	33.3	34.7
I. H. P.....	100.0	100.0	100.0

The ideal efficiencies in these engines are practically the same, and assuming that one-third of the heat going to the engine is converted to work and that the heat loss occurs near the beginning of the stroke, the difference between the jacket plus radiation losses, in any two engines, should be three times the difference between the indicated horsepower. In the L and X engines this is found to be exactly the case.

Calculations, assuming these to be the true specific heats, are, however, very nearly accurate. From the cooling curves and specific heat values so determined a balance sheet has been obtained for the X engine as follows:

	Per cent.
Heat flow during explosion and expansion.....	16.1
Heat contained in gases at end of expansion.....	49.3
Indicated work.....	34.6

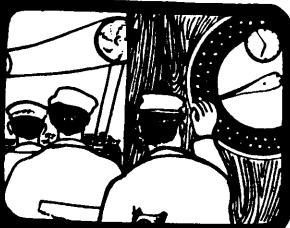
Comparing this with that found by the committee, it is seen that the indicated work is the same in both. There is, however, less heat flow during expansion, and more heat in the gases at exhaust. This shows that about 21 per cent. of the heat in the gases at the end of expansion goes to the water jacket during the opening of the exhaust valve and exhaust stroke. This is considered a more accurate balance sheet than has yet been obtained. Calculating the ideal efficiency as before, the value 41 per cent. is obtained. From the values of specific heat given, the adiabatic may be calculated, from which the ideal efficiency is found to be 39.5 per cent., showing that the actual engine has converted 88 per cent. of the heat which it possibly could convert into indicated work.

The Ham & Nott Mfg. Co., of Brantford, Ont., have temporarily abandoned the plan of a branch plant in Ottawa, and will greatly enlarge the local factory at a cost of \$40,000. The work commences at once. The capacity will be doubled and the number of hands increased to 200.

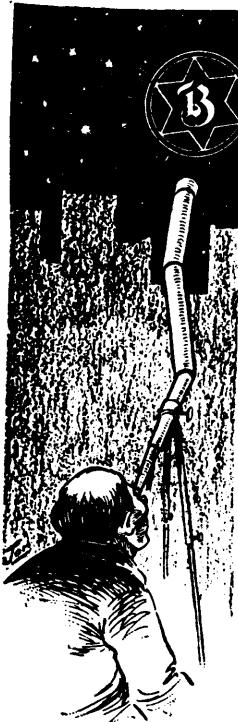


Office Methods and Appliances

A Review of the Latest Suggestions in Office Systems and Supplies for Manufacturers.



Co-Operation.



people united to accomplish results.

NO SYSTEM CAN WORK ITSELF.

No scheme of co-operation will amount to anything unless each human factor enters into the work enthusiastically and completely. The spirit of co-operation is optimism—the belief that the world, the people, the company and its product are all right. It also calls for belief in yourself—that you are square, that you owe no man anything that you will not repay.

Look up into the heavens some star-lit night. You see there the vast system of worlds governed by a perfect and harmonious law—the law of co-operation.

Society, life, business depends for its highest perfection on the perfect working of the part, the individual, each with the other.

The strongest of us are dependent on the good will and the ready help of their fellows.

The man who gets this help is always found to be the quickest to give help. For a while hot-air and "diplomatic" leg-pulling goes, and the victim does your work. Presently he wakes up, then you get nothing—for you not only have forfeited his respect, but his confidence and you have aroused his resentment.

Most of us have at one time or another met the slick, smooth type of gentleman whose kind of tact and diplomacy had produced a reputation for insincerity that made his decapitation a prayer for boon.

YOU CAN NOT USE PEOPLE FOREVER.

When the Great Architect brought the universe into existence He planned it on a co-operative basis. He made the law of co-operation the universal law. Our highest sense of joint activity at best is but a feeble reflection of this great law.

If you examine any great commercial system, such as the National Cash Register's, the Westinghouse Co.'s or the New York Central Railroads, you will find its pivotal principle, co-operation; and it is the almost general rule that as a business has become united, compact, cohesive, it has succeeded because the mind power, the blood and brawn of all its

parts is slick enough to always have you under obligation to him is the man you are glad to work with and work for and you enter a friendly rivalry to put the other man under obligation to you.

IF YOU WANT HELP, HELP YOUR HELPER.

As an instance, if you want a piece of printing, get it ready as completely as you know how, send a sample of the style you want it arranged in, or explain it in detail, and then give the printer a chance to do it right by giving him time. I know a man who is costing his firm a lot of money by his handling of its printing, because, not knowing how a piece of printing is going to look, he experiments, setting and re-setting proofs, until he gets something he thinks he wants. That isn't co-operation.

Every man should co-operate with his employer to keep up the efficiency and to keep down the expenses.

This man breaks both parts of the rule.

Another man who handles a stock of supplies for his department is totally without system. He never knows where his stock is until he is out of it. Then he rushes to the purchasing department to "rush it."

After many times, is it any wonder that he gets the cold shoulder? That he costs the firm money for rush telegrams and special express bills, in order that his negligence and incapacity may not result in a further loss to the company?

Co-operation has for its first law—mutual consideration.

Does Brown want an express package sent to New York? He holds it over until closing time, and then he rushes into the supply department and gives the order, "that must go out at once,"—and then he goes home to supper.

Does White need some figures? He knew on the 15th of the month that he would want them on the 30th, but "there is plenty of time," so he lets it go until the 29th and then somebody has to do night work to get them out, but you may bet that it isn't White that stays to do it.

That isn't co-operation, because it is making somebody else pay the penalty of



your lack of system, and co-operation like charity, begins at home.

THE WORST THIEF OF ALL.

But of all the mean thieves in the world the most despicable is the fellow who steals the credit for things well done; and a close second for meanness is the man who refuses to give credit for a thing well done.

A good man can't be kept down. He rises to the top in an organization like the Burroughs where there is no artificial barriers between officials and the newest office boy.

Don't let the ambition to shine, to attitudinize in the lime-light, cause us to forget the man who helps us.

Praise is co-operation—because it helps a good man along.

Beware of the man who, while he says nothing bad, never says anything in praise of a man. That man works from the least of virtues, policy.

Even Beau Brummel said "Every time I look in the mirror I have more respect for my tailor."



You have met men who seem to have arrived at that pinnacle of egotism where they honestly think they are complimenting you to give them an idea.

Help a man once, and if he is grateful, keep on doing it.

Help—co-operate—lend a hand to everybody.

That is what you are here for.

You are not here to make your fortune—to realize your ambition—to make your department the best—only—but you are

here to help make the Burroughs organization the best in the world.

That means a harmonious, enthusiastic organization.

No man can persistently and greedily pursue his selfish ends, measuring every request or chance for help and assistance from either himself or his department, by the benefits that may accrue to his personal ambition, and be permanently valuable to any business.

"United we stand, divided we fall," is the motto of a commonwealth.

No man or woman, whether stenographer, the humblest clerk or the head of a department, can ignore the family claim of his or her fellow employee for help and assistance.

That same sense of mutual helpfulness which nature made an obligation and a duty and which makes the people of one family, one nation, one blood fight each other's battles, should make us as a Burroughs family help, think and feel for each other.

As the office force we should help each other to give neither factory nor sales force just cause for criticism, as the factory we should help each other to beat the sales force.

As Burroughs men and women we should unite to beat the world in the making and selling of the best adding machines.

You must, as a contributor to the fund of service that makes up the sum total of results, learn the lessons of co-operation.

You should blush for the factory when it fails to maintain the highest standard of our product, and help it in every way to improve.

BAD FOR THE SALES FORCE.

When a salesman lets a competitor sell a poorly constructed machine against a Burroughs, as a salesman you should feel that you have a part in the failure, that it is a reflection on you as a member of the Burroughs sales force. You should ask yourself—"Have I told the other fellows all I know about that machine? Couldn't I have helped him?"

When you, Mr. Office Manager, fail to send in your reports on time, and the factory writes letters about it, don't get excited but get the reports in at once—co-operate by giving your mite towards the result.

When you can't get all the machines you want, pull an old trial, be glad that the company is selling so many. It proves that you



are working for the biggest manufacturers of the best adding machine in the world.

If you are called on for a demonstration of the Cash Received System, don't blame the System Department, but learn the system and make it do for you what it is doing for others.

If you don't like your territory—just remember there are others; and you are in a lot better position than the man whose territory didn't like him. Just remember, too, that you are a cog in the machine; the company is bigger than you are, and will probably get along after you are retired for "the graveyard is full of men the world couldn't get along without."

"God helps those who help themselves" is a law good enough for heaven, and it will have to do here.—The Burroughs.

SIGNS TWENTY LETTERS WITH ONE OPERATION.

DEVICE THAT OPERATES IN CONNECTION WITH FOUNTAIN PENS WILL MAKE THIS NUMBER OF ORIGINAL SIGNATURES ALL AT ONE TIME AND EVERY ONE THE SAME—A BOON TO BUSINESS MEN.

There are happy days in store for mayors, comptrollers, presidents of banks, railroads, trust companies, manufactories and officers of corporations of all kinds made possible by the invention and development of a device called the "Signagraph," says Office Appliances. Hitherto the highest paid officials in corporations have been tied to their desks and overburdened by the monotonous and tedious drudgery of having to affix their signatures to countless bonds, stocks, checks, certificates short time notes, etc.

Almost every department of effort has been aided by labor saving devices, but the signature writer alone has seen his labor increase without the slightest assistance to lighten it. The vast increase in corporate issues of all kinds, caused by expanding business, makes some relief of this nature a necessity, as the delivery of such documents must be made with promptness and despatch. The Signagraph, the invention of Mr. W. R. Woodward, places it within the power of any writer of average ability to deliver some 20,000 signed documents in an ordinary day's time.

The instrument referred to, a working model of which is now on view at the office of the L. E. Waterman Co., 173 Broadway, New York, enables a writer to sign a number of documents simultaneously, twenty being the usual number, but a larger or small number can be arranged for as required. Twenty Waterman Ideal Fountain Pens are arranged in two parallel rows, covering the signature spaces of an equal number of documents to be signed. These are previously arranged in proper order for delivery under the pens, the actual delivery being under the control of the writer. The checks, stocks, or other documents are placed overlapping each other in a frame so that space only is left for the signature. The various frames with the documents are fed beneath the pens by the turning of a feed handle. When they are signed they drop into a receptacle on the left. Provision is of course made for arranging the pens to accommodate any width, or length.

ALL WRITE AT ONCE.

All the twenty pens are on a sort of pantograph and are controlled by means of a "monitor" pen placed at the point nearest the writer. This pen has a rubber holder filled with water and alcohol, a handle is attached with which one actuates the pen. At the opposite end of the writing table is a small magnet. When one wishes to write, contact is made with the monitor handle, and the depression of this pen causes all the other twenty pens to be depressed to a similar degree so that they all touch the paper.

The monitor pen writes upon glass, the water and alcohol drying almost immediately and every movement of that pen is faithfully and accurately reproduced to the minutest detail by all the other 20 pens. Of course a little practice is required to use the monitor pen, but this is only the question of a short time when the absolute individuality of a writer's signature is produced with a faithfulness beyond the power of an expert handwriting to tell from the original. Each signature is of course in ink.

The question of the legality of signatures made on this machine has been raised. According to many opinions, there is not the slightest doubt but that signatures made on this machine are as good and valid as those made by an individual with a single pen. The writer using the monitor pen writes his signature, and the other pens on the rods merely follow the impulse and direction of the instrument actuated by the writer. In writing one, he writes all, simultaneously.

The control of the movement of each pen is wonderfully easy. All the joints of the machine are ball bearing. There are about 412 minute steel balls concealed in the mechanism, which will account in a great measure for the exactness of the machine, and its ease of working. The rod holding the pens are aluminum, and the base on which the pens write is of metal.

A LOST CONTRACT.

THE LITTLE THING THAT MAY SOMETIMES PREVENT A SALE.

A pen once lost me an order. I had just worked up the executive of a large concern into a desire to buy. I had my contract form lying on his desk with my finger on the dotted line. He reached over toward his pen rack, took off a pen and plunged it in to the ink well. He turned to me with a frown on his face—the well was empty.

I was ready with a fountain pen. The pen was uncapped. I handed it to him. He started to write. The ink would not flow. I took it and shook it. Again he made the attempt, with no result.

"I will get one," he said. So he stepped into the other room. Evidently some one stopped him with a question for he did not come back for three minutes. Then he stood at his desk. He looked down at the contract.

"I believe I had better think this matter over again," he said. And all the talk I put up could not budge him.

I had lost a sale because my fountain pen was empty. Now, one of my regular morning duties, week in and week out, just as regular as my shave and my checking over of calls to be made and the making out of my expense account, is filling my fountain pen.—James N. Bowen in System.

July 19, 1907.

THE CANADIAN MANUFACTURER.

FITS THE NEED AT EVERY POINT

No matter whether you require a system for a wholesale house, manufacturing concern, financial corporation or retail business

THE CRAIN SYSTEMS

are manufactured to meet your requirements.



THE CRAIN FOLDED ORDER FORM

enables the travellers to write up their orders and despatch them with one writing. No further need to carry small order books.

THE CRAIN LEDGER cannot be duplicated for durability. Can be supplied with the only safe and sure seal attachment.

Write us or call up our representatives for further particulars.



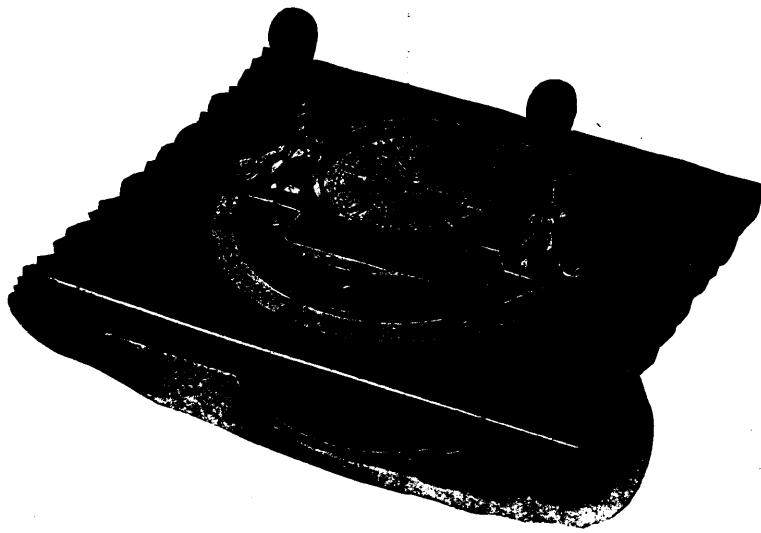
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THE Rolla L. Grain Co.
LIMITED.
OTTAWA, CANADA

YOUR FACTORY COST SYSTEM. What Is Its Basis?



THE CALCULAGRAPH

DOES NOT GUESS
DOES NOT FORGET

DOES NOT ESTIMATE
DOES NOT MAKE CLERICAL ERRORS

As the stability of a building depends on the soundness of its foundation, so a factory cost system depends on the accuracy of the records on which it is based.

If you depend on your workmen for these records they must be full of errors—not necessarily intentional.

The Calculagraph

is a machine which makes original records of working time with absolute mechanical accuracy.

Such records make a reliable foundation for, and are adaptable for use in connection with, any system of finding costs of factory products.

The **CALCULAGRAPH** is the only machine in the world which mechanically subtracts the time of day a workman begins from the time of day he stops and prints his actual working time.

THE NORTHERN ELECTRIC & MFG. CO., Limited
COR. GUY AND NOTRE DAME STREETS, MONTREAL

Twenty-Five Years Ago.

EXTRACTS FROM THE FILES OF THE CANADIAN MANUFACTURER OF JUNE 23, 1882.

EDUCATION IN MANUFACTURES.

Elsewhere we print an article from an English contributor on the importance of technical education as an aid to manufacturing progress. It will readily occur to many of our readers that the subject is an important one for Canada as well as for England. Owing to the pronounced attitude taken by the Dominion with regard to the promotion of home industries it is more important to us now than ever it was before. It is, therefore, in order to examine what we have already in the way of provision for education in the manufacturing arts, and to consider what is yet wanted. In Ontario we have now the School of Practical Science, in connection with the Ontario Provincial University. It cost for building, exclusive of apparatus, \$30,353, and was opened in September, 1878. Instruction is given by the following professors:—Dr. Daniel Wilson, ethnology; E. J. Chapman, mineralogy and geology; James Loudon, mathematics and natural philosophy; R. Ramsay Wright, biology; J. Galbraith, engineering; W. H. Pike and W. H. Ellis, chemistry. The departments most directly connected with manufactures are of course those of chemistry and engineering. Evening lectures, specially adapted to skilled mechanics and artisans, were commenced in November last, one of them being given every Monday by Professor Galbraith, on applied mechanics, and two on other evenings on chemistry, by Professors Pike and Ellis. The department of mathematics and physics, conducted by Professor Loudon and Mr. Baker, may be said further to be in close relation to the improvement of manufacturing skill. Dynamics, sound, light, and heat, are the leading subjects here, a scientific understanding of which is of great practical value for promoting manufactures.

In the report for 1880-81 it is stated that the School is still imperfectly equipped, but the hope is expressed that the appliances yet wanting will soon be furnished on a scale worthy of a Provincial School of Science. A list published of those attending the evening classes, shows forty students in applied mechanics, fifteen in chemistry, five in both and eight in all the courses.

The Montreal Witness says that the immigration by way of Quebec so far this season has been about thirty thousand, more than double the number arrived at this time last year; and thinks it looks as if many more people are coming into the country now than are leaving it. Let us rejoice that the "exodus" so much talked of is stopped at last.

The new firm of Hay & Patterson, of Galt, are about entering into the manufacture of machine knives of all descriptions, including cheese-box knives, paper knives and edge tools. They are now preparing their factory, a stone building, 75x52 feet, for this manufacture, which will be completed and in operation about the first of August. The power is to be supplied by a 35 h.p. engine.

Three car loads of carding machines have arrived for the Kingston knitting mill, and also two car loads of spinning machines. A

temporary engine has been placed in position at the mill for the purpose of testing the machines as they are erected. The machinery is of the most modern that is manufactured, and is a great improvement on that of the last mill. Men commenced to place it in position to-day.

The old established firm of Messrs. John McArthur & Son, Montreal, wholesale dealers in paints, oils, dyestuffs, etc., will in future be known as McArthur, Corneille & Co. The late firm was composed of Messrs. James G. McArthur, Milton Pennington, and Chas. C. Corneille. Mr. Milton Pennington, who has been a member of the firm since 1867, now retires, and the name of the firm has been changed as above.

Hamilton Spectator:—There arrived in this city yesterday the largest steam hammer in Canada; and its arrival was one of the direct results of the sustaining of the National Policy at the recent election. The Hamilton Forging Works waited to see the result of the election, and, find it to have gone the right way, the big steam hammer was immediately ordered by telegraph. When the hammer gets into position it will weigh, in iron work alone, no less than twenty-five tons.

The Messrs. Crossley Bros., of Manchester, England, the manufacturers of the celebrated "Otto" silent gas engine, are now represented in this manufacture in Canada by John Doty, Toronto, engine and boiler manufacturer. The "Otto" requires but a small jet of gas, the expense of boiler and attendant being done away with. At a comparatively small outlay a manufacturer can have in his upper room, if necessary, a perfectly noiseless and clean engine up to as great a power as 85 h.p. Mr. Doty is now making a specialty of those of from two to eight h.p.

The Smith-Elkins Mfg. Co., Sherbrooke, are about to erect extensive buildings in connection with their works. These buildings embrace a new foundry, blacksmith shop, and boiler manufacturing building, and will be erected immediately contiguous to their present foundry building, which will be converted into the machine shop of the company. The company will thus have all their works concentrated in close proximity and on the ground floor, thereby enabling them with ease to convey their heavy castings from one department to another, as well as enabling the foreman to properly oversee all the work under construction.

The village of Valleyfield, situated, as is well known, at the upper or west end of the Beauharnois Canal, is to-day one of the busiest places in the province. The Montreal Cotton Co. have had their works there for some time, a large stone mill with 35,000 spindles and a weekly capacity for about 2,000 pieces of goods, of which there are some ten or twelve grades. The mill is being doubled in capacity, and there are at present, in addition to the 400 or 500 people engaged in the factory, between 300 or 400 mechanics and work people employed on the building.

Messrs. Cawen & Co., of the Galt foundry, have been given a large order for a full

assortment of wood-working machinery by the Chatham Mfg. Co. We published the prospectus of this company some short time back, and it would appear from the above that the promoters have been successful. The object of the company is to engage exclusively in the manufacture of wagons, etc., for the North-West, and as there is a large demand for such vehicles, and as the works will be erected at Chatham, a most favorable point for securing the different woods that enter into the manufacture of wagons, etc., we would think that the company have a prosperous future before them.

Messrs. Firstbrook Bros., Toronto, are replacing their former premises by a large brick factory 90x70 feet, two stories high and basement. A new boiler of 75 h.p. has been placed to drive a new 35 h.p. engine as well as the one before in use of 25 h.p. The former will be utilized in driving the small planers, dove-tailers, borers and sand papering machines of the upper story, the other engine to drive the large planers and matching machines of the lower flat. The firm employ from forty to forty-five hands, to be increased. The quality of work produced is well known throughout the city and Dominion, and the enterprise of this firm will be rewarded, as in the past, by a brisk and prosperous business.

The Montreal Gazette says: "We are glad to learn from what is considered good authority, that Messrs. H. Disston & Sons, the celebrated saw manufacturers of Philadelphia, are about to erect extensive works in Canada, now that the policy of protection for Canadian industries has been practically settled as the policy of the country. This firm, probably the largest in the world in their special line, employ about nine hundred men in their works in Philadelphia. In starting an establishment in Canada, they contemplate supplying not only the Canadian market, but supplying as well a large part of their foreign trade from this point. This is another of the indications which go to show how wise, from a patriotic standpoint, was the decision of the people of Canada at the recent elections."

BE GOOD NATURED.

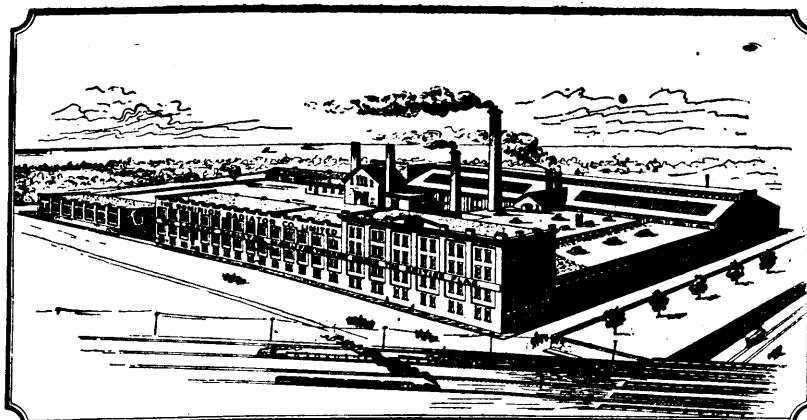
Did you ever realize the value of keeping good-natured? This is one of the greatest aids to a successful retail business that a man can have, and is far beyond estimation in cash value. Not only does it keep you contented with trade whatever may come up, but it keeps all your employees in the same humor, and they in turn fill the minds of the public with the impression that with such happiness and good nature surely there must be business success. People love to aid a happy man. Notice the impression made on you when you wake up and rush to work a little late. On the way to the train you meet another neighbor who is whistling as though he had not a care in the world. On the train you meet another who has a pleasant yarn to tell. Your whole day has been changed. Whereas you got up feeling tired and cross, by the simple magic of one good-natured man, you were led to forget your troubles and look for a minute on the bright side of life. In that brief minute you caught the spirit and your disposition for the day was changed.—*Shoe and Leather World.*

Manufacturer's Opportunity

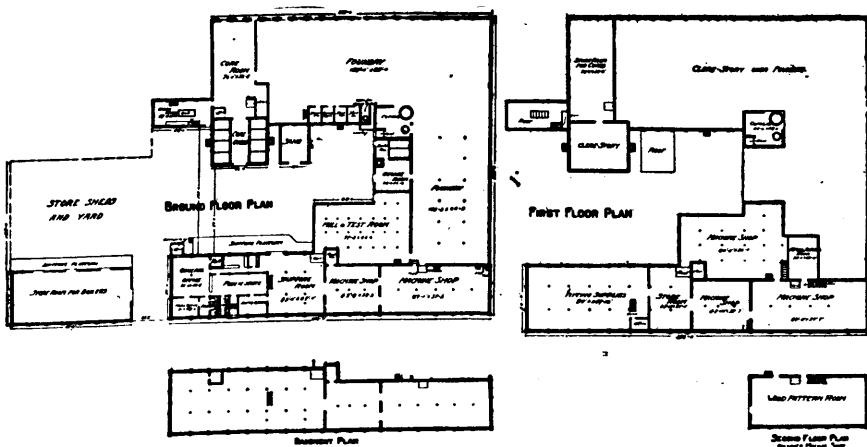
FOR SALE

LAND AND BUILDINGS
Foundry and Machine Shop

(TWO CUPOLAS)



About 90,000 square feet floor space. Good yard room, close to Grand Trunk and Canadian Pacific Railways.



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340-376 Dufferin Street, Toronto, Canada

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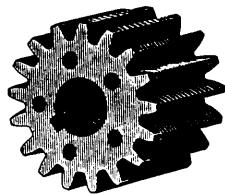
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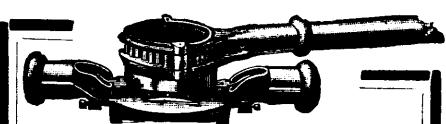
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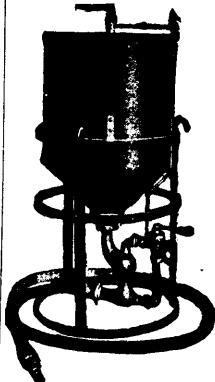
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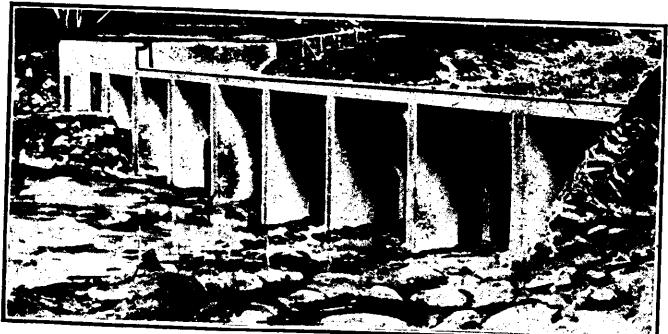
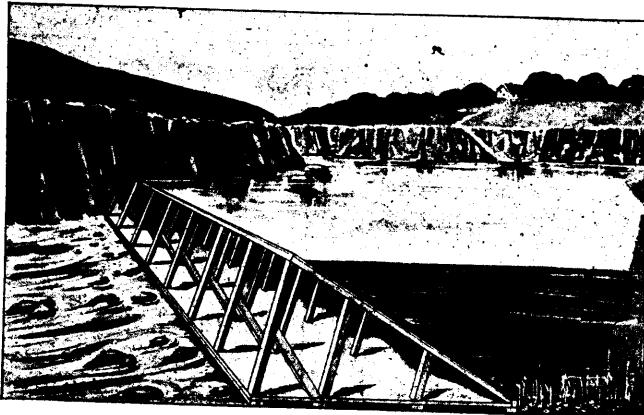
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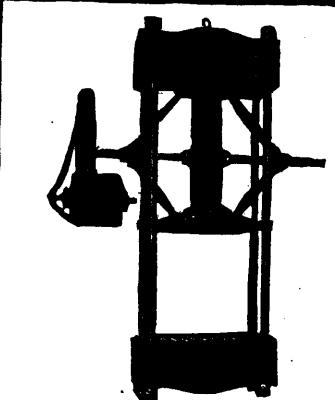
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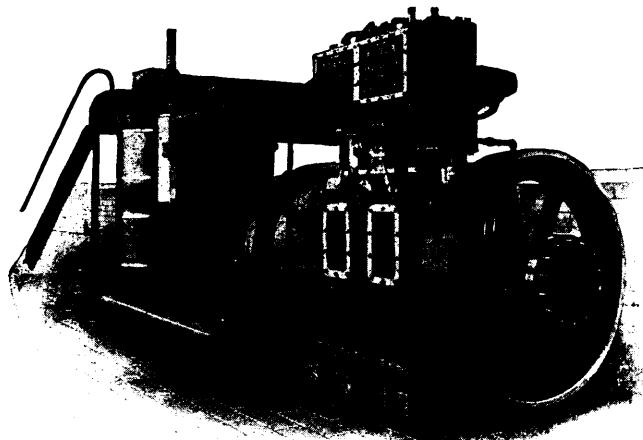
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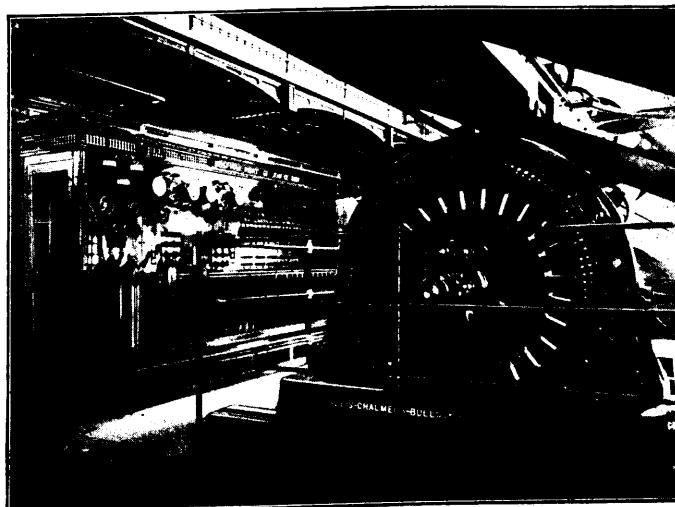
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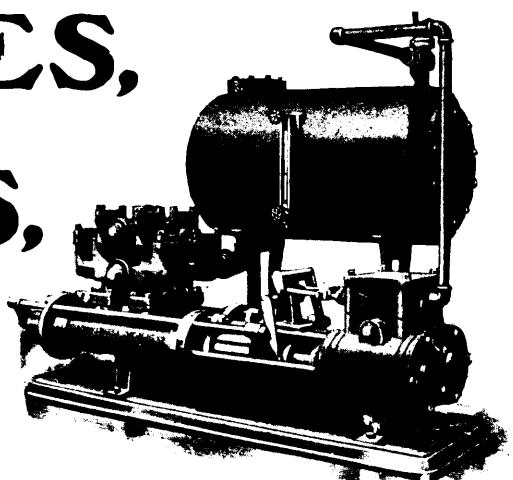
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