(No Model.)

J. T. HILL.

DRY PIPE VALVE FOR AUTOMATIC SPRINKLER SYSTEMS.

No. 570,018. Patented Oct. 27, 1896.

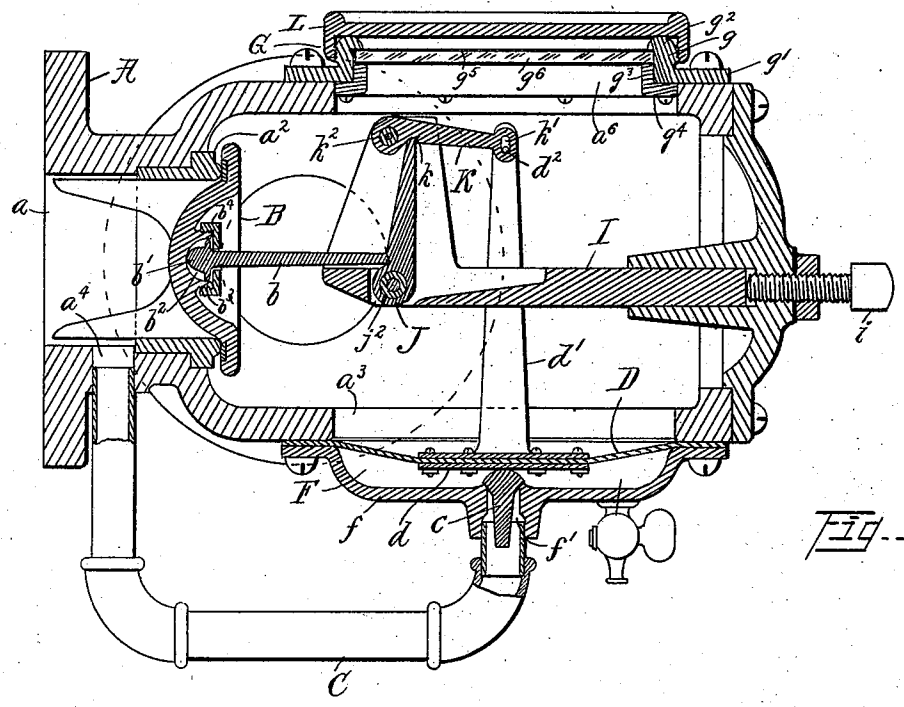

Fig. 1

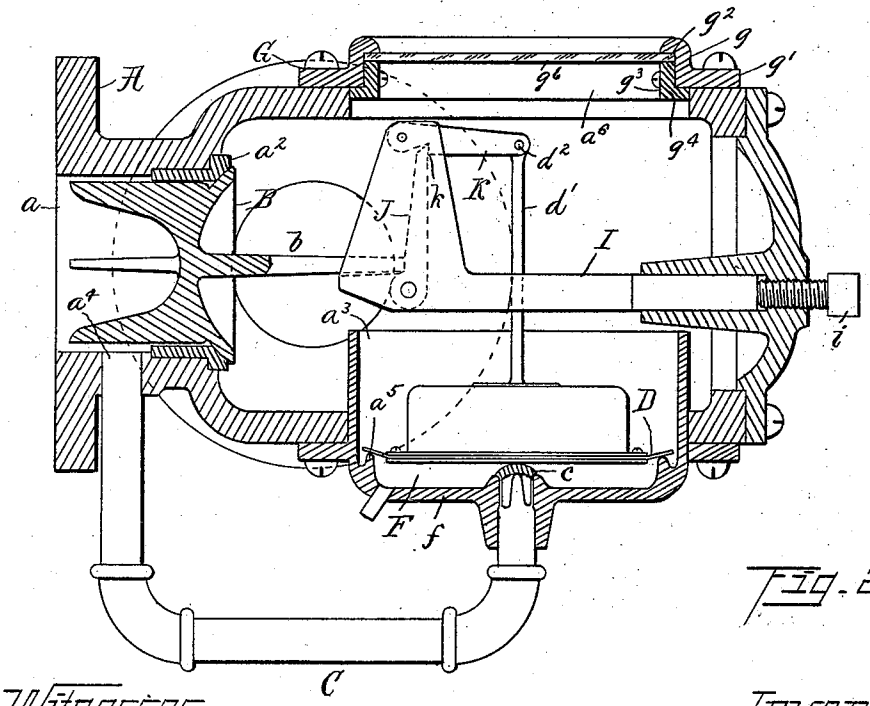

Fig. 2

Witnesses.
H. Griswold
Helen M. Hutchison.

Inventor.
John T. Hill
By C. L. Thurston
his atty.

UNITED STATES PATENT OFFICE.

JOHN T. HILL, OF CLEVELAND, OHIO.

DRY-PIPE VALVE FOR AUTOMATIC SPRINKLER SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 570,018, dated October 27, 1896.

Application filed March 26, 1896. Serial No. 585,031. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. HILL, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Dry-Pipe Valves for Automatic Sprinkler Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in dry-pipe valve mechanism for automatic sprinkler systems—that is to say, valve mechanism which will prevent the entry of water to the distributing-pipes so long as all of the sprinkler-heads remain closed, but will permit the flow of water into said pipes immediately any of the sprinkler-heads are opened.

The objects sought to be attained by my invention are, first, the certain and continuing exclusion of the water from the distributing-pipes for a long period of time, if necessary, whatever may be the water-pressure in the supply-pipe, and, second, the immediate and certain operation of the valve mechanism to admit the water to said distributing-pipes whenever any sprinkler-head is opened.

The invention consists in the construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a central vertical sectional view of my improved valve mechanism, and Fig. 2 is a similar view of a modified construction of said mechanism.

Referring to the parts by letter, A represents the valve-casing, having an inlet-opening a, which is to be connected to the main water-supply pipe, and an outlet-opening (indicated by dotted lines) to which the main distributing-pipe is to be connected. It has not been thought necessary to show either the water-supply pipe or the distributing-pipe, because they may be of ordinary construction and may be connected to the valve-casing at the points indicated in any suitable manner.

Around the inner edge of the inlet-opening is an annular valve-seat a^2, upon which the inwardly-movable valve B is seated and held by the mechanism to be presently explained.

In one side of the casing is an opening a^3, which is covered by a concavo-convex cap f, within which is formed a shallow chamber F. This chamber is separated from the interior of the valve-casing by a movable partition D. A pipe C connects this chamber with the water supply, being connected at its end preferably over an opening f' in the cap f and in an opening a^4 through the valve-casing outside of the valve B. The opening f' is closed by a valve c, which is movable into the chamber F, but it is held against its seat by pressure from the movable partition D. The valve c is preferably made of glass, so that there is no danger of any corrosion and consequent sticking together of the valve and its seat however long the valve may remain seated.

In its best form the movable partition is a flexible diaphragm, (made preferably of vulcanized rubber,) which is clamped at its edges between the cap f and the valve-casing across said opening a^3. When constructed of rubber or equivalent material, a wear-plate d is secured to the outer side thereof for engagement with the valve c.

In the construction shown in Fig. 2 the movable partition is a float-valve, which engages with a seat a^5, surrounding the opening a^3, thereby separating the chamber F from the interior of the valve-casing. When this valve is closed, it engages with the valve c and holds it closed.

In both constructions the pressure of air in the valve-casing holds the movable partition against said valve c. In the construction shown in Fig. 1 the diaphragm-partition is deflected outward into contact with the valve c by said pressure; but when water is admitted to the chamber F the diaphragm is deflected inward by the water-pressure in said chamber F, thereby, through the intermediate mechanism to be described, releasing the inlet-valve B. In the construction shown in Fig. 2 the valve is lifted by reason of its own buoyancy on the water admitted to chamber F, thereby effecting the same result.

The valve B is held closed by mechanism which is maintained in its operative position by the partition D so long as said partition is holding the valve c closed, but which is moved out of said operative position by the inward movement of said partition.

The valve is pressed against its seat by a

strut b, which is rigid with the valve B, as shown in Fig. 2, or it may be a separate piece, as shown in Fig. 1. In the latter case it has an enlarged rounded or pointed head b', which bears in a tapered socket b^2, formed within the annular flange b^3 on the inner side of said valve. A flanged cap b^4, which screws onto said flange b^3, embraces the strut above the head and thus prevents the complete separation of the strut and valve.

An adjustable bar I, which is fitted closely in a socket in the casing opposite the valve B, supports the lever J and the trigger K, both of which are pivoted thereto. The lever J engages with the inner end of the strut b. The outer end of the lever J engages in a notch k in the trigger K, whereby the movement of said lever is prevented. An arm d', which is secured to the inner side of the movable partition D, is connected with said trigger K, whereby the trigger is moved to release the lever J when the movable partition moves inward, but holds the trigger immovable so long as the partition D does not so move. The connection between the arm d' and trigger K is a slot k' and a pin d^2, whereby a slight inward movement of the partition may take place before the movement of the trigger begins. The position of the supporting-bar I is adjusted to regulate the pressure upon the valve B by the set-screw i.

The trigger K and lever J, as shown, are provided with glass bushings k^2 j^2, respectively, for the purpose of preventing any sticking of these parts at their pivots. These valve mechanisms frequently remain set for long periods of time, and except for these bushings the metal surfaces in contact might become corroded and stick together. This would be disastrous, for it would defeat the whole purpose of the sprinkler system if the valve did not immediately open when a sprinkler-head was opened.

In the side of the casing A opposite to the movable partition is an opening a^6, through which the inclosed parts may be reached to set them. This hole is normally closed by a cap G, composed of a glass plate g^6, held by a frame, which consists of, first, a ring g, having a flange g', which is to be secured to the casing, and an internal shoulder g^2, and, second, the ring g^3, having a flange g^4, which is secured by screws or equivalent means to the ring g. The glass and a rubber gasket g^5 are held between the shoulder g^2 and the edge of the ring g^3. This glass plate serves as a sight-glass through which the parts may be inspected from time to time. The sight-glass is protected by a cap L, which screws onto the ring g.

The operation of the described valve mechanism is as follows: The parts are set in the relative position shown, the opening a^6 is closed, and the distributing-pipes and valve-casing are filled with air under pressure. When any sprinkler-head opens, the air-pressure is relieved, so that the water-pressure in the pipe C may force the valve C open, the water entering the cylinder F behind the movable partition D. This partition is moved inward, thereby, through the arm d', moving the trigger K and releasing the lever J. The water-pressure against the valve B may now open it, since the lever J may be swung to a vertical position out of the path of the strut.

Having described my invention, I claim—

1. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, a chamber separable from the interior of the casing, a pipe connecting said chamber with the water supply, a valve movable into said chamber for closing the end of said pipe, a movable partition adapted to separate said chamber from the interior of the casing and to hold said valve closed, an inwardly-movable valve for closing the inlet-opening, and mechanism intermediate of said partition and inlet-valve for holding the latter closed and for releasing it, substantially as and for the purpose specified.

2. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings and a third opening through its walls, a cap for closing this last-named opening, a flexible diaphragm clamped at its edges between the casing and said cap, thereby forming a chamber between itself and the cap, with a pipe connecting the water supply with said chamber, an inwardly-movable valve closing the communication between said chamber and pipe, said diaphragm being adapted to hold said valve closed under the influence of air-pressure within the valve-casing, an inwardly-movable valve for closing the inlet-opening, and mechanism intermediate of said diaphragm and inlet-valve for holding the latter closed and for releasing it, substantially as and for the purpose specified.

3. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, an inwardly-movable valve for closing said inlet-opening, a chamber separable from the interior of the valve-casing, a movable partition adapted to separate said chamber from the interior of the casing, a pipe connecting the water supply with said chamber, an inwardly-movable valve closing the communication between said chamber and pipe and adapted to be engaged and held closed by said partition when the valve-casing contains air under pressure, a strut engaging with the valve over the inlet-opening, a lever engaging with said strut, a trigger engaging with said lever, and an arm connected with said partition engaging with said trigger, substantially as and for the purpose specified.

4. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, and a chamber at one side, an inwardly-movable partition for separating said chamber from the interior of the valve-casing, a pipe con-

necting the water supply with said chamber, an inwardly-movable valve for closing the communication between said pipe and chamber, which valve is adapted to be engaged and held closed by said movable partition, an inwardly-movable valve for closing the inlet-opening to said casing, an adjustable bar supported within said casing, a strut engaging with said valve, a lever pivoted to said bar and adapted to engage with said strut, a trigger pivoted to said bar and adapted to engage with said lever, and an arm connected with said movable partition for operating said trigger, substantially as and for the purpose specified.

5. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, a chamber at one side of said valve-casing, a pipe connecting said chamber with the water supply, and an inwardly-movable glass valve adapted to close the communication between said pipe and chamber, a movable partition for separating said chamber from the interior of the valve-casing and adapted to engage with said valve and hold it closed, an inwardly-movable valve for closing the inlet-opening, and mechanism intermediate of said valve and movable partition for holding the said inlet-valve closed, substantially as and for the purpose specified.

6. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, an inwardly-movable valve for closing the inlet-opening, an adjustable support within the casing, a lever having a glass bushing pivoted to said support, a strut interposed between said lever and valve, and a trigger engaging with said lever pivoted to said support and having a glass bushing, and mechanism for controlling said trigger, substantially as and for the purpose specified.

7. In a dry-pipe valve for automatic sprinkler systems, the combination of a valve-casing having inlet and outlet openings, and a chamber at one side, with a movable partition for separating said chamber from the interior of the valve-casing, a valve for closing the inlet-opening, a strut engaging with said valve, an adjustable support within the casing, a lever pivoted thereto engaging with said strut, a trigger pivoted to said support engaging with said lever, an arm connected with the movable partition, and a slot-and-pin connection between said arm and pivot, substantially as and for the purpose specified.

8. In a dry-pipe valve for automatic sprinkler systems, the combination of a casing having inlet and outlet openings, and a chamber at one side of said casing, with a flexible diaphragm secured across the last-named opening, thereby separating the said chamber from the interior of the valve-casing, a pipe connecting said chamber with the water supply, a valve movable into said chamber for closing the opening to said pipe, which valve is engaged and held closed by said diaphragm, an inwardly-movable valve for said inlet-opening, a strut engaging therewith, a lever engaging with said strut, a trigger engaging with said lever, an adjustable support for said lever and trigger, and an arm secured to the diaphragm and engaging with said trigger, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN T. HILL.

Witnesses:
E. L. THURSTON,
L. F. GRISWOLD.