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AUTOMATIC SPRINKLER SYSTEM.

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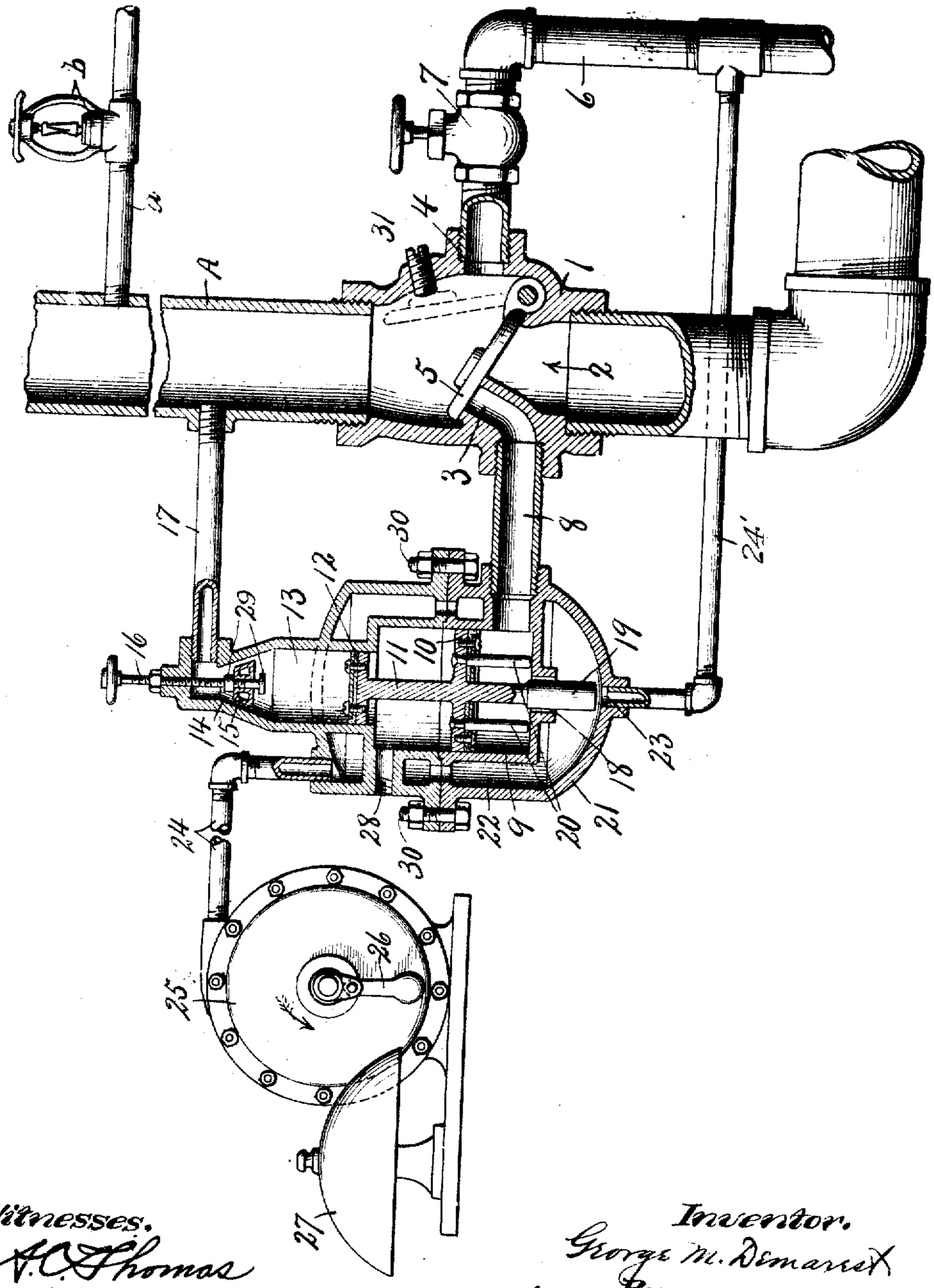

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GEORGE McLEAN DEMAREST, OF BUFFALO, NEW YORK.

AUTOMATIC SPRINKLER SYSTEM.

No. 911,705. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed June 3, 1908. Serial No. 436,411.

To all whom it may concern:

Be it known that I, GEORGE M. DEMAREST, of Buffalo, in the county of Erie, in the State of New York, have invented new and useful Improvements in Automatic Sprinkler Systems, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in automatic sprinkler systems adapted to be installed in buildings for protection against fire and refers more particularly to a controlling mechanism for an alarm which is used in connection with the sprinkler system to indicate the opening of one or more of the sprinkler heads by fire or other cause which may allow water to escape from any portion of such system.

In many water systems and particularly those in which the pressure of the water is maintained by pumps and to which the sprinkler systems of buildings are usually connected, the water pressure is always more or less variable thereby causing what is commonly known as "water hammer" in the pipes which produces a greater or less movement or ebb and flow of the water in the sprinkler system and is frequently of sufficient variation to cause the operation of the alarm while all of the sprinkler heads are still intact or closed. This false alarm is, of course, prejudicial and it is always more or less liable to create undue excitement or panic and the essential object of my present invention is to provide means for preventing the operation of the alarm under such variations of pressure or water hammer and to render such alarm operable only under prolonged outflow of the water through one or more of the open sprinkler heads of the system. In other words, I have sought to automatically control the operation of the alarm through the medium of differentially sized pistons operated by the water pressure in the sprinkler system to control the passage of water to the alarm operating motor and at the same time to govern the action of the pistons through the medium of an adjustable choke valve or retarding medium whereby the action of the pistons and valve connected thereto may be regulated at will to prevent the operation of the alarm under fluctuating pressures or "water hammer" when the sprinkler heads are intact.

Other objects and uses will be brought out in the following description.

In the drawings, I have shown a sectional view of a portion of a sprinkler system and my improved alarm controlling mechanism connected therein, the alarm being shown in elevation.

—A— represents the main supply or stand pipe of a sprinkler system having one or more branch pipes —*a*— connected thereto and provided with one or more sprinkler heads —*b*— of any well known construction adapted to be opened by the fusing of one of its parts in case of fire. Connected in this supply or stand pipe —A— is a valve casing —1— having a direct passage —2— and branch passages —3— and —4—. This valve casing contains a suitable check valve —5— normally closing the main passage —2— and branch passage —3—. As shown in the drawings this branch passage —3— is located beneath the valve —5— while the branch passage —4— is located at the opposite side of said valve, and to this branch passage —4— is connected a drain passage —6— having a valve —7— which is normally closed but may be opened to drain the water from the entire sprinkler system above the valve —5— when the portion of the supply pipe below the valve is closed by any suitable valve, not shown.

The branch passage —3— is connected by a conduit —8— to a piston chamber —9— in which is movable a piston —10—, the latter being connected by a rod —11— to a somewhat smaller piston —12—. This smaller piston —12— is movable in a piston chamber —13— having a tapering upper end forming a conical valve seat —14— with which coöperates an adjustable conical valve or governor —15—, the latter being mounted upon an adjusting screw —16— in the upper end of the valve chamber —13—. The upper end of the valve chamber —13— above the valve or governor —15— is connected by a conduit —17— to the main supply or stand pipe —A— above the valve —5—.

The piston chambers —9— and —13— are coaxial and communicate with each other, the portion of the chamber —9— below the piston —10— communicating through the conduit —8— with the stand pipe —A— below the valve while the portion of the piston chamber —13— above the smaller piston —12— communicates through the pipe —17— with the same stand pipe —A— above the valve or to that portion of the

sprinkler system to which the laterals —*a*— containing the sprinkler heads —*b*— are directly connected.

The piston chamber —9— is closed at the bottom except for a comparatively small central opening —18— in which is movable a valve —19—, the latter being rigidly connected to and depending from the piston —10— and is slightly smaller in cross sectional area than the opening —18— in which it plays to allow slow drainage of the water from the chamber —9— below the piston.

The piston —10— is located above the inlet —8— and is limited in its downward movement by the stop pins —20— depending therefrom and adapted to engage the bottom of the chamber —8— as the piston descends, sufficient clearance being left above the piston —10— to permit it to withdraw the valve —19— from the opening —18— when both pistons are raised to their extreme upward limit of movement as for instance when one or more of the sprinkler heads —*b*— of the sprinkler system is opened by fire or other cause.

Surrounding the piston chamber —9— is a shell —21— forming an intervening chamber —22— having a drainage opening —23— centrally in its bottom which is connected by a pipe —24'— to the main drainage pipe —6— to permit the water which may accumulate in the chamber —22— to be carried off. The upper portion of the chamber —22— is connected by a pipe —24— to a suitable motor —25— which in turn is provided with a hammer —26— adapted to engage and ring a bell —27— or equivalent alarm as the motor is rotated by the water escaping through the pipe —24— to the chamber —22— in a manner hereinafter described.

The upper portion of the piston chamber —9— communicates with atmosphere through a suitable vent —28— to prevent compression of air or vacuum therein which might interfere with the free action of the pistons.

The check valve —5— allows the free upflow of water through the conduit —A— to the several branches of the sprinkler system but prevents back flow of such water and in as much as the laterals in which the sprinkler heads —*b*— are attached are "dead ended," it is evident that when they are completely filled with water under pressure, the water pressure above and, below the valve —5— will be equal and therefore said valve will close by its own gravity to cut off communication between the sprinkler system and piston chambers in the shell —21— thereby permitting any water which may accumulate in said shell or in the piston chamber —9— to readily drain off through the openings 18— and —23— through the pipe —24'— into the drain pipe —6— while at the same time the water in the sprinkler system will readily pass through the conduit —17— and act upon the smaller piston —12— to depress both pistons to their extreme downward limit of movement in which position they will be held until the water pressure in the sprinkler system is relieved as for instance by the opening of one of the sprinkler heads —*b*— in case of fire. Under such conditions the water pressure above the valve will be less than the pressure below valve —5— causing said valve to open and allowing the water to flow through the branch passage —3— and conduit —8— and into the lower end of the piston chamber —9— below the piston —10—. It is now apparent that the water pressure per square inch above the piston —12— and below the piston —10— is the same so that the pressure upon the upper and lower faces of the pistons is in opposite directions but owing to the fact that the lower piston —10— is of considerably greater area than that of the upper smaller piston —12—, the total pressure tending to lift the pistons and valve —19— will be much greater than that tending to force the pistons down thereby elevating both pistons and causing the upper piston to displace the water from the chamber —13— past the open valve —15— and through the branch —17— into the main pipe —18—. This valve —15— has a slight vertical play upon the stem —16— between two shoulders —29— located above and beneath said valve to allow the valve to open to a maximum degree during the inflowing of the water through the pipe —17— to the chamber —13— in depressing the pistons, but as soon as the pistons reach the downward limit of their movement and particularly during the elevation of such pistons, the valve —15— is forced under pressure of the water against the upper stop —29— thereby partially closing the valve to reduce the opening and retarding the upward movement of the pistons, the degree of closing of the valve being regulated by the adjusting screw —16— which raises and lowers the upper stop —29— and thereby determines the normal closing position of the valve —15—.

It will be seen from the foregoing description that the valve —15— is automatic in its action to allow a maximum opening or entrance for the liquid from the pipe —17— to the piston chamber —13— but such opening is automatically restricted by the compression of the liquid upwardly during the elevation of the pistons, it being understood that the speed of upward movement of the pistons depends entirely upon the speed of expulsion of the water from the chamber —17— back to the chamber —13— and that the smaller the valve opening around the valve, the greater will be the

resistance to expulsion of the water and the slower will be the upward movement of the pistons. By the proper adjustment of this regulating valve —15—, the elevation of the pistons and consequent opening of the valve —19— may be retarded to any degree beyond the intervals of fluctuation of pressure of water hammer in the sprinkler system so as to prevent the opening of the valve —19— sufficient to allow the water to flow to the motor —25— except under a prolonged opening of some part of the system as for instance the opening of one of the sprinkler heads —*b*— in case of fire.

In the event of one or more of the sprinkler heads —*b*— being opened by heat or other cause, the prolonged upflow of the water through the stand pipe —A— and open sprinkler heads allows the water to enter the branch —3— and piston chamber —9— thereby elevating both pistons until the valve —19— is withdrawn from the opening —18— which allows the water in the piston chamber —9— to flow through the opening —18— into the chamber —22— and thence outward through the conduit —24— to the motor —25— to operate the alarm —27—. It is evident, however, that many other forms of alarm capable of being operated by the passage of water through the conduit —24— may be used in place of that herein shown and described and, therefore, I do not limit myself to any particular form of alarm adapted to be operated by water pressure in the manner described.

For convenience of manufacture, the shell in which the piston chambers —9— and —13— and surrounding chamber —22— are formed is preferably made of lower and upper sections divided horizontally substantially midway between their lower and upper ends and secured together at their meeting edges by suitable fastening means as bolts —30—.

The opening in the valve —5— may be limited by any suitable means as an adjustable stop —31— which is shown as secured into side of the valve casing —1—.

What I claim is:

1. In an alarm controlling mechanism for automatic sprinkler systems, a water distributing pipe, piston chambers of unequal size communicating with said distributing pipe, a check valve controlling communication between the larger piston chamber and distributing pipe, a retarding valve controlling communication between the smaller piston and distributing pipe, pistons movable in said chambers, the larger piston chamber having an opening in one side, a valve movable in said opening and actuated by one of the pistons, and an alarm actuated by the water escaping from said opening when the valve is open.

2. In an alarm controlling mechanism for automatic sprinkler systems, a piston chamber having a water inlet and a valved outlet, a valve in the outlet, a piston actuated by the water flowing into the inlet for opening said valve, an alarm actuated by the water flowing from the outlet when the valve is open, and means for retarding the action of the piston in opening the valve to prevent said valve from being opened by fluctuation in pressure and only by prolonged escaping of water in the sprinkler system.

3. In an alarm controlling mechanism for automatic sprinkler systems, a water distributing pipe, a piston chamber communicating with said pipe, a piston movable in the chamber, means controlled by the movement of the water in said pipe for controlling the action of the piston, and a retarding valve between the piston and said pipe for controlling the action of said piston.

4. In an alarm controlling mechanism for automatic sprinkler systems, a water distributing pipe, a piston chamber communicating with said pipe, a second, but smaller piston chamber, also communicating with the pipe, a check valve controlling communication between the distributing pipe and largest piston chamber, pistons movable in said chambers, the larger chamber having a valved opening on one side, a valve movable in said opening and operated by one of the pistons, an alarm actuated by the water flowing through said opening when the valve is open, and a retarding valve in the connection between the smaller piston chamber and distributing pipe, and means for adjusting said retarding valve.

5. In combination with a water distributing pipe of an automatic sprinkler system, a piston chamber communicating with said pipe and having an outlet, a check valve controlling such communication, a piston in said chamber and actuated by the inflowing water when the check valve is opened, an outlet valve actuated by the piston, an alarm actuated by the outlet of the water when the outlet valve is opened, and adjustable means for retarding the opening of said outlet valve to prevent the operation of the alarm except when some part of the sprinkler system is opened.

In witness whereof I have hereunto set my hand this 19th day of May 1908.

GEORGE McLEAN DEMAREST.

Witnesses:
CHARLES M. CLARKE,
W. C. TRUNGER.