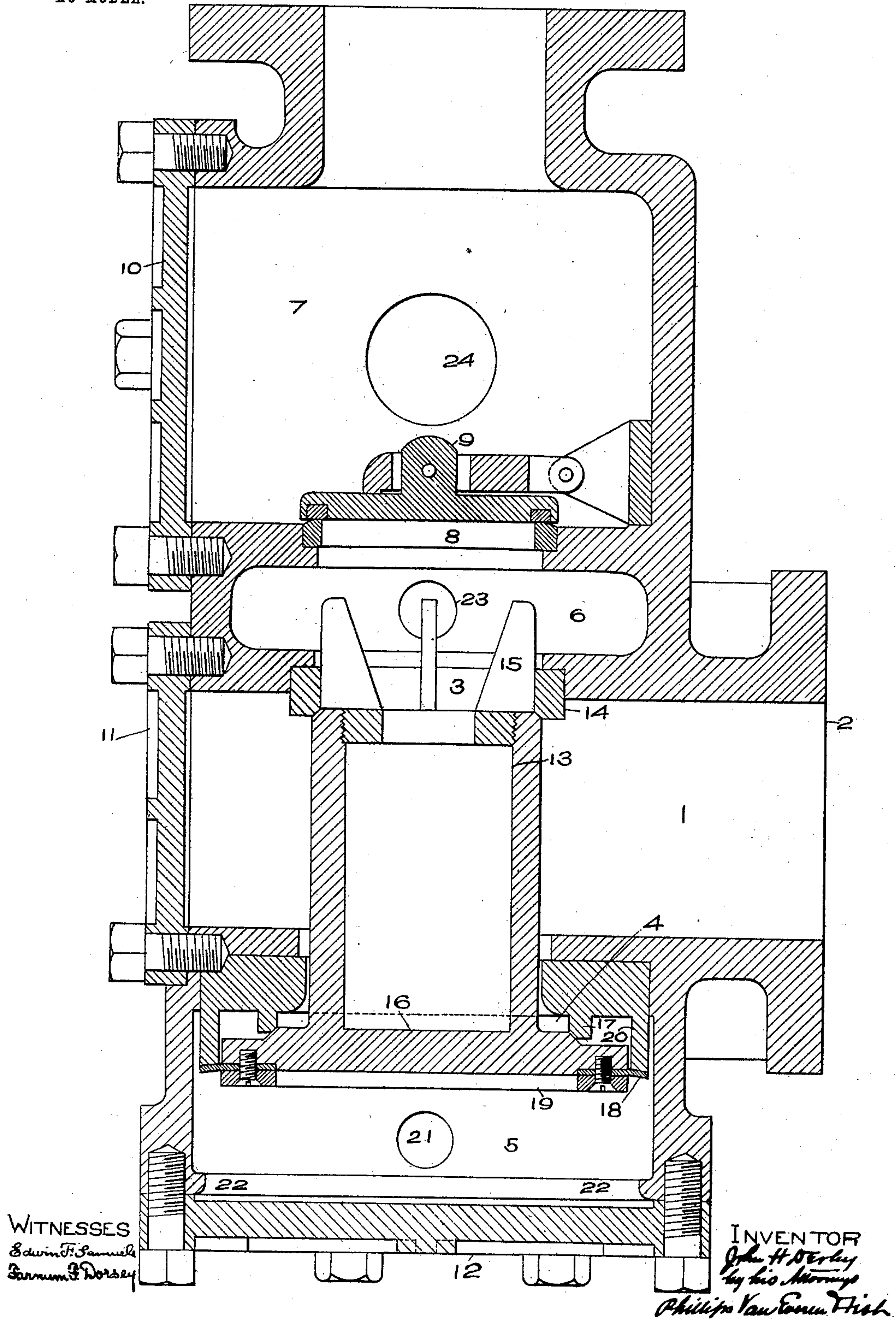


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PATENTED APR. 12, 1904.

J. H. DERBY.  
AUTOMATIC VALVE FOR FIRE EXTINGUISHERS.  
APPLICATION FILED FEB. 12, 1903.

NO MODEL.





# UNITED STATES PATENT OFFICE.

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## AUTOMATIC VALVE FOR FIRE-EXTINGUISHERS.

SPECIFICATION forming part of Letters Patent No. 756,835, dated April 12, 1904.

Application filed February 12, 1903. Serial No. 143,013 (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. DERBY, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Automatic Valves for Fire-Extinguishers; 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.

The present invention relates to automatic valves for fire-extinguishers, and more particularly to an improved form of valve for use in connection with what is known as the "dry-pipe" fire-extinguisher system.

The present invention is an improvement on the invention described and claimed in the patent granted to me October 8, 1901, No. 684,352, in which the water-valve consisted of a partly-balanced valve member—that is, a valve upon which the water pressed in opposite directions with unequal forces, the excess of force in one direction being opposed and overcome by the pressure of air in the pipe system.

One object of my invention is to eliminate the opposing pressures of the water upon the valve member.

Other objects of the invention are to improve the valve in various other respects hereinafter pointed out, and particularly defined in the claims.

The preferred form of the invention is illustrated in the accompanying drawing, which represents the automatic valve of a dry-pipe system in sectional elevation, in which the water-chamber 1 receives water from the supply through the water-inlet 2. This water-chamber is provided with two oppositely-disposed valve-openings, one of which comprises a water-outlet 3 and the other of which, 4, opens into the air-pressure chamber 5. The water-outlet opens into an air-chamber 6, which in turn opens into the check-valve chamber 7 through an opening 8, normally closed by the check-valve 9. The check-valve chamber, the air-chamber, the water-chamber, and the air-pressure chamber are preferably made in a

single casting. The check-valve is accessible through a hand-hole closed by the ribbed plate 10. The water-chamber is accessible through a hand-hole closed by the ribbed plate 11, and the air-pressure chamber is closed by the cover-plate 12. The valve member 13 is cylindrical in form, having a valve-face upon its upper end which engages the valve-seat ring 14 of the water-outlet opening 3. The upper end of the valve member is provided with guide-wings 15, which bear within the water-outlet seat-ring and guide the valve to its seat. The lower end of the valve member is provided with a disk 16, which closes the bottom of the valve member and projects laterally therefrom, being provided with a surface which engages the seat-ring 17 of the air-pressure opening 4. The disk 16 is also provided with a flexible valve-ring 18, which is secured to the disk 16 by means of a retaining-ring 19 and suitable screws. The projecting edge of the valve-ring 18 engages the seat-ring 20 of the valve-ring 17, and the valve-ring 18 is held to the seat by the pressure of the air in the air-pressure chamber 5. The space between the valve-ring 17 and the valve-seat 20 is drained, as in the patent above referred to or in any convenient manner. The air-pressure chamber 5 is connected, through the pipe 21, with the pipe system, preferably at a point considerably above the check-valve 9 and which may conveniently be about twenty feet above the same, so that an accumulation of water upon the check-valve 9 will not cause water to flow into the air-pressure chamber 5. When the cover-plate 12 is removed, the valve member 13 may be inserted in the air-pressure chamber, and the inwardly-projecting lip 22 affords means for supporting the valve member upon the valve-ring 18, which readily passes through the opening over the lower curved surface of the lip, but which will not return as easily therethrough. This lip is a convenient support for the valve member until the cover-plate 12 is secured in place. The air-chamber 6 is connected, by means of the connection 23, with a pipe which leads to an alarm device adapted to be operated by pressure. Normally the air-chamber 6 is under



atmospheric pressure; but when the flow of water begins the pressure therein rises and causes the alarm device to operate. The check-valve chamber 9 is drained, if desired, through the opening 24. This also affords a means for priming the check-valve 9.

The operation of the illustrated embodiment of my invention is as follows: Assuming the parts to be in the position indicated, with water under pressure from a supply filling the water-chamber 1 and with the pipe system 7 under pressure of the air therein, which is communicated with the air-pressure chamber 5 by the connection 21, the air-chamber 6 being at atmospheric pressure, being connected through a small opening with the atmospheric air, the parts will maintain their positions for the following reasons: The pressure of the water upon the valve is equal to the pressure thereof upon the exposed area of the disk 16, which projects beyond the main portion of the valve member and extends to the valve-seat 17. There is no other pressure of the water upon the valve member tending to move it either toward its seat, so as to hold the water-valve closed, or to move it in the opposite direction to open it. This pressure of the water tending to move the valve member downward and in the opposite direction to the flow of water through the water-outlet is resisted by the pressure of the air upon the entire lower surface of the disk 16, which is sufficient to overcome the pressure of the water upon the small surface exposed to it upon the opposite side. It will be noted that the pressure of the air-chamber 6 being atmospheric pressure will only oppose to that extent the pressure of the air in the air-pressure chamber 5. The pressure of the air in the pipe system will hold the check-valve 9 to its seat. If now one of the sprinklers goes off, thereby reducing the air-pressure in the pipe system, the pressure in the air-pressure chamber 5 will fall, and when the upward pressure of the air is less than the downward pressure of the water upon the upper side of the disk 16 the valve member will no longer be supported by the air-pressure thereunder, and the valve member will fall, thus opening the water-outlet and permitting the water to rise through the water-outlet into the air-chamber 6, through the check-valve opening into the check-valve chamber 7, and thence into the pipe system. As the pressure rises in the pipe system, owing to the entrance of the water, the pressure in the air-chamber 6 will rise, and the alarm will be set off. It will be noted that when the valve member 13 falls it will not obstruct the flow of water through the water-outlet as it moves down and away from that opening and that inasmuch as there are no projections on the valve member which may be engaged by the water flowing out through the water-outlet there will be no tendency to lift the valve member to close the outlet. After the operation of the apparatus

is over and the pipe system has been drained the hand-hole plates 10 and 11 will be removed, the check-valve 8 will be cleaned and reseated, the hand-hole plate 10 will be replaced, and the check-valve primed with water. Then the air under pressure will be admitted to the system, the valve 13 being lifted up against its seat by the operator until the pressure in the system is sufficient to hold it in place. The restoration of air-pressure to the system will be continued until it reaches normal pressure. Then the hand-hole plate 11 will be replaced and water again admitted to the water-chamber 1, when the apparatus will again be in condition for operation.

The present invention may be embodied in other forms without departure therefrom. One feature of my invention which I consider of some importance resides in making the valve member closing the water-outlet of a size where it is exposed to the flow of water through the water-chamber not less than its size at the water-outlet, whereby impediment to the flow of water and the tendency of the flow to close the valve are eliminated. Another feature of my invention which is to be remarked is that in those forms thereof in which the valve member comprises a hollow body open at the upper end if by any accident the valve member should be broken between its two water-seats there would be no substantial tendency of the water to hold the upper portion of the valve member against its seat. Under such circumstances, of course, if the leak caused by the break were sufficient the lower portion of the valve member would drop and the upper portion of the valve member if it remained in position, being hollow, would afford little, if any, impediment to the flow of water therethrough, while the likelihood would be that it would drop, there being no substantial tendency to hold it in place. Another feature of the present invention consists in eliminating from the valve member all tensile strains and reducing all the forces which operate thereupon to forces of compression.

I believe I am the first to produce an automatic valve for fire-extinguishers operating on the dry-pipe system which comprises a water-chamber having a water-inlet and two oppositely-disposed openings, one of which comprises a water-outlet and a valve member for closing said openings having no portion thereof of less size than the size of the water-outlet, whereby all pressure of the water tending to hold the valve closed is eliminated.

The preferred form of my invention is clearly distinguished from prior valves for dry-pipe systems employing differential valves, levers, frangible plates, or balanced valves by virtue of the fact that in the present valve there are utilized none of the principles upon which such valves operate. It will be noted that such form of valve is not a differential



valve, that it is not operated by levers or frangible plates, nor is the valve member balanced by opposing forces. On the contrary, the forces which have been balanced in such valves are entirely eliminated by my construction.

Having thus described my invention, what is claimed is—

1. An automatic valve for fire-extinguishers, having, in combination, a pipe system, an air-pressure chamber, a water-chamber located between the pipe system and the air-pressure chamber provided with a water-inlet and two oppositely-disposed valve-openings one of which comprises a water-outlet into the pipe system and the other of which communicates with the air-pressure chamber, and a valve member normally closing said opposite openings, the size of said valve member being not less at any portion thereof than its size at the outlet-opening, whereby no portion of the valve member is exposed to a pressure of water tending to close the valve, substantially as described.
2. An automatic valve for fire-extinguishers, having, in combination, an air-pressure chamber, a water-chamber provided with a water-inlet and two oppositely-disposed valve-openings which comprise a water-outlet and a connection with the air-pressure chamber, a valve member normally closing said opposite openings the size of the valve member being not less at any portion thereof than its size at the outlet-opening, a connection between the pipe system and the air-pressure chamber, and a check-valve in the pipe system between the water-outlet and the said connection with the air-pressure chamber, substantially as described.

3. An automatic valve for fire-extinguishers, having, in combination, an air-pressure chamber an atmospheric chamber, a water-chamber provided with a water-inlet and oppositely-disposed openings into the air-pressure chamber and the atmospheric chamber, the latter opening comprising an outlet, a connection between the pipe system and the air-pressure chamber, a check-valve between the atmospheric chamber and the pipe system, and a valve member normally closing the said oppositely-disposed openings and preventing communication between the air-pressure chamber and the atmospheric chamber, the part of the valve member between the said openings being substantially cylindrical, one end of the cylindrical portion being closed, and the size of the valve member being not less at any point than its size at the outlet-opening, substantially as described.

4. An automatic valve for fire-extinguishers, having, in combination, a water-chamber provided with a water-inlet and two oppositely-disposed round valve-openings one of which comprises an outlet, and a valve member comprising a hollow cylindrical portion closing the outlet and extending through the other opening, and a plate secured to the cylinder and closing the latter opening, the size of the valve member being not less at any point than its size at the outlet-opening, substantially as described.

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

JOHN H. DERBY.

Witnesses:

HORACE VAN EVEREN,  
FRED O. FISH.