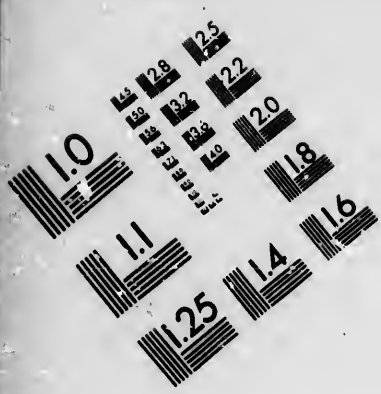

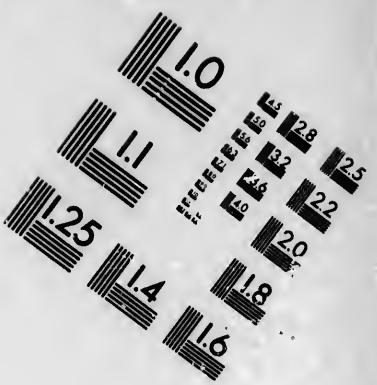

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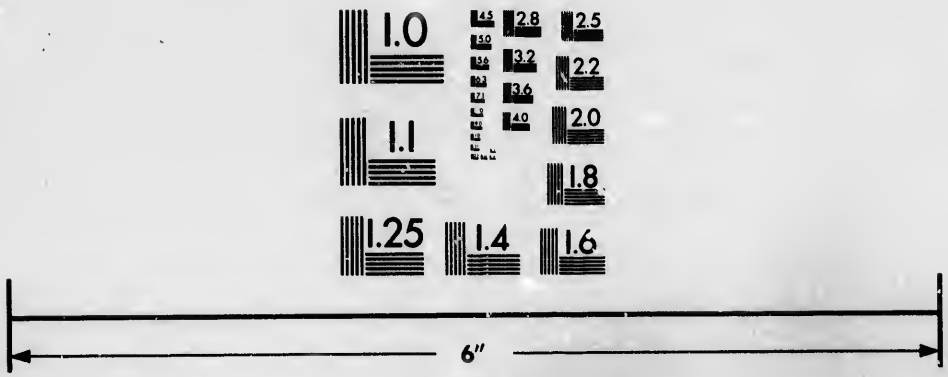

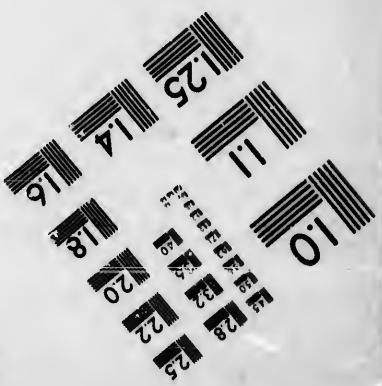

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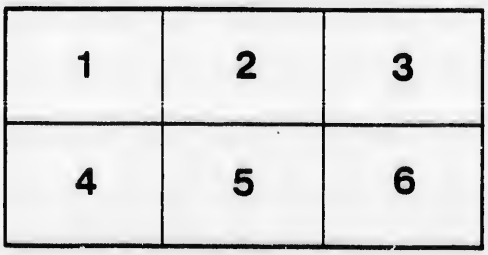

BRANTFORD ENGINE WORKS,

ESTABLISHED 1844.

WATEROUS'

IMPROVED SYSTEM

OF

Fire Protection

AND

WATER SUPPLY,

FOR

CITIES, TOWNS, AND VILLAGES.

MANUFACTURED UNDER LETTERS PATENT BY

C. H. WATEROUS & CO.,

C. H. WATEROUS. G. H. WILKES.

BRANTFORD, ONT.

ALSO MANUFACTURERS OF

ENGINES, SAW MILLS, GRIST MILLS,

—AND ALL KINDS OF—

SAW MILL MACHINERY.

HUNTER, ROSE & CO., PRINTERS, TORONTO.

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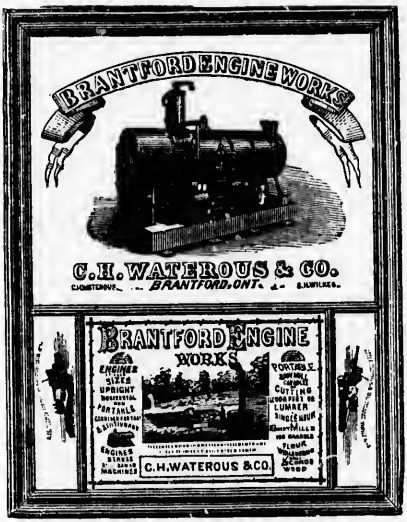
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FOR CITIES, TOWNS, AND VILLAGES.

The Reservoir plan of Water Works is confessedly imperfect. Its settling process does not furnish water of satisfactory quality. Its fixed gravitation pressure does not meet the varying wants of communities so far as quantity is concerned. Its value for Fire Protection is generally limited to the supply of Fire Engines. It is withal so expensive that tax-payers shrink from the liabilities it imposes. Topographical difficulties prohibit numerous localities from supplying their wants for water by this method. There was urgent need, therefore, of a new and better way of accomplishing the important objects of Water Supply and Fire Protection. Happily these public wants are fully met in the new system of Water Works, invented by Charles Horatio Waterous. The frequency of fires in Brantford, which the means at hand were lamentably incompetent to check, turned his thoughts in the direction of providing a better method of fire protection. We regret to make the statement, but it is strictly true, that no town or city in Canada had suffered so much loss from fires during the last ten years as the town of Brantford. Within that time nearly all the buildings on both sides of our main business streets, have been destroyed ; new edifices have arisen from the ashes, only to be destroyed again. The cause or origin of these fires has usually been enveloped in mystery, but in some cases the hand of the incendiary has been clearly traced. From the oldest and most experienced Insurance Agents in the town we have learned some facts relative to the value of property destroyed, and the amount of it covered by insurance. There had been during the ten years prior to 1870. over fifty fires, some of them sweeping away whole blocks of buildings on two sides of a street at the same time. The

estimate of the value of property destroyed varied from $300,000 to $500,000. We take the lowest of these estimates, because we wish to avoid anything like exaggeration. Of the three hundred thousand dollars' worth of property destroyed by fire within the ten years, much less than one hundred and fifty thousand, or greatly less than one-half, was covered by insurance. The loss, therefore, to the people of Brantford, the owners and occupiers of the property destroyed, has been over fifteen thousand dollars a year, in addition to the amount paid for insurance, which amounted to fifteen thousand dollars more for the whole property insured in the town. Many people fancy that the amount of insurance that has been paid has exceeded the value of property destroyed, but no idea could be more erroneous. A careful consideration of the whole matter will at once satisfy the enquirer that what the various insurance companies, doing business here, have had to pay, will be more than they ever received from the assured; the owners of the property destroyed have also been heavy losers.

Now, whatever may have been the origin of the numerous fires which have occurred in Brantford, their terrible devastating effects can be ascribed to one cause only: the WANT OF EFFICIENT AND ADEQUATE MEANS FOR THEIR IMMEDIATE EXTINCTION WHEN THEY FIRST BROKE OUT. It is true the town had, during almost the whole period to which we have reference, a well-organized and efficient Fire Brigade, with fire engines of the best construction, but the efforts of the firemen had too often proved futile, BECAUSE THERE WAS NO ADEQUATE SUPPLY OF WATER. Had that been supplied in ample abundance by means of Water Works, such as exist in the large cities of Canada and the United States, and such as we possess now, the loss by fire in the town would have been less than one-tenth what it has been heretofore. *The great desideratum in this town* WAS WATER, and until that was supplied by some mode not hitherto used here, we might have reasonably expected that destructive fires would continue to occur at short intervals, just as they have occurred during the previous ten years. Water Works, however such as have been constructed at Hamilton, Toronto, Montreal, and in the largest American cities, would have been *entirely too costly for a town of the wealth and population of Brantford.* The corporation could not afford to expend millions of dollars for the first construction of Water Works, or to spend a hundred thousand, or even fifty thousand dollars a year on a Fire Department. Previous to the construction of the present Water Works the Fire Brigade cost over thirteen hundred dollars annually, and if we add to this the amount paid yearly to the insurance companies, say fifteen thousand dollars, also an excess of fifteen thousand dollars for the property annually destroyed beyond the total amount of insurance, we shall find

that fires and the inefficient means for their extinction cost over $31,000 on an average yearly, and as the town increased in size the liability in losses by fire would have also increased.

Now no scheme could have been devised for supplying water for the rapid extinction of fires when they occurred, and which at the same time would diminish the devastating effects by one-half, *and which would not cost in the first instance more than one-half of the annual loss by fire, and which to be kept in efficient working operation won't exceed the hundred and twenty-fifth part of the previous annual loss by fire*, other than such a scheme as Mr. Waterous has invented. The scheme devised and submitted to the consideration of the Town Council by C. H. Waterous, Esq., has secured the approval of some of the first Engineers in this country as well as in the State of New York.

The system of water works introduced, so modified as to be almost entirely new, is the same as that which has proved so eminently successful in Lockport, Ogdensburg, and other cities in the United States.

In 1860 Mr. Waterous made a proposition to the Council, the same in substance as that which they accepted last year, but at that time the Council were not in a position to receive and act upon it, and therefore the matter was abandoned. Mr. Waterous, however, with the enterprise which has always characterised him, repeated the proposition again, when it was more favourably received, and prominent gentlemen formed a joint stock company with a capital of $20,000, in shares of $20 each, for the purpose of carrying out Mr. Waterous' views, and with the understanding that the corporation should guarantee eight per cent. per annum on the amount up to $18,500.

Waterous' system of Fire Protection and Water Supply has been patented, and is one of his own invention. It is substantially the same, with improvements, as the "Holly System," which is being extensively introduced into the cities and towns of the United States. Mr. Waterous' system dates its inception to the year 1860, whereas, the "Holly System" was not introduced until 1863.

If we may place any reliance on the opinions of such Engineers as Kivas Tully, Esq., Chief Engineer of the Ontario Government, and others well qualified to pronounce judgment on such works, our system is not surpassed, if equalled, when we consider its comparative inexpensiveness and proved efficiency, by any other now in existence.

Since the works have been in successful operation there has scarcely been a fire in Brantford, and those which have occurred have been almost immediately extinguished. *The result is that the insurance companies have reduced their rates of premium from 20 to 30 per cent.*, and the bad reputation which

Brantford had attained in this particular, she is likely to lose for all coming time. So satisfactory has the system worked up to the present time that a movement is now on foot to extend and utilize it still further. It is proposed to procure by means of the Water Works, the water necessary for domestic purposes. Possibly hereafter they may be still further utilized for manufacturing purposes. We may sum up by giving some of the many advantages of *Waterous' Improved System of Fire Protection and Water Supply.*

1. One of the advantages of this system is, the great strength and power of the machinery, as compared with fire engines, for suppression of fires. The latter are made light as possible, in order that they may be moved with celerity in case of fire alarm. This sacrifice of strength to locomotion, often results in their giving way in some weak point at the critical moment which determines whether the fire shall be quelled or rage unchecked, until immense amounts of property are destroyed. The Water Works on the contrary are permanently located, and iron and steel are freely used to make them massive, strong and durable. That they will not give way in time of fire, may be relied upon with great certainty. That they are constructed with superabundant amount of power, and in duplicate sets of machinery, is an additional guarantee of unfailing efficiency.

2. Another advantage of the system is, that it saves and makes available the precious time consumed by fire engines in reaching a fire after the alarm is given. Fire engines wait for men to draw them, or are liable to be detained by a balky horse, or by overturning the engine, or by muddy streets, or a deep fall of snow, or some other difficulty, which keeps them from reaching the spot where their services are required, until too late to be of any service at all. The Water Works, on the contrary, reach out by their under-ground pipes throughout the entire town, and wherever a fire breakes out there will always be, near at hand, several hydrants—which, under this system, is but another name for most powerful engines—ever standing sentinel and always ready without waiting to be moved, (upon the turning of a wrench, and the attachment of a section of hose,) for instant and successful action. The value of this system in this feature, cannot be over-estimated, for a few minutes gained in throwing water upon a fire at the outset, are more than the equivalent of hours at a later period, when the conflagration has spread, and is sweeping all before it in its devastating course.

3. Another advantage of this system of Water Works is, that it obviates a serious difficulty, with other systems, in regard to a supply of water for the extinguishment of fires. It too often happens that even when the fire engines are in good working order, and arrive promptly at the conflagration, they cannot grapple with and master it, because of a partial supply of water. In marked con-

trast with this, by the Waterous system, each and every hydrant—or fire engine—is also a never failing reservoir, which will yield its full supply, from the main source of supply, until the flames are subdued. The failure of this main source of supply, can, in the construction of the works, be abundantly guarded against, and hence it is hardly a conceivable contingency that a lack of water will prevent the suppression of fires promptly, wherever they occur.

4. Still another advantage of this system is, that the severity of winter weather does not in the least interfere with its efficient operations. Very different is it with the other modes of suppressing fires with either hand or steam fire engines, or any other fire apparatus. They may be in perfect working order, and the supply of water may be abundant, and yet with the thermometer at or below zero—and it is then fires are most frequent—how often communities stand appalled at the spectacle of conflagrations which frozen fire engines, and frozen hose cannot furnish a drop of water to repress and subdue. With the Waterous system it is noticeable that the suction is taken within a frost-proof building, the water is thence pumped into and through long stretches of pipes beneath the ground and below the reach of frost, is thrown to the surface at the required point, with temperature considerable warmer than the open atmosphere, and thence, with great and unchecked velocity is showered in torrents upon the fire through short stretches of hose, in which the water cannot congeal in its rapid flow. This circumstance, alone, very strongly recommends these works above all others, in that the security is not diminished when most needed in intensely cold weather.

5. Another weighty circumstance bearing upon the question of adopting this system of Mr. Waterous', is, that since it dispenses with fire engines, engine house, &c., the sale of this property, no longer needed, will contribute largely to pay the cost of the Water Works. In many cases the sale of the engines, engine houses, &c., will provide for nearly, or quite the entire cost of the Waterous machinery.

6. Another circumstance in favour of this system, which commends it strongly, is the nominal sum it costs to superintend and keep them in repair. The Brantford works cost for care and superintendence but $250 per year. Let the comparison be made between this and the annual cost of maintaining a single fire engine, whether hand or steam, and tax-payers have an all powerful reason for immediately adopting the Waterous system. When tax-payers ascertain and foot up the annual cost of maintaining existing fire departments, they will be startled at the amount, and will appreciate the importance of the Waterous system, which reduces it to a trifling sum annually.

7. Yet another circumstance in favour of these water works is, that it relieves communities of the expense of fire departments as now organized. By the Waterous system, hose companies alone are required, and since, wherever laid, the water pipes to that extent take the place of hose, only a small amount comparatively is

required. In Brantford, a hydrant hose company has been organized, composed of citizens interested in the protection of property, and in other places the same classes, prompted by this motive, will readily perform the same services.

8. Conclusive proof of the superiority of this system, is found in the fact that underwriters readily make large concessions in the rates of insurance, within districts covered and protected by them.

9. This system, it is to be observed, also meets a public necessity, inasmuch as it combines fire protection and water supply, without the expense of constructing and maintaining reservoirs and fire engines, and thus places it within the reach and means of communities, to enjoy almost perfect immunity against fire, while at the same time a full supply of water may be secured for household and other purposes.

WATER SUPPLY FOR TOWNS.

THE WATEROUS SYSTEM.

ITS OPERATION IN BRANTFORD.

Extract from the "Daily Globe," Toronto, 30th January, 1872.

An effective system of water supply for towns and cities is one of the most pressing necessities of Canada. For the want of it hundreds of thousands of dollars worth of property is annually lost in Ontario alone. Most of our towns and cities are deplorably deficient in this respect, and even of those that make some pretence to an efficient system, few have reduced the danger of loss by fire to anything like a minimum. The unusual number of destructive fires last summer and autumn, has aroused public attention to the importance of the subject; and city and town corporations, upon which the responsibility mainly rests, have of late been casting about to find out the best, and at the same time the cheapest, means of protection against fire. What is wanted is a system that combines efficiency and economy. Of course no plan is really cheap that is not thoroughly efficient; but the one that combines both elements will always necessarily and properly obtain the preference. Two things are essential in any system, and in proportion as they are wanting will it be found deficient. There must be an abundant supply of water, so that there will be an absolute certainty that it will not fail just at the moment when it is most needed; and there must be the means of applying the water promptly upon the discovery of fire. Every moment, then, is of the utmost importance. A few minutes are generally sufficient to decide whether the fire is to be servant or master. Reference to the Chicago fire may be somewhat hackneyed, but that great disaster can be turned into a universal blessing if the lessons which it teaches be only universally observed. It is an indisputable fact that had the engines been promptly on the spot when the fire began it would have been quickly subdued, and a local para-

graph in the Chicago papers would have sufficed to tell the whole story. The same may be said of nearly all our large fires. Few get much headway before they are discovered, but the delay in getting to work is fatal; the fire has gained strength, and sweeps all before it. Promptitude of operation is, however, not more important than an unfailing supply of water. How often do we hear of fires raging unchecked, simply because the water supply has failed just at the critical moment, and firemen and spectators are alike helpless? With two or three exceptions there is not a place in Canada that can be at all times sure of a constant stream of water equal to any fire that may take place within its limits. In some towns a neighbouring stream is relied upon, though for lack of the requisite machinery its supply can only be used at a limited distance from its banks. In other places the wells of private individuals are the only dependence. Under such a state of things it is not surprising that the ravages of fire have become somewhat alarming. Indifference has in a measure given place to enquiry on the part of corporations; and though such bodies proverbially move slowly, it is to be hoped their present alarm will not subside until all our towns and cities are supplied with the best means of protection against fire. The supply of water for domestic purposes is also of vital importance, and a good system of fire protection should be capable of extension for this purpose. The importance of pure water, from a sanitary point of view, is every day becoming more generally recognized. Wells in a town of any considerable size are very liable to become impure, and the prevalence of epidemic diseases may, to a great extent, be attributed to this fact. In the selection of a system of water-supply of course, this point must not be overlooked.

Heretofore but two plans for protecting our cities and towns against the ravages of fire have been known in Canada. These are the fire-engine system and the reservoir system. The first of these uses whatever means of obtaining water may be within its reach, and contents itself with providing engines on a greater or less scale of efficiency for the extinction of fire. It does not assume to make provision for a supply of water.

The second, or reservoir plan, provides for drawing water from lakes or streams at so high an elevation above the level of the towns to be supplied, as will enable a full supply of water to be carried by natural gravitation to any necessary height within the town. In the event of no such elevated sources of supply being within reach, it also provides for the pumping up of water from lakes, or rivers, to artificial reservoirs, constructed on so high a level above the town as to secure a supply of water for all purposes by natural gravitation.

Up to a very recent period these plans for the supply of towns with water have been the only systems known in Canada. But within a year or two past a third scheme has been gradually creeping into public notice—and though only as yet adopted by one Canadian town, it has already given sufficient proofs of its theoretic and practical efficiency for the work it assumes to do, as to entitle it, at least, to an earnest examination by the active men in all our cities and towns. It proposes by means of powerful engines, placed within reach of a constant supply of water, to force such a stream through pipes and hose to any height as will effectually extinguish any fire in the shortest possible space. It also provides for the supply of water for domestic, manufacturing, and sanitary purposes in all parts of any town,—and it claims to do all this with a degree of efficiency, certainty, and economy, that the old existing systems cannot compete with.

The parties who have made this new system of water-supply their own, and who have for some months past been urging it energetically on public

attention, are Messrs. C. H. Waterous & Co., the eminent machinists of the Town of Brantford. These gentlemen seem to have the strongest confidence that their plan will meet all the requirements of our Towns, that it will reduce immensely the annual loss of wealth by fires, and contribute largely to the health and comfort of our civic population.

Messrs. Waterous & Co. admit, of course, that the best water supply for any place, if such a source is accessible, and the funds to construct the works attainable, is that derived from lakes and rivers, sufficiently elevated above the place, to secure what is desired by natural pressure. But they contend that few towns in Canada are so situated as to have such lake or river supply open to them; and that even if they had such sources within reasonable reach, the cost of the works would be entirely beyond their means.

They object further to the system of pumping up water to elevated artificial reservoirs, such as that of Toronto—that the cost of constructing these reservoirs is enormous—that they are liable to get out of repair—that in case of an extensive fire, the supply of water may be exhausted—and that, as the reservoirs for a period of time are in an almost stagnant state, the water cannot be so pure as if pumped directly from the source to where it is used. They also urge that this system is not complete in itself, but must have attached to it a complete and costly separate establishment for the extinction of fires. And they point to the necessarily light construction of moveable fire engines—their liability to get out of order—and the great delay in getting them in operation after a fire is discovered, as serious objections against this plan.

Messrs. Waterous & Co. confidently assert that their system is not open to any of these objections to anything like the extent as are the existing systems. They claim that this system does efficiently all that existing systems claim to do, but don't do—and at a much less cost.

Without at present pronouncing any opinion on these pretensions, we have deemed it our duty, to institute a thorough enquiry into the merits of the whole plan—with the view of laying the results fully and fairly before the public. A large number of the cities and towns of Canada are yet without regular water supply, or are most inefficiently supplied; and we feel we shall discharge an important service to the public by furnishing any information that may lead to an enlightened consideration of the whole subject, and to the adoption of the system which may be found the best and most economical. Our first step in this direction was naturally to send a well-qualified member of our staff to examine the works now in operation at Brantford, and to obtain from Messrs. Waterous & Co. full information as to their system, the nature of the works and machinery necessary, the quantity of water attainable from it, and the cost it involves in sunk capital and annual expenditure. This we have done, and in a future article we shall place before our readers the result of our Reporter's enquiries.

(Continued fsom Globe of 30th January, 1872.)

In compliance with instructions from head-quarters, the writer last week left town by the Great Western Railway for Brantford, and, after a run of three hours, duly arrived in that flourishing and pleasant town. Our instructions were to inquire thoroughly into the merits, practical working, and financial results of the Waterous system for supplying towns with water, and to embody what we saw and heard in a full and impartial report.

Our first step was to call upon the firm of Messrs. C. H. Waterous & Co! We were allowed by them free access to all the official documents connected with the patenting of the system and the putting of it into operation. The senior member of the firm, Mr. C. H. Waterous, the inventor of the system, kindly showed us over the works, explained their nature and operation, and supplied us with all the information necessary to an intelligent comprehension of the system. To the officers of the Brantford Water Works Company, we were indebted for information as to the cost of the works and their operation. We sought also to obtain accurate information respecting the effect of the works upon insurance rates; and, in order to ascertain how they satisfied the wants of the general public, we called upon a number of the business men of the town, and obtained their views upon the subject. In the performance of this task we were greatly aided by the kind offices of Mr. R. Mathison, of the *Expositor*, whose local knowledge of men and places was invaluable.

The plan for supplying the water, now in operation in Brantford, was the invention of Mr. C. H. Waterous, and his firm hold a Dominion Patent covering its operation in Canada, under the title of "Waterous Improved System of Fire Protection and Water Supply." As far back as 1860, Mr. Waterous recommended his system to the Brantford Town Council, and on the 5th of March of that year, a committee of that body was appointed to investigate the matter; but like the investigations of many other committees, the results were *nil*. Two years after this date Mr. Birdsill Holly, of Lockport, United States, on being applied to by the Council of that city for some means of protection against fire, introduced the system since known in the United States as the Holly system, but which is essentially the same as that recommended to the Brantford Town Council by Mr. Waterous, in 1860.

The peculiarity of the system is the substitution of stationary steam force pumps for hydrostatic pressure. No reservoir is necessary. A stationary steam engine erected at the source of water supply drives a force pump (one or more as required), and the supply of water is direct from the pump to where it is needed. Pipes connected with the pump are laid at a sufficient depth under ground to protect them from the effects of frost. These pipes are tapped by hydrants at any required distance from each other. Two lines of hose can be attached to each hydrant, and they are so constructed that when they are shut the water runs out into the pipes, and, therefore, they are not liable to be frozen up. When a fire breaks out, all that is required is to attach the hose to the hydrants and turn on the water. All the force of the pumps being concentrated upon the hydrants that are open, an abundance of water is supplied direct from the pumps, the force, of course, depending upon the power of the engine.

It will be seen from this brief description that the system can be adapted to any town, large or small. The cost depends upon the size of the engine and the length of pipe laid down, and therefore varies according to the size of the town. The system is intended to supply water for general use as well as for

fire protection. For this purpose the pumps are kept constantly working. In the latter case an arrangement has been devised whereby it can be indicated at the engine house when a sufficient force of water is on, so that the pumps may be regulated. It will be noticed that with this system no power is wasted. With the reservoir system every drop of water used has first to be pumped up to the highest point of elevation, and thus more power is needed than under a system where the power is direct from the source to the point where the water is required. On this material point, *Mr. Alfred Perry*, Inspector of the Royal Fire Insurance Company, in a recent letter to a Montreal paper says :—"*The introduction of steam-engines was a vast improvement upon the old hand-engines; but the time is not far distant when these steam-engines as now employed will be looked upon much in the same light as we now view the hand-engines of the past.*" "THIS SYSTEM (THE WATEROUS SYSTEM) will accomplish upon the present steam fire-engine organizations a greater reform than has been accomplished by the adoption of steam over the hand-engine system." Mr. Perry recommends this system for the purpose of supplying water to the higher levels in Montreal in preference to constructing a new reservoir on a greater altitude than the present one. The latter plan would, he estimates, involve an expenditure of $100.000, while the former could be put into operation for some $20,000.

Mr. Thomas C. Keefer, C.E., under whose direction the reservoir, Water Works of Montreal, Toronto, and Hamilton were constructed, was appointed by the City Council of Ottawa to inspect the Holly Water Works at Ogdensburgh and Lockport. In his report he says :—

"In gravitation plans it is necessary either to provide a supply for future generations, entailing heavy interest charges on the present one, or else to duplicate the works at a great extra cost when an additional quantity is required ; and in this respect pumping systems have generally the advantage over others, additional pumps being added only as required, and at a comparatively trifling cost.

"Gravitation supplies must also be assumed for a fixed level, and with the increase of consumption and waste, an annually increasing loss of head sets in, for which there is no remedy save a higher head, which the fixed level cannot supply ; but with the pumping system the water can be kept up to any required level by the application of more power.

"It does not appear that the question of dispensing with steam-engines altogether was considered in connection with the construction of Water Works until within the last twenty-five years. The pressure required for this purpose was, until recently, looked upon as inconvenient, and to a certain extent, hazardous ; but hose taps have been improved, and it has been settled that the cost of the street pipes is scarcely affected by it, because smaller sized pipes, which form the bulk of the distribution, are necessarily made stronger (in order to insure good casting) than is required for any water pressure. 'Furthermore, it has been proved that although there may be an abundant supply of water, fire-engines, even when worked by steam, are not always reliable in cold weather—when, if meeting with any temporary derangement they are quickly frozen up and become useless.'

"For the speedy extinction of fires, nothing can equal the high-pressure hydrants from which, as soon as the hose can be attached, a ceaseless stream is poured on the flames, confining them to the place of origin. This system not only extinguishes the fire in the shortest possible time, but it has been found greatly to reduce the number of fires, and has been the means of detecting incendiarism. The fire is extinguished before the proofs of incendiarism are destroyed, and the prepared and saturated combustibles are thus revealed.

"The peculiarity of this system consists in the employment of rotary pumps which possess the power of rapidily increasing the pressure, and thus supplying the place of high level reservoirs, when none such are possible either from physical or financial reasons."

The firm of Messrs. C. H. Waterous & Co. need no introduction to the Canadian public. Their extensive displays of engines and mill machinery have made their names familiar to all who have attended our Provincial Exhibitions. The firm consists of Mr. Waterous, a practical machinist, devoted to his profession; and Mr. G. H. Wilkes, a shrewd, practical, enterprising man of business. For the introduction of a new system of water-works, where long-standing prejudice has to be overcome by the most persistent energy, no better combination could be desired than that possessed by this enterprising house. As already mentioned, they submitted their system to the Brantford Town Council, early in the year 1860, but with no immediate effect. Impressed with its value, they renewed their recommendation at subsequent periods, but met with very little success. Meantime the destruction of property in the town by fire was becoming alarming, and the Corporation, being slow to move in the matter, a number of the principal business men of the town were induced by Messrs. Waterous & Co. to take hold of the matter themselves. In the spring of 1870, a joint-stock company, with Mr. I. Cockshutt as President, was formed, with a capital of $20,000, in shares of $20 each, for the purpose of carrying out Mr. Waterous' views, Messrs. Waterous and Co. guaranteeing for five years the successful operation of the works. An agreement was entered into between the Company and the Corporation of the Town of Brantford whereby the latter agreed to pay the Company interest at the rate of eight per cent. per annum upon their outlay, and an additional sum of $250 per annum towards the running expenses of the works. The Company's works were also made free of taxes. Tenders were advertised for, and contracts awarded to C. H. Waterous & Co. for the construction of engine-house, engines, pumps, etc., and to James Stewart & Co. for pipes, hydrants, and the laying of the same. The works were completed in October, 1870, and have been in operation ever since. They are, at present, for fire purposes only; but the Company have power to extend them for general purposes, and it is not improbable they may do so at an early date, as a handsome revenue could be derived from that source. The work consists of two stationary engines of twenty-five horse-power each, propelled by a vertical tubular boiler. Each engine drives an eliptical rotary pump. The engine-house is a brick building about twenty-six feet square, and two-and-a-half stories high. In it are apartments for the engineer and his family. It is situated over a spring of water which gives a sufficient supply for ordinary occasions, but, in case it should at any time fail, an additional supply can be drawn from the canal that flows past the building. The iron pipes that extend from the engine-house to all parts of the town vary in size—from eight to four inches in diameter, and are sufficiently strong to stand a water pressure of 300 pounds to the square inch. The fire is at all times ready to be kindled, and in five or six minutes after the alarm is given the engine can be put in full operation.

Since the works have been in operation there have been only two fires in town. These were speedily extinguished, though the localities in which they occurred were of such a nature that, had not water been promptly supplied, they would, in all probability, have destroyed a large amount of property, as was almost invariably the case in all fires prior to the establishment of the works. A great many deputations from Town and City Councils have visited Brantford and inspected the works, and in every case they have reported favourably. As to what they are capable of doing under ordinary circumstan-

ces, an extract from the report of Deputies from the city of Fredericton, N. B., who visited Brantford last September, may be of interest :—

"At a distance of 2,094 feet from the engine house the hose was attached to the hydrant extending 100 feet, with a 7/8 inch nozzle ; this threw a stream 123 feet horizontally, to where the water would be effective. Another hydrant was opened at the adjoining corner, and to it another 100 feet of hose attached with a nozzle similar in size to the first, and with like effect. After this a 1 1/8 inch nozzle was placed on the branch pipe ; this threw a stream 153 feet horizontally. Both streams were thrown over a flag staff in the centre of the square, said to be over 100 feet high. The elevation at this point was 42 feet above the works. Another hose 100 feet in length was attached to the hydrant 330 feet from the last mentioned, and with a 7/8 inch nozzle, the water was thrown 123 feet horizontally. Another hydrant was opened at the extreme end of the street, and at a farther distance of 1,354 feet. Two hundred feet of hose was attached, with 7/8 inch and 1 1/4 inch nozzles, both streams doing efficient service at 123 feet from the nozzle. The whole distance from the work was 3,778 feet, or nearly 3/4 of a mile, the ground between the second and last hydrant being nearly level. The five streams of water were kept working at the respective distances named for over half an hour, without any diminution in the distance thrown. The highest water pressure used at the engine did not exceed 105 pounds to the square inch, carrying 75 lbs. steam pressure when the greatest force was required. While playing three streams of water only one pump was used ; both, however, were in operation with the five streams playing."

(*Continued from Globe of February 18th, 1872.*)

As usual in the introduction of new systems, however good, everywhere, the Waterous Water Supply System encountered strong opposition before it was adopted in Brantford. The project was stoutly opposed to the very last by some gentlemen ; others regarded it with doubt and suspicion ; few, indeed, were confident of its success. The fact that Messrs. Waterous & Co. had to guarantee the successful operation of the works for five years before a company could be formed, shows how little faith the general public had in the untried system. But at last all obstacles were overcome and the works erected. They have now been in operation for fifteen months.

To ascertain the feeling of the citizens of Brantford in regard to the system after fifteen months' trial, we, as already intimated, called upon a number of the principal business men of the town, and were surprised to find an entire unanimity of opinion on the subject. Former opponents of the scheme were equally emphatic with its friends in declaring it a perfect success. Not a single one could be found to say a word against it. The universal opinion of the merchants was that they would not be without the works for ten times their cost. They felt that their property was perfectly secure. They were confident that if a fire broke out it would be confined to the building where it originated; and therefore, while each one took proper care of his own premises, he felt no danger of fire from his neighbour's carelessness. Gentlemen who had stock in the Water Works Company declared that it was paying them 20 per cent., calculating the reduction in the rates of insurance. In short, we encountered universal enthusiasm in its favour which could only have come of the assurance that it was in every respect thoroughly efficient. The following gentlemen were among the parties we conversed with, and they all spoke in the strongest terms of the efficiency of the system, and recommended its general adoption by our cities and towns :—

I. Cockshutt, general merchant, and President of the Water Works Company.
Wm. Patterson, Mayor of Brantford.
Ex-Mayor Matthews.
Wm. Watt, Deputy-Reeve, builder.
John Comerford, grocer.
Councillor Jackson Ford, grocer.
R. Phair, Deputy-Reeve.
Councillor W. J. Scarfe, clothier.
Jas. Bellhouse, builder.
Councillor John J. Hawkins, grocer.
Enos Bunnell, grain merchant.
Henry Wade.
H. W. Berthour, dry goods merchant.
T. S. Shenston, Registrar of Brant and Treasurer of the Water Works Company.
H. B. Leeming, wholesale confectioner and Secretary of the Company.
James Wilkes, insurance agent.
James Woodyatt, Town Clerk.
James Cowherd, stove dealer.
J. B. King, hatter and furrier.
R. Turner, wholesale and retail grocer.
A. Cleghorn, hardware merchant.
Geo. Foster, wholesale and retail grocer.
Thos. McLean, dry goods merchant.
P. C. Allan, bookseller.
Thos. Botham, broker.
A. S. Hardy, barrister.
R. Henry, wholesale grocer.
Chas. Duncan, dry goods merchant.
A. Watts, wholesale grocer.
W. E. Welding, of Welding & Belding, pottery manufacturers.
Councillor Cantillion.
W. Sanderson, seedsman.
E. P. Broughton, Grand Trunk Station Master.

The last-named gentleman informed our Reporter that he regarded the Water Works as quite sufficient to protect the extensive buildings of the Grand Trunk Company at Brantford, notwithstanding the fact that they are situated over half-a-mile from the engine-house.

The very best evidence as to the efficiency of this system of Fire Protection, we found in the effect it has had upon the rates of insurance. Some months ago Mr. Alfred Perry, of Montreal, wrote :—"I presume that where such a fire system is in use it will enable insurance companies to reduce their rates at least one-quarter per cent. below the rates that obtain under any other arrangement." In order to ascertain the exact effect of the Waterous system upon insurance rates, our Reporter obtained a statement showing the rate of insurance before and after the establishment of the Water Works. It will be noticed that in some cases the insurer has reduced the amount of his policy since the works were in operation, considering himself quite as safe with a low policy as he was before with a high one. The following is the statement :—

	Amount Insured.	Rate.	Amount Insured.	Rate.	Saving
	$		$		$ cts.
H. W. Brethour & Co., dry goods	80,000	1⅛	80,000	¾	300 00
Jas. Kerr, grain dealer	25,000	⅞	25,000	¾	31 25
Geo. Foster, wholesale groceries	25,000	¾	25,000	⅝	31 25
John Comerford, groceries	14,000	¾	14,000	½	35 00
A. & J. Y. Morton, hardware	12,000	¾	10.000	⅝	27 50
Stewart & Mathieson, "Expositor" Office	3,000	1⅛	3,000	¾	22 50
Chas. Duncan, dry goods stock	15,000	⅞	15,000	½	56 25
Chas. Duncan, buildings	7,000	⅞	7,000	2-5	33 25
Thos. McLean, dry goods	27,000	1⅛	17,700	⅝	193 15
Leeming & Paterson, wholesale confectioners, &c.	5,000	1¼	5,000	¾	25 00
H. Lemon, "Courier" Office	4,000	1½	4,000	⅞	25 00
J. O. Wisner & Son, fanning mill factory	2,000	5½	2,000	2½	60 00
Welding & Belding, pottery	4,000	3	4,000	2½	20 00
Wm. Buck, stove foundry	8,000	3	8,000	2	80 00
C. H. Waterous & Co., engine-works	13,000	3½	11,000	3	125 00
John Edgar, glassware	6,000	1	6,000	¾	15 00
Jackson Forde, groceries	5,000	1⅛	5,000	¾	17 75
Farr & Bishop, hardware	7,000	⅞	7,000	⅝	17 50

Having thus ascertained that the new system gives great satisfaction to the citizens of Brantford, and the solid grounds on which that satisfaction rests—our next step was to enquire fully as to the cost of erection and annual maintenance of the works. From the report of the Treasurer of the Brantford Water Works Company, it appears that the entire cost of the works, including all extras and sundries, was $18,615.93. Of this amount $10,472.23 was for pipes, hydrants, castings, &c., and laying of pipes. The length of pipe laid under the contract was as follows :—

2,713 feet of four-inch inside diameter, weight 170 to 180 lbs. per length of 9 feet.

3,400 six-inch, weight 270 to 300 lbs.; and 2,484 eight-inch, weight 380 to 415 lbs.

The pipes to bear a pressure of 300 lbs. to the square inch.

The cost of the pipe was as follows :—

8-inch pipes.....$10 a length of nine feet.
6-inch,..... 7.50
4-inch,..... 4.50

It will benoticed that the chief item of expense is for the pipes, and therefore the total cost in any town or city will greatly depend upon the length of pipe laid down. For a village the cost would be but trifling, while in a large city, where great length of pipe and heavy machinery would be required, it would be proportionally greater. It will be understood, of course, that the above figures are only for fire protection. As only additional machinery would be required in extending the system for the purpose of supplying water for domestic purposes, the extra cost would not be large, while the revenue received from that source would, it is contended, not only defray all expenses, but yield a large direct profit to the shareholders or corporation owning the works.

As to the cost of maintaining the works, we found that the entire annual expense of working the whole machinery was the insignificant sum of two hundred and fifty dollars. But as Messrs. Waterous & Co. contract to keep the works in operation for this sum, perhaps it should not be regarded as a safe guide to the annual cost of similar works in other towns.

Our next step was to obtain from Messrs. Waterous & Co. some information as to the probable cost of erecting works on their system of water supply in Canadian towns of varied importance, and we were readily furnished with the following estimates :—

ESTIMATE FOR BELLEVILLE.

Water Works with a capacity of supplying that town for domestic purposes 1,500,000 gallons per 24 hours, and of throwing simultaneously four heavy streams over the highest buildings, $41,000. This sum is made up as follows :—

Machinery put in operation	$16,000
Building, foundation, &c	3,000
Hydrants	2,700
21,650 feet of pipe, laying the same, lead used in laying it, stop-valves, transportation and contingencies, about	19,300
Total	$41,000

The population of Belleville is 7,305.

ESTIMATE FOR BARRIE.

For fire protection only with a capacity to throw three good streams over the highest buildings in the town, $15,000.

Made up as follows :—

Machinery	$7,000
Pipe and laying the same	4,800
Building and foundations	2,000
Hydrants, stop-valves, and contingencies	1,200
Total	$15,000

The population of Barrie is 3,398.

ESTIMATE FOR ST. CATHARINES.

For fire protection and water supply; capacity 500,000 gallons per day, for domestic purposes, and six good heavy fire streams, $55,500.

Made up as follows :—

Pipes laid, say	$29,000
Buildings, foundations, &c	4,400
Hydrants, &c	4,000
Water Gates	600
Machinery	16,000
Contingencies	1,500
Total	$55,500

The population of St. Catharines is 7,864.

ESTIMATE FOR FREDERICTON, N. B.

For fire protection and water supply; capacity 360,000 gallons of water per 12 hours. and five heavy fire streams, $18.000.

Machinery	$8,500
Hydrants, water gates, &c	1,500
Building and foundations	2,000
Conduct and contingencies	6,000
Total	$18,000

In this estimate the cost of pipes is not included, and the estimate is only for one set of pumps for both water supply and fire protection. In the other places the estimates are for two sets of pumps. The population of Fredericton is about 6,000.

ESTIMATE FOR TORONTO.

Annual cost of running Water Works (on Waterous system) in the city of Toronto, estimating the cost of said works at $400,000, with thirty miles of mains, and machinery capable of pumping and distributing 5,000,000 gallons per day, and of throwing twelve streams simultaneously at an elevation of sixty feet above the works, and six streams at a higher elevation :—

Cost of running the machinery per day, $27.25, 365 days	$9,946, 25
Interest on $400,000	28,000 00
Incidentals	2,053 75
Total cost per annum	$40,000 00

The revenue, of course, would be about the same as under the present system. What that amounts to it is impossible to ascertain, as the works are in the hands of private parties, who keep that information to themselves. An approximation to the amount may be arrived at as follows :—

The revenue of the Hamilton works is $40,000 per annum, or about $1.50 for each inhabitant. At this rate, the revenue from Toronto would be about	$90,000
The present cost to the city for water for the streets is	6,700
Annual cost of four steam fire-engines, say	12,000
The two last mentioned items would be saved under the Waterous system, and if added to revenue would show a total income of	108.700
Cost of running the Waterous system	40.000
Saving to the city per year	$68,700

HAMILTON WATER WORKS.

The Hamilton Water Works, including 19 miles of pipes, cost the city $776,732. To pump and distribute 620,000 gallons per day it costs—

Per annum	$10,000
Interest on $776,732	54,371
Annual cost of Hamilton works	$64,871

(Or $24,871 in excess *of cost* to run the Waterous System in Toronto, though only pumping less than *one eighth as much water.*)

We also beg leave to refer municipalities wanting an efficient means of *Fire Protection* to Mr. Alfred Perry, of Montreal, Inspector, Royal Insurance Company, whose intimate knowledge of all means in use for fire protection, *(he having for over 30 years made it his special study,)* as well as his high official position as inspector of one of our largest English Insurance Companies, make his opinion one of the most weighty Canada can produce. We append a letter from him that we clip from a recent issue of the *Daily Globe.*

PROTECTION AGAINST FIRE.

(To the Editor of the Globe.)

SIR,—It must not be understood that I intend to convey the idea that the expenditure made by the Civic Government for the erection of its valuable fire stations and fire alarm telegraph, and the purchase of its steam fire engines and hose, has of itself been otherwise than most valuable in the extinguishing of fires. On the contrary, I know of no place where money has been spent with more judgment for that purpose than in your city. Your engine-houses have not their equal in Canada; the steamers are excellent, and the fire telegraph, if properly worked, is all that can be desired; but, Sir, this is a progressive age. Years ago, on going from Toronto to Montreal, in my present occupation, I had to stage it. In passing over the road known as the Indian Woods, below Belleville, we had to employ oxen

to draw the stage through to Napanee. Times have changed; the driver is no longer employed to drive the ox team; but, supposing the man who drove the ox team had been selected to drive the locomotive of the present day, he ought not to be held responsible if he could not stop the locomotive at the first station, or prevent it from smashing into any train that may have been on the line. Certainly the blame would be rightly attached to those who kept him in such a position. For similar reasons I am not inclined to throw the entire blame on the "Fire Department" for their inability to combat fires in Toronto successfully. The correct working of the Fire Alarm Telegraph is most essential; in fact, without it the most fatal consequences might arise. I noticed in one of the city papers that on the evening the "Iron Block" was found to be on fire the alarm was commencing to be promptly struck, but only the first character could be indicated on the receiving-bell at the engine station. The policeman who attempted to send the alarm, instead of pulling down the spring to its full distance, so that it might have repeated the number, drew down only enough to strike one character instead of five. It was owing to this fact the engines could not respond to the call earlier than they did. Had this policeman committed such a blunder in some cities I know, he would have been discharged from the force the next day; and until the men are made to understand that such will be the penalty of neglect in the proper performance of their duty, I fear that like occurrences will not be unfrequent.

The portable steam engines are of themselves heavy, unwieldy machines, liable to get out of order at the very time the extinguishing of the fire depends on their efficiency; and in Canada, during the winter months, they are liable to be rendered useless by their valves and pumps becoming frozen when the temperature is at or below zero. The weight of each machine is from three and a-half to four tons, requiring two horses to draw it at a moderate rate of speed; at a low calculation taking, on an average, from ten to twelve minutes to arrive at the scene of the fire, and by the same rule requiring five minutes more ere they are got into play. The next drawback is the expensive and heavy rubber hose, seldom less than five hundred feet in length, and often from one thousand to twelve hundred feet. This quantity will weigh, with the reel, in the vicinity of one and a-half tons. This is quite fatal to any chance of a fire being got under command in less than nine minutes. Your fires, I am creditably informed, have, on the contrary, twenty minutes' full sway ere the brigade can be in working order. TAKING THIS INTO ACCOUNT, YOU MUST NOT BE SURPRISED TO FIND THAT FIVE FIRES DURING TWO YEARS INVOLVED A LOSS OF CLOSE ON A MILLION AND A QUARTER OF DOLLARS. The hose now in use cost some $1.30 per foot, and are unreliable after four years' service. The bulk and weight of 100 feet almost precludes the most active and daring men from being capable of drawing the hose to the roof of a building; and I attribute this as one reason the men in front of the "Iron Block" preferred to stand on the packing case instead of ascending to the roof. There is still the further difficulty arising from the uncertainty of the Fire Department obtaining water. All these drawbacks combined go far to account for the heavy losses I have referred to. It is not to be wondered at that rates of insurance are excessively high, and with it that the loss is severely felt, not only by local, but by other companies doing business in Toronto.

The late disaster will I believe lead to the withdrawal of some of the Insurance Companies, and a further increase of rates by others. The question is, how can this state of things be put an end to, so that Toronto may command as efficient a fire brigade as there is to be found on this continent?

To arrive at this most desirable position it will not require an expenditure equal to the sum lost by the late fire. It will enable you to do away with the unwieldy apparatus now in use, to have hydrants placed over the whole city limits at a minimum distance of three hundred feet apart. Any one of the hydrants will afford an equal, and in many cases a greater, quantity of water, discharging a one and a quarter-inch stream at as great a height as is now obtained from a steamer. It will in fact be placing at every house a dormant power which in a moment, with one hundred and fifty to two hundred feet of hose, can be brought into immediate use. It does away with the loss of time under the existing system. All that will be required is a small one-horse hose cart, with its 400 feet of canvas hose. This hose, costing only 30 cents per foot, will be found, with proper care in drying, to last as long as the rubber hose. The whole of this apparatus will not weigh over 650 lbs., and should be taken to the scene of fire from any point in three to four minutes. The majority of fires will be finally subdued in seven or eight.

This brings me to the question whether a full supply of water can be obtained for fire purposes by gravitation; or, if gravitation is not available, what is the next best and possible means available for fire purposes? And if for fire purposes, of course the same system can be utilized both for fire and domestic uses.

The possibility of obtaining the required water supply by gravitation is a question I must leave to those who possess the requisite local knowledge to determine. I believe Scarboro' Heights is the nearest and highest elevation where pure fresh water can be obtained from the lake. What the elevation is, and the distance it is from the city, I leave to those more familiar with Toronto and its environs. Unless the spot named, which I understand is about seven miles from the city, and the highest point available is two hundred and fifty feet above the city, it cannot be made available for fire purposes.

Quebec obtains its water supply at a distance of 15 miles at an elevation of five hundred feet and only obtains a projected elevation of about 130 feet. Therefore you will at once see that even should the height that can be obtained here be two hundred and fifty feet, it would prove for fire use insufficient.

Montreal has only an elevation at the reservoir of 200 feet, and though so close, only one hundred and seventy feet projected elevation is obtained at St. Paul and Magill streets.

Therefore, if gravitation is not possible, either as regards height, distance and cost, what is the alternative?

In very many cities and towns in the United States, where a sufficient water supply is not obtainable or available by gravitation, the Holly system has been adopted as the most efficient and serviceable both for fire and domestic purposes. That same system improved is in use in Canada to-day in only one town, Brantford, and is known as the "Waterous system." The power is direct, and as this system has been so very fully described in the columns of the *Globe* since the burning of the "Iron Block" it is not necessary for me to recapitulate in this letter the arguments in its favour, though I AM PREPARED TO PROVE, IF MY STATEMENTS ARE DOUBTED, THAT THE WATEROUS SYSTEM IS THE BEST THAT HAS YET BEEN DISCOVERED WHERE A FULL SUPPLY OF WATER IS NOT POSSIBLE AND AVAILABLE BY GRAVITATION.

It is unfortunate that a young country like Canada that we do not possess many men who have made the subject of extinguishing fires a special study; but we must avail ourselves of the material amongst us. As for myself, I can only say that the suggestions I have taken the liberty or giving through your

columns to the public, are the results of a practical experience of over thirty years.

I do not propose to disguise that, as an officer of the "Royal," I am most anxious that Toronto should possess the very best possible Water Works for fire purposes, for all possible requirements, for many years to come.

I remain yours very truly,

ALFRED PERRY,
Inspector, Royal Insurance Co.

Toronto, February 26, 1872.

(Extract from the Toronto Daily Telegraph.)

Last year Canada was visited by several terrible conflagrations, by which whole villages and districts were wiped out, and smoking ruins left in their stead. The fires in the Ottawa and Saguenay regions left grim and ugly batches on the face of the country, and made grief and poverty the settled portion of hundreds of industrious settlers. One would have imagined that every municipal council in the Dominion—taking warning by the fate of the sufferers—would have at once taken steps to arm themselves against the future action of the fire fiend. The municipal councils, however, did nothing of the kind. They sent resolutions of condolence to the burnt-out, and thanked Heaven that they themselvees had not been afflicted, then shut their eyes and trusted to luck, as they had done before from time immemorial. As a consequence of this suicidal fossilism, the fire came this season, found them unprepared, and punished them for their imprudent neglect by a series of destructive conflagrations, by which Bradford was reduced to rubbish, Barrie disfigured almost out of all ken, and other places scorched and blackened to a woful extent. The disasters of last season might have taught the authorities of the towns and villages that fire cannot be conquered except by water and the proper machinery for applying it; but the lesson was lost, and the primeval keg and buckct system of extinguishing flames is the broken reed on which they lean for protection. Fortunately, some of the municipalities, with more foresight than the rest, are agitating the fire question, and have made up their minds to take precautions which will put them out of any risk of suffering the fate of Bradford and Barrie. We would recommend them, before seeking fire engines from foreign manufacturers, to inspect the Water Works system now in operation in Brantford, constructed by Messrs. C. H. Waterous & Co., of that flourishing town. The advantages of this system are chcapness of construction and economy in use, so that the poorest council or corporation in the land could procure it without the slightest difficulty. In Brantford it has worked to a charm. A great saving has been effected in the maintenancc of the fire brigade; fires have been casily extinguished which, under the old keg and bucket system, would have probably converted the town into a mass of smoking stones, and the cost of insurance has been reduced from 30 to 50 per cent. For their own sakes, then, we would advise the municipalities intending to arm themselves against fire, to send a deputation to Brantford, and see for themselves how casily and cheaply they can guard against the terrible conflagrations which have seriously injured the prosperity of the Province and desolated an almost incalculable amount of private property.

Extract from the Annual Report of the Brantford Water Works Company for 1871.

"During the winter and up to the present time nothing of importance has occurred; a number of trials have been made, principally to deputations from other towns interested in having more efficient protection from fire. All these have proved satisfactory, and we believe that Messrs. Waterous & Co., will be rewarded for their enterprise by furnishing other towns with similar works.

"On two occasions the works have been used for the extinguishing of fire, and in both instances clearly demonstrated their advantage and power by confining the flames and completely subduing them in a very short time. WE CLAIM THAT WE HAVE A MORE POWERFUL, EFFECTIVE AND CHEAPER SYSTEM FOR PROTECTING US AGAINST AND EXTINGUISHING FIRE THAN ANY OTHER TOWN IN THE PROVINCE. In fact it seems to operate as a preventative as well as a successful extinguisher of fire; for since the introduction of these works the town has been freer from its ravages than for the past fifteen years. Their benefits have been clearly felt also in the reduction of insurance. In a number of instances we hear of a reduction of one-eighth, one-quarter and one-half per cent., and there are cases where, in the renewal of a single policy the reduction pays the increased taxation entailed by these works and leaves a considerable margin of clear gain."

To the Editor of the Intelligencer.

BRANTFORD, July 6, 1871.

DEAR SIR,—An official visit to the Town of Barrie in connection with the late fire there has shown me the necessity existing for not only large towns and cities, but also small towns and even villages to be supplied with a never-failing, never wearied power to combat the disastrous spread of that most merciless and pitiless of all the elements—resistless fire. The agony of the ruined merchant is unheeded, and the houseless family in vain looks for mercy from this monster, while the business prospects of the one are thrown back twenty-five or thirty years, if not entirely ruined; the homestead secured after many and hard years of toil, sacred in the eyes of those grown up under its roof, is destroyed, wiped out of its very existence by the destructive elements in a few short hours.

Communities, like individuals, are slow to move, perhaps much slower than the majority of individuals on account of the diversity of thought and opinion as well as of interest, and it is only when some severe disaster has occurred that unanimity of feeling to resist the common foe compels, as it were, corporations or communities to spend a little money for the protection of their own property as well as that of their neighbours.

Two weeks before the late fire in Barrie, the Corporation had determined to send a deputation to Toronto to report on the best steam fire-engine there in use, and one week before that trial of engines took place, $60,000 worth of property was destroyed, sufficient to put up three Water Works, such as that supplied to the Town of Brantford.

Interested as the Queen Insurance Company is in the Town of Brantford, I was requested to proceed there to report upon the efficiency of the Water

Works, and as the plan and operations may be useful to Belleville, I will give my ideas as those of an uninterested party.

Having communicated with the President of the Company (which is Joint Stock, capital $20,000) and obtained his consent for a trial, 7.15 was the time specified for operations to commence.

Before going any further I might say the engine is a stationary one, with a pump well immediately underneath for a supply of water, which can be augmented at any time by other means at their disposal; the principle is what is called a rotary one, two sets of pumps, one boiler, two engines, and one pump or both can be disconnected at at any time; the water is forced through 8 inch iron mains, laid 5 feet under the street with hydrants at convenient distances.

At 20 minutes past seven the order was given to fire up, in 4½ minutes 30 lbs. of steam was generated (sufficient to start the engine), in 4½ minutes more the hose was on the hydrants and the water then began to play through two lengths of 100 feet each, nozzles ¾ and 1½ inch. The stream thrown was strong and very steady, and any one accustomed to the practice of different kinds of fire extinguishers, must acknowledge these equal at least to anything on this continent.

The hose was afterwards attached to another point higher up in the town, and with equal results, the streams if anything being heavier in volume than the preceding, and I would recommend this system as being far superior to anything I have yet seen.

The engines, which are models of perfection, are, I believe, made by Messrs. Waterous & Co., of Brantford, who, no doubt, can give better ideas of the cost and working the same; as I care not so much for details of working as for result of such work, and from what I have seen I should consider the Town of Brantford has done itself eminent justice in supplying its citizens with one of the best fire preventives to be secured. It would also be well for towns and cities to look into the principle closely, and I should think they would, on looking into figures, give this system the preference above either reservoirs or fire-engines.

The corporation keeps the hose in order, and guarantees eight per cent. on the capital; while the stockholders themselves have made ten per cent. extra from the decrease of rates of insurance.

Should you consider the above of any interest to the readers of your paper, an insertion will oblige,

Yours very truly,

CHAS. W. WALKEM,

Inspector, Queen Insurance Co.

Extract from the Report of Messrs. John Junkin, and D. W. Corbin, Deputation from the Town of St. Catharines.

(*From the St. Catharines Daily Journal, May 25.*)

We will state the cost of building Water Works here and in other places, in order to shew the advantages we possess. The New York Water Works cost $40 per head; the Boston Works cost the city $32 per head; the Montreal Works cost $30 per head; the Philadelphia Works cost $55 per head;

the Hamilton Works cost $40 per head ; the Brantford Works cost $2.30 per head ; the St. Catharines Works will cost $8 per head, and many of these places are obliged to pump the water into reservoirs or service pipes.

We might state that the Towns of Brantford and St. Catharines are the only two places in the above comparison that are computed on the Waterous improved system.

Extract from the Report of Geo. E. Henderson and W. A. Foster, Deputation from the Town of Belleville.

The trial of the Works exceeded our expectations, water was thrown from three hydrants at a time at a distance of one mile, and upon the elevation of 40 feet to the length of 80 feet, and at a distance of 150 feet horizontally, and from 600 to 800 feet of hose, 1¼ nozzle, to the height of 100 feet, and at a distance horizontally 200 feet. Then they threw three streams at one time with as great force apparently as one at a time ; in short we consider the Water Works quite equal to fire-engines at every corner of the street where hydrants are placed.

Brantford Engine Works;

ELLIPTICAL ROTARY POWER AND FORCE PUMPS.

Owing to the very many enquiries we are daily receiving relative to our Power and Force Pumps, we have deemed it advisable to issue the following illustrative catalogue in order to give all the information possible in a more convenient and comprehensive form. With a practical experience of over twenty-seven years in the manufacture of engines, saw and grist mill machinery, we feel confident that our engines and machinery, as well as pumps, for simplicity, efficiency, economy and durability, are unequalled by any in the market.

We assure our customers that we are sparing no pains to produce machinery that will tend to increase our wide-spread reputation. We are only manufacturing Engines, Saw and Grist Mill Machinery, Water Work, and pumps, having our entire attention to these special lines, we aim to give better value for first cost than can be produced elsewhere.

During the last year our Mr. Waterous having patented "Waterous System of Fire Protection and Water Supply for cities, towns and villages," to fill the demand for which we have greatly increased our facilities, that the manufacture of same may not interfere with our engine and machinery business.

ELLIPTICAL ROTARY POWER PUMPS.

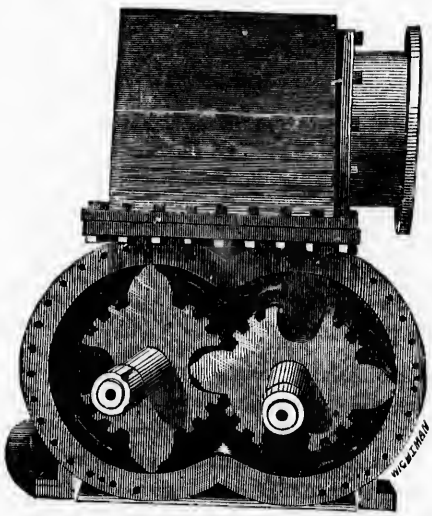
In placing before the public this catalogue, we wish to call especial attention to our Rotary Pumps as shown in the representations herewith. They have now been before the public for several years, and during that time have been most thoroughly tested, and with the most flattering results.

The great advantage of this Pump is in its simplicity and durability. We do away with valves and packing in the working parts of the Pump, therefore it is not liable to get out of order. The cams, or long cogs on the piston, are packed by the action of the water, grooves being made in them for that purpose, and into which the water is forced. The shafts are of the best cast steel, and all have outside bearings. They take less power to drive than any other Pump, from the fact that there is but little friction, as the ends of the cams do not rub on the inside of the case.

We wish to call particular attention to the advantages of these Pumps for fire purposes, as they will throw a very large quantity of water, and that also at a great distance. They can be run at a very high rate of speed without injury, and they are so constructed that they cannot break if the whole power is suddenly applied to them. These Pumps are now being introduced, under our system, into many towns for supplying water for either fire or hydrant use. Wherever introduced they have given perfect satisfaction.

The reduced space which this Rotary Pump occupies, doing its work so quietly without the use of Levers, Piston Rods and Walking Beams, ascending and descending, together with the ease with which it is driven, are strong arguments in its behalf.

ELLIPTICAL ROTARY PUMP.

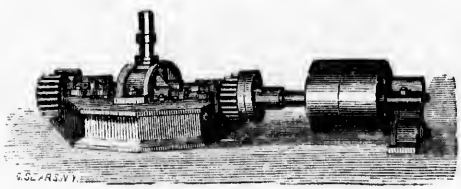


Sectional View, Showing Internal Arrangements.

The above cut represents the internal construction of our Rotary Pumps. A glance will show how plain and simple they are.

NO. 1 ROTARY PUMP.

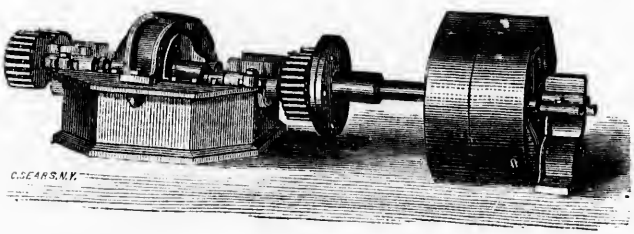
Double Geared with Tight and Loose Pulleys.



Suction, 1¼ inch bore; discharge, the same, with brass union coupling, arranged for either gas or lead pipe; capacity 40 to 75 gallons per minute. Should be run for constant use at from 75 to 150 revolutions per minute. Has tight and loose pulleys. We make of Brass or Gun Metal, when ordered so, for pumping acids or liquors.

NO. 2 ROTARY POWER PUMP.

With Tight and Loose Pulleys.

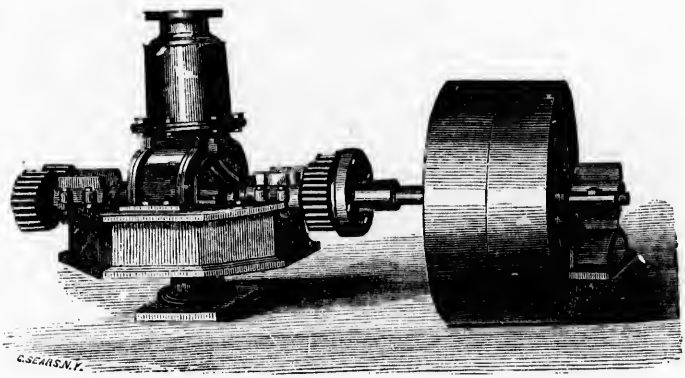


An excellent Pump for its size, mainly used for raising water at Railway Stations, small Mills and Factories, using a moderate supply. ...on 2 inch bore; discharge the same. Capacity 50 to 125 gallons per m... cording to speed. Should be run for constant use at from 100 to 200 ... tions per minute. Has tight and loose pulleys.

We make this same size, also, of Brass or Gun Metal, for pumping acids, liquors, etc., when ordered.

No. 3 ROTARY POWER PUMP.

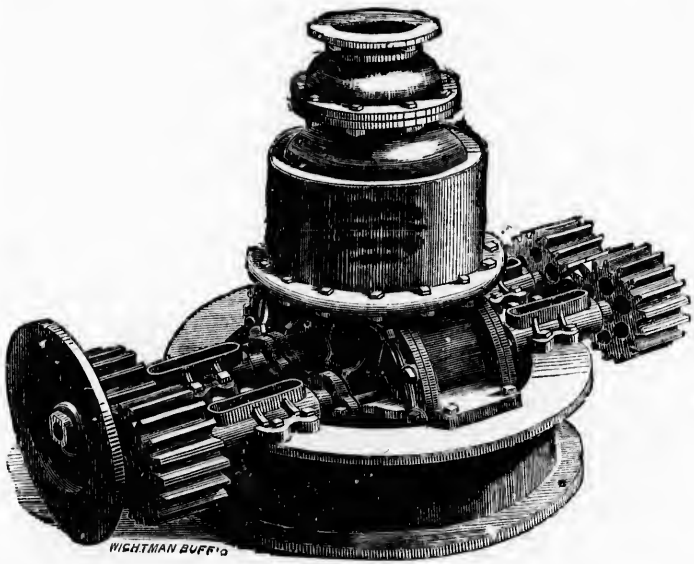
With Tight and Loose Pulleys.



This Pump is the same in all respects as the No. 2, but has double the capacity. Suction is 3 inch; discharge, the same. For constant use should be run from 100 to 175 revolutions per minute; can be speeded higher for special use. Has tight and loose pulleys. We arrange this for fire purposes, similar to our Nos. 4 and 5, when so ordered, at a small additional expense.

We make this size, also, of Brass or Gun Metal, for pumping liquors, acids, &c., when ordered.

No. 4 POWER PUMP.

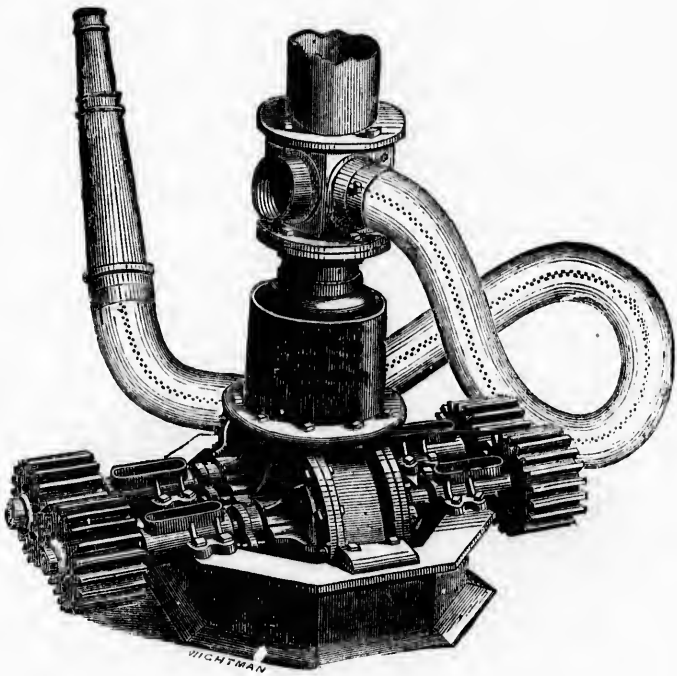


A favourite size for Distilleries, Factories, Mills and Railroad Stations, where an extra quantity of water is required, and also as a protection against fire. Will discharge from 150 to 300 gallons per minute. Should be run for constant use at from 75 to 150 revolutions per minute. Suction pipe 4 inch; discharge, the same. For fire purposes, this Pump can be speeded up to 500 gallons per minute. Has coupling fitted ready for counter shaft.

We make this size, also, of Brass, when ordered, for pumping liquors, acids, &c. Pumps on same principle are extensively used at the New York State Salt Works, at Salina and Syracuse.

It is constructed so that the Pump rests on a heavy iron frame, the *shaft resting in bearings on this fsame*, thus making the Pump and frame, so to speak, one complete machine. The utility of this will be obvious to all; as by this means the use of a standard is done away with, the Pump being complete without it. Another great advantage is, that shafts are always in line at the bearings with the Pump.

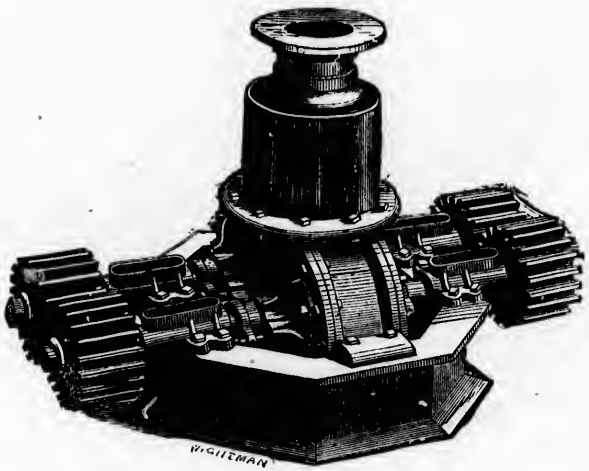
No. 4 FIRE PUMP.



The above is a favourite size for Fire Protection, and is fast being used in all parts of the country. Will throw from 300 to 500 gallons per minute, according to power or speed driven at, forcing water through a one and a half inch nozzle from 150 to 200 feet. One has been known to throw four streams at a time over 150 feet high. Should be run at 250 to 350 revolutions per minute. Suction 4 inch. Put small quantity of oil into Pump after using, turning once or twice, to prevent rusting. Made with coupling fitted ready for counter-shaft.

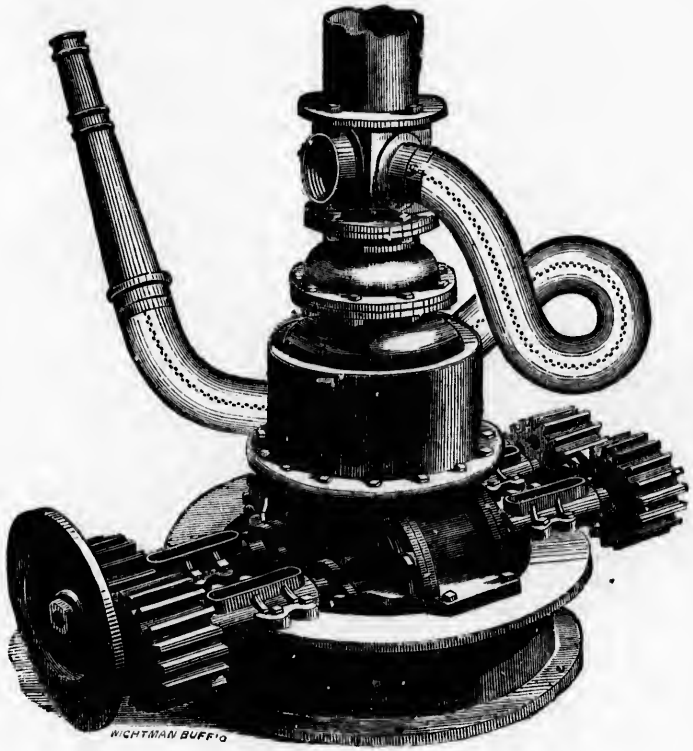
It will be noticed it has all the improvements of the pump on the preceding page, but has the addition of attachment for hose, being designed especially for *fire* purposes. This size and No. 5 have achieved for themselves a splendid reputation as Fire pumps, and are to be found in mills and buildings throughout the country.

No. 5 POWER PUMP.



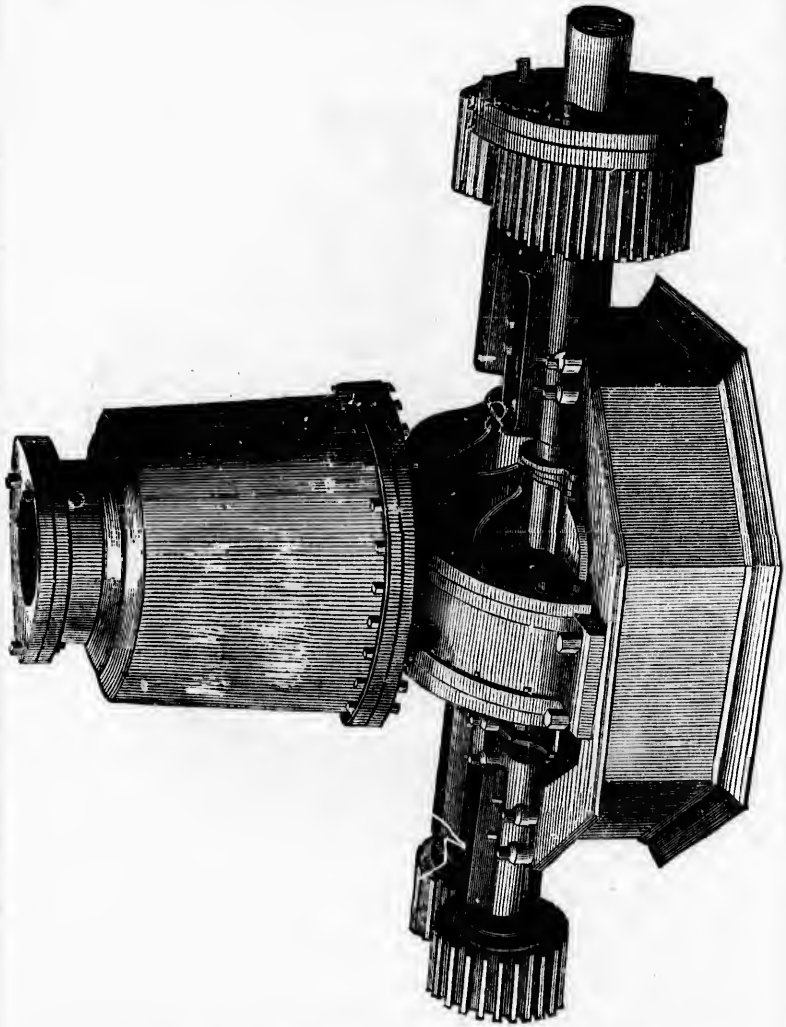
This is a very strong and durable pump, and has the same improvements as No. 4. (See page 29). This pump, for constant use, should be run 75 to 150 revolutions, and will discharge from 250 to 500 gallons per minute. It will raise proportionately more when speeded higher, but higher rates of speed are not economical. Suction 5 inch, discharge same. Has coupling fitted ready for counter-shaft. We make these pumps of brass, for raising and forcing chemicals, when so ordered.

No. 5 FIRE PUMP.



Same as our No. 4 Fire Pump, but of larger capacity. This size, or the No. 4, is to be found in many of the largest mills and buildings in all sections of the country, for fire purposes. Suction, 5 inch; discharge the same. Should be run the same number of revolutions as No. 4 Fire Pump. Made with couplings, ready for counter-shaft. This size is being used by the New York Central Railroad, at Rochester, for protecting against fire their immense Depots, Workshops, Round Houses and other buildings in that city.

No. 7 ROTARY POWER PUMP.



A large, strong and powerful pump, intended for starch factories, large distilleries, paper mills, *Water Works*, or any purpose requiring a large amount of water. Shafts of steel 3¼ inch. Capacity 600 to 1,200 gallons per minute. Has 10 inch suction; discharge the same. Should be run from 60 to 150 revolutions per minute. Fitted for counter-shaft same as number four.

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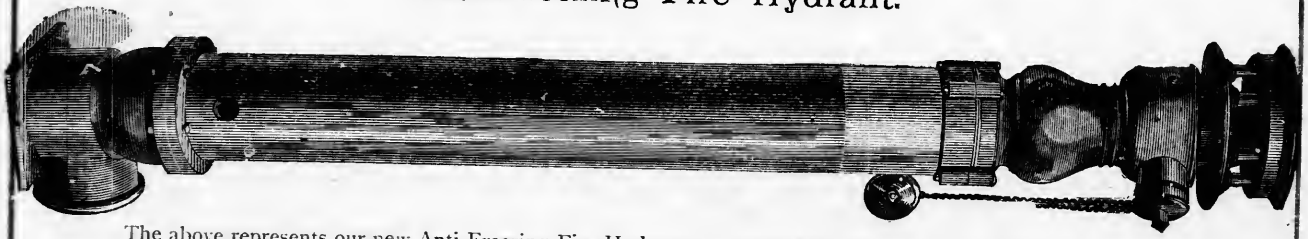
150

Anti-Freezing Fire Hydrant.



The above represents our new Anti-Freezing Fire Hydrant, arranged with either one or two take-offs for hose.

(See sectional view, the following page.)

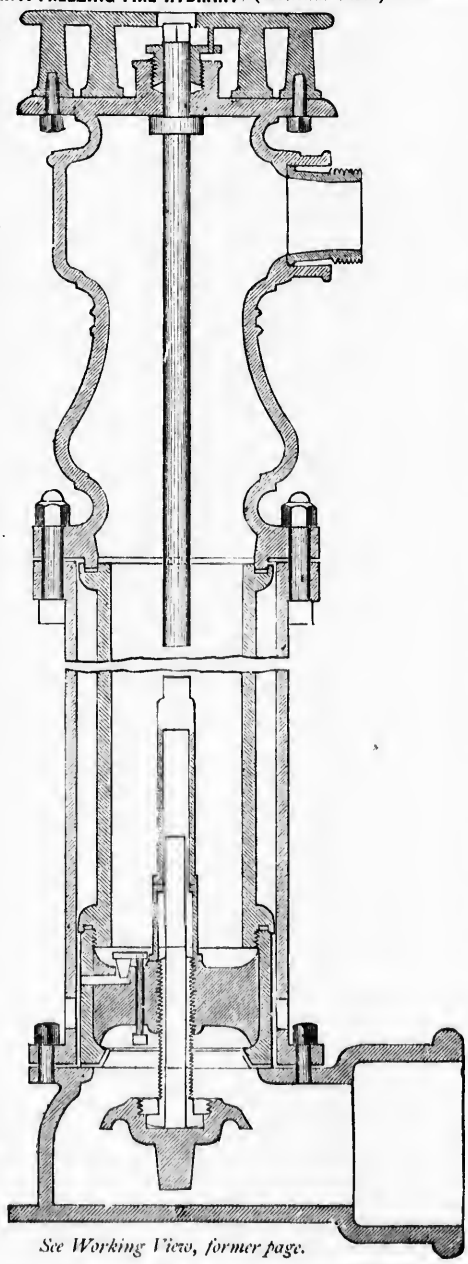
Cast Iron Pipe and Elbow.

With Flange Connections.

We furnish large quantities of the above for use in Mills, and other buildings, for conveying water, steam, &c. We make all sizes up to 10 inches, and furnish it of any required length, arranged with branches and openings, at any desired point or angle. We also furnish all sizes of Wrought Iron Pipe and fittings, at current rates.

WATEROUS & CO'S ANTI-FREEZING FIRE HYDRANT—*(Sectional View.)*

This cut represents the sectional view of our improved Fire Hydrant. The outer case is set in the ground at the required depth, and to which the earth will freeze, so as to adhere in severe weather. It has also an inner stem through which water is forced for fire or other purposes. Between the case and stem is a space for air. The valve is at the bottom of case, and so far underground as to be entirely out of reach of frost, and is operated upon by valve rod, the screw and nut of which are immediately above the valve, and so secured as to prevent any vibration under very heavy pressure. The valve seat is of leather, and valves open against and close with current. In order to get at the valve take out the four bolts at the surface of the ground, the inner stem with valve, and the whole working part of the hydrant can then be taken out, examined or repacked and replaced wihout difficulty, making the joint at the bottom of stem tight by tightening the four bolts at surface of the ground. It is so arranged that when the valve is closed all the water in the case above valve will run out, leaving the hydrant empty at all times except in case of fire, or when water is rapidly passing through it, and as the valve is so constructed that it will not leak one drop, it is impossible for frost ever to affect this hydrant. The act of opening the valve closes the drip and prevents any water escaping while the hydrant is being used. A guard at the top prevents any unauthorized person using them, as they cannot be opened except with lock wrench constructed especially for this purpose. There has no case been reported where one of these hydrants has frozen, and they have been placed under pressure equal to 500 feet head, without leaking one drop. They are of extra weight and strength, and adapted especially for use in connection with *Waterous' Improved System of Fire Protection and Water Supply.*



See Working View, former page.

TAKE-OFF VALVE FOR HOSE.

This is a very excellent Valve, whose use will be seen at once, being arranged or designed for upright iron pipes, running from cellar to garret, for fire purposes, one of these being located in each story, with hose attached, when, in case of fire, by merely turning the crank, the water is let on.

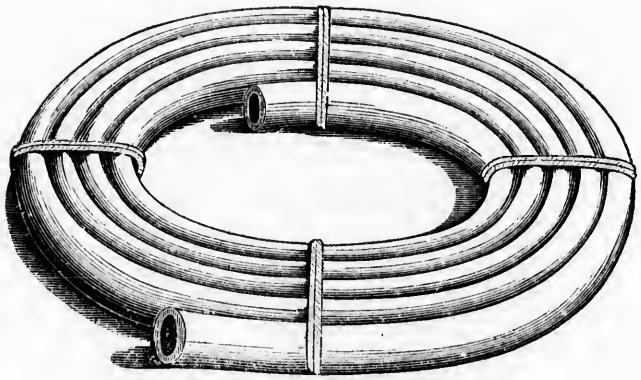
CUT-OFF VALVES.

With Brass Valve-Seat and Stuffing Box.

We claim this to be the best Valve of its kind now in use, as by an ingenious arrangement of an eccentric movement, it can be closed perfectly tight. This obviates the necessity of a pressure, which is usually required to make tight the ordinary valve, this one being equally as tightly closed, with or without pressure.

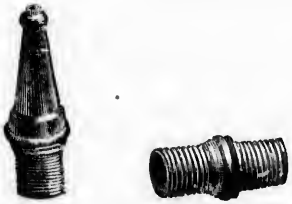
We also furnish all sizes of Globe Valves.

RUBBER HOSE.



We furnish all sizes to order.
We also furnish Canvas and Leather Hose for Hydrants, Fire Engines, &c.

BRASS HOSE COUPLINGS AND NOZZLES.



We make all sizes to order.
For Price List and further information address

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Blake's Patent Belt Studs, Gummers, Swages, Cant Hooks, &c., Always in stock.