

No. 615,354.

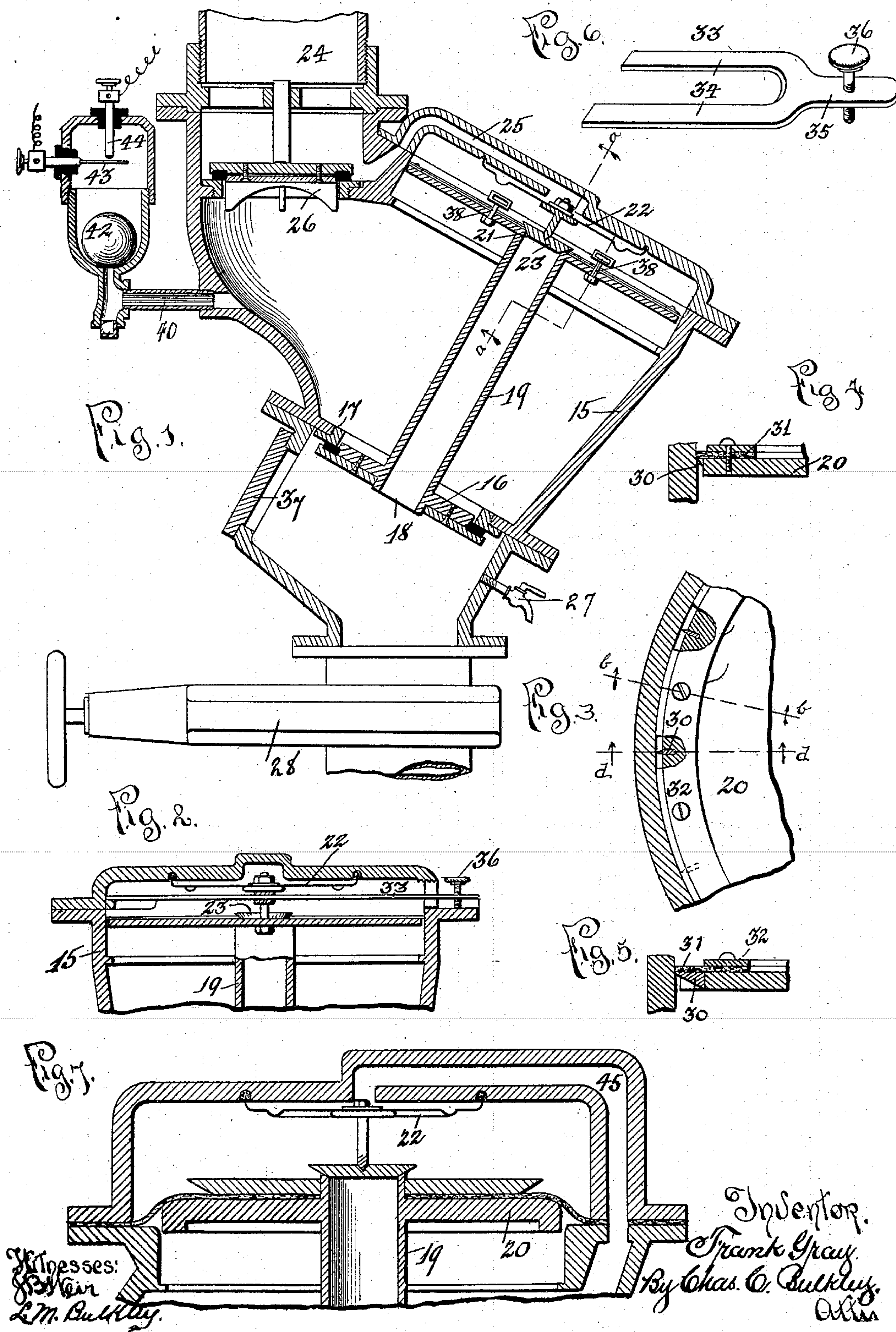
Patented Dec. 6, 1898.

F. GRAY.

VALVE FOR FIRE EXTINGUISHERS.

(Application filed Jan. 4, 1897.)

(No Model.)



UNITED STATES PATENT OFFICE.

FRANK GRAY, OF CHICAGO, ILLINOIS.

VALVE FOR FIRE-EXTINGUISHERS.

SPECIFICATION forming part of Letters Patent No. 615,354, dated December 6, 1898.

Application filed January 4, 1897. Serial No. 617,905. (No model.)

To all whom it may concern:

Be it known that I, FRANK GRAY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have
5 invented certain new and useful Improvements in Valves for Fire-Extinguishers, of which the following is a specification.

My invention relates to certain improvements in automatic valves for controlling the
10 automatic sprinklers of what are known as "dry-pipe" systems.

The objects of my invention are to increase the efficiency and sensitiveness of this class of valves, to assemble the various parts in a
15 more compact and simple form, to avoid corrosion, and to overcome friction in the working of the valve.

My invention consists in a downwardly-opening water-valve held closed by the water-pressure, a piston connected therewith
20 by a spindle, a drain-cock below the water-valve, and a cut-off valve also below the water-valve, whereby the said water-valve will open when operative by opening the drain-cock.

My invention consists in a water-controlling valve or valve-face which is in turn controlled by a piston, the valve and the piston being connected by a hollow spindle opened
30 at one end, always to the water-pressure, and forming a port in the water-controlling valve and normally closed at its other end by a spindle-valve exposed to the water-pressure and held closed against said pressure by a
35 diaphragm exposed to an increased air-pressure within the pipes leading to the automatic sprinklers, whereby upon a reduction of the air-pressure by the opening of any one of the sprinklers the water-pressure opens
40 the spindle-valve, operates the piston, and opens the water-valve to permit the water to pass through the pipes to the sprinklers.

My invention has certain other objects in view; and it consists in certain other features
45 about to be described, and pointed out in my claims, reference being now had to the accompanying drawings, in which—

Figure 1 is a central vertical section through the valve-casing, showing the various parts
50 in a normally-closed position. Fig. 2 is a section on the line *aa* of Fig. 1. Fig. 3 is a plan view of a portion of the piston, showing the

construction for preventing corrosion and reducing the friction. Fig. 4 is a detail sectional view on the line *bb* of Fig. 3. Fig. 5 is
55 a like view on the line *dd* of said figure. Fig. 6 is a detail perspective view of the setting device. Fig. 7 is a sectional view illustrating a modified form in which the air-pressure is below the piston.

The valve-casing is designated at 15, within which the various valves of the apparatus are disposed. The water-valve is designated at 16, finding its seat upon the valve-seat 17. A port 18 is provided centrally in the water-
60 valve 16, connected by the hollow spindle 19 with the piston 20, having also a central port 21 at the end of the hollow spindle 19, connected with said piston. A diaphragm 22 is connected with a spindle-valve 23, which is
65 normally held to close the port 21, by means of said diaphragm, which latter is exposed to the initial air-pressure of the dry-pipe system, which air-pressure is normally maintained within the pipes 24, leading to the au-
70 tomatic sprinkler, a passage 25, communicating with the pipe 24, conveying the initial air-pressure to the diaphragm 22. In the form shown in Fig. 1 a check-valve 26 normally cuts off the initial pressure from the
80 piston 20 and the water-valve 16. A drain-cock 27 opens communication for draining purposes below the water-valve 16, and a manually-operated valve 28 controls the entrance of the water to the valve-casing 15.

In order to prevent corrosion and to reduce the friction, I provide a certain peripheral construction for the piston 20, (shown more particularly in Figs. 3, 4, and 5,) and consisting of the guiding-lugs 30, set into the per-
90 riphery of the piston 20 and projected therefrom against the side of the casing 15, a washer 31 being provided of a suitable fabric, also projected beyond the edge of the piston to fill the space between the said edge of the
95 piston and the casing-wall above the guides 30. A ring 32 is bolted down upon the washer 31, and therefore holds said washer and the guiding-lugs 30 in position.

By reason of the differential of area be-
100 tween the diaphragm 22 and the spindle-valve 23 it is evident that a given pressure of air will cut off and withhold a much greater pressure of the water on the valve 16. In order

to adjust the parts in position and impose the initial air-pressure upon the diaphragm 23, the setting implement 33, Fig. 6, is provided, consisting of the limbs 34 and the tang 35, carrying the adjusting-screw 36. This implement 33 is inserted into the interior of the casing 15, through a hand-hole therein, after the valve 16 has been pushed into a closed position manually through the hand-hole 37.

The ends of the limb 34 are passed through eyes of bolts projected from the piston 20, and thus the setting implement 33 is connected with said piston. In order to draw the valve 16 and the valve 23 tightly upon their respective seats, the adjusting-screw 36, impinging against the stud 39, is rotated. Upon the accumulation of a predetermined initial air-pressure within the sprinkler-pipes and upon the diaphragm 22 the water is admitted below the water-valve 16, and the relative difference of pressure between the air and the water is such that upon the reduction of a given pressure of air by the automatic opening of a sprinkler the diaphragm 22 permits a release of the spindle-valve 23, and thus permitting the water to actuate the piston to open the water-valve 16, whereupon the column of water opens the check-valve 26 and passes out into the sprinkler-pipe 24.

I have also shown conjunctively employed an electrical circuit-contact maker for automatically sounding an alarm included in said circuit, which consists of a by-passage 40, leading to a cup-shaped chamber 41, within which a ball 42 rests. Above the ball is a contact-spring 43, connected with one terminal of the circuit and adapted to be brought against the contact-point 44, connected with the other terminal of the circuit. The water in passing through the open valve 16 into the sprinkler-pipe 24 also passes into the chamber 41 and, lifting the ball 42 against the contact-spring 43, closes the circuit through the contact-point 44.

In Fig. 7 I have shown a form in which the air-pressure of the sprinkler-pipe is admitted below the piston 20 and upon the water-valve 16. In this construction a flexible diaphragm is provided, secured to the casing and holding the piston to a limited stroke. This diaphragm prevents the passage of the air by the piston to bear against the under side of the diaphragm 22. In this construction also a by-passage 45 is provided, leading from below the piston 20 to a point above the diaphragm 22.

It often becomes necessary to test the operativeness of the valve 16—that is, to determine whether it is in condition to open automatically—and to accomplish this test the air has been reduced in the sprinkler-pipes, which oftentimes permits the water to freeze therein and produce other injurious results. By virtue of the construction which I provide the manually-operated valve 28 may be closed to cut off the water from the valve 16 and the drain-pipe 27 opened. If the valve 16 is in

a proper condition, it will then open by gravity or by the assistance of the air-pressure. Under these conditions a test may be accomplished without permitting the water to pass through the valve 16 into the sprinkler-pipe 24.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a valve apparatus for automatic sprinkler systems the combination of a water-valve, a piston, a hollow spindle connecting the water-valve and the piston, a port in the water-valve opening into the spindle and a port in the piston also opening into the spindle together with a spindle-valve and diaphragm connected therewith which spindle-valve normally remains seated upon the port of the piston opening into the hollow spindle by virtue of the initial air-pressure upon the diaphragm, but which spindle-valve is opened by the water-pressure upon a predetermined reduction of air-pressure in the sprinkler-pipe whereby the water acts upon the piston to open the water-valve and permit the water to pass through and into the sprinkler-pipe.

2. In a valve apparatus for automatic sprinkler systems the combination of a water-valve opening downwardly and subject to a pressure tending to open it, a draining-cock below the water-valve and a cut-off valve for cutting off the supply of water below the water-valve whereby the operativeness of the water-valve may be tested without permitting the water to pass through said valve into the sprinkler-pipe.

3. In a valve apparatus for automatic sprinkler systems the combination of a water-valve, a piston, a hollow spindle connecting the water-valve and the spindle, a port in the water-valve opening into the spindle, a port in the piston also opening into the spindle, a spindle-valve and diaphragm connected therewith which spindle-valve normally remains seated upon the port of the piston opening into the hollow spindle by virtue of the initial air-pressure upon the diaphragm but which spindle-valve is opened by the water-pressure upon a predetermined reduction of air-pressure in the sprinkler-pipe whereby the water acts upon the piston to open the water-valve and permit the water to pass through and into the sprinkler-pipe, a draining-cock below the water-valve and a cut-off valve for cutting off the supply of water below the water-valve whereby the operativeness of the water-valve may be tested without permitting the water to pass through said valve into the sprinkler-pipe.

4. In a valve apparatus for automatic sprinklers the combination of a water-valve, a piston, which water-valve and piston are connected by a hollow spindle, a spindle-valve for closing one end of the hollow spindle, a diaphragm exposed to the initial air-pressure normally holding the spindle-valve closed upon the spindle and a diaphragm connected with the piston cutting off the air-

pressure from the under side of the spindle-valve-controlling diaphragm and permitting the accumulation of the initial air-pressure below the piston and above the water-valve.

device on the implement for raising the limbs to tightly close the water-valve.

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

FRANK GRAY.

Witnesses:

CHAS. C. BULKLEY,
J. B. WEIR.

5 5. A setting device consisting of an implement which is bifurcated to form extended limbs, extensions from the piston of the valve apparatus having eyes therein through which the ends of the limbs pass and an adjusting