July 23, 1963 G. ALLEN ETAL 3,098,527

SPRINKLER ALARM VALVE

Filed March 22, 1961 4 Sheets-Sheet 1

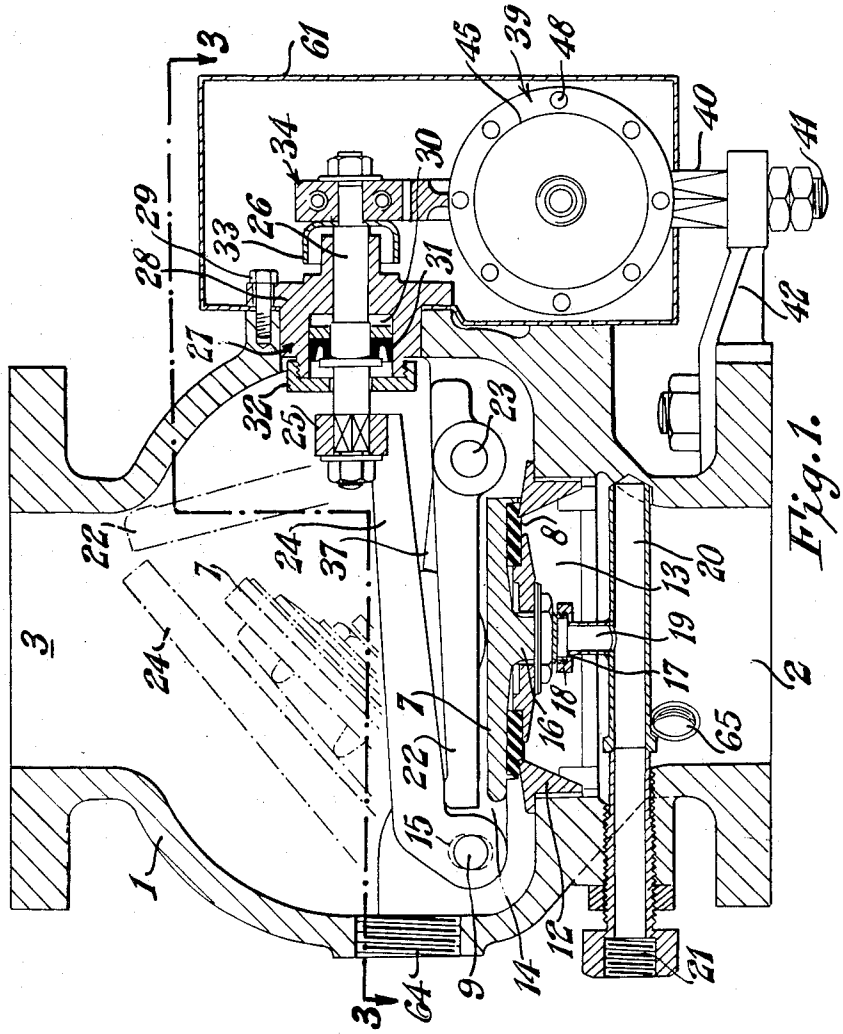


Fig. 1.

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SPRINKLER ALARM VALVE

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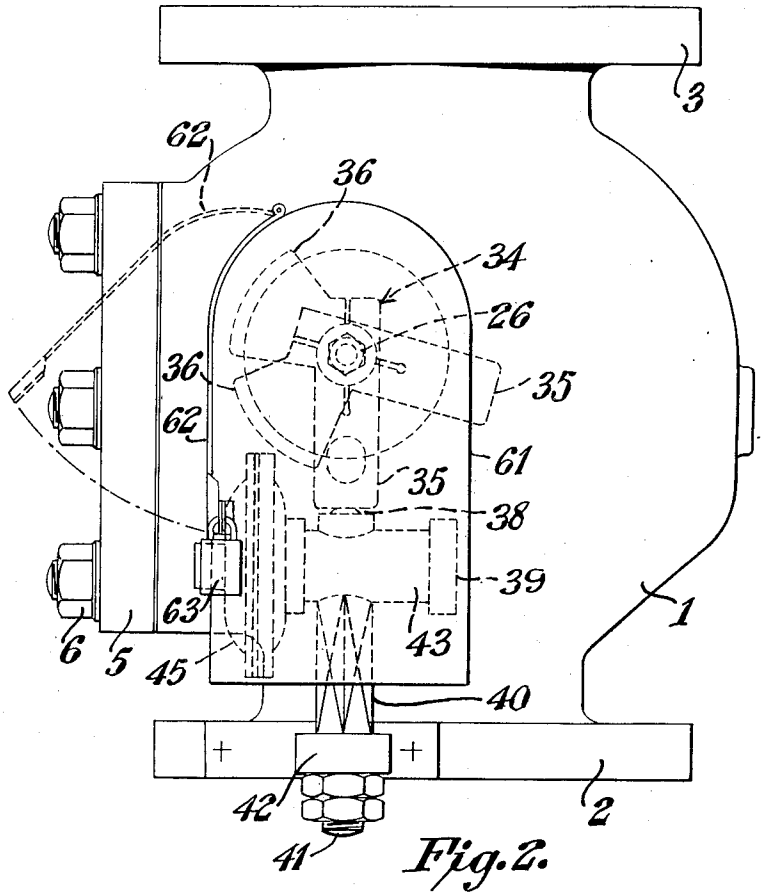


Fig. 2.

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SPRINKLER ALARM VALVE

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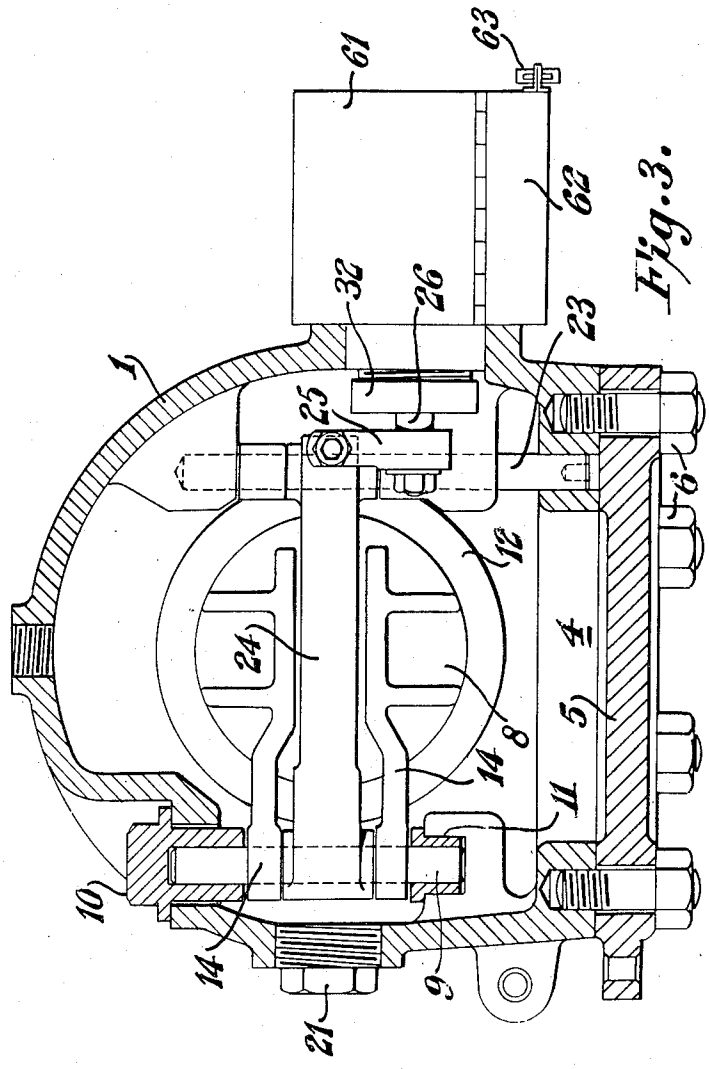


Fig. 3.

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SPRINKLER ALARM VALVE

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Fig. 4.

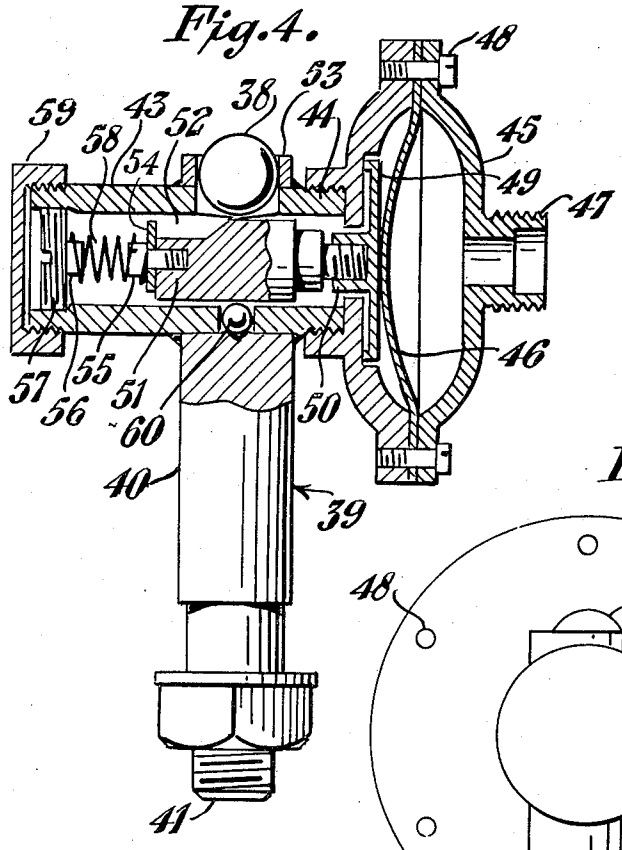
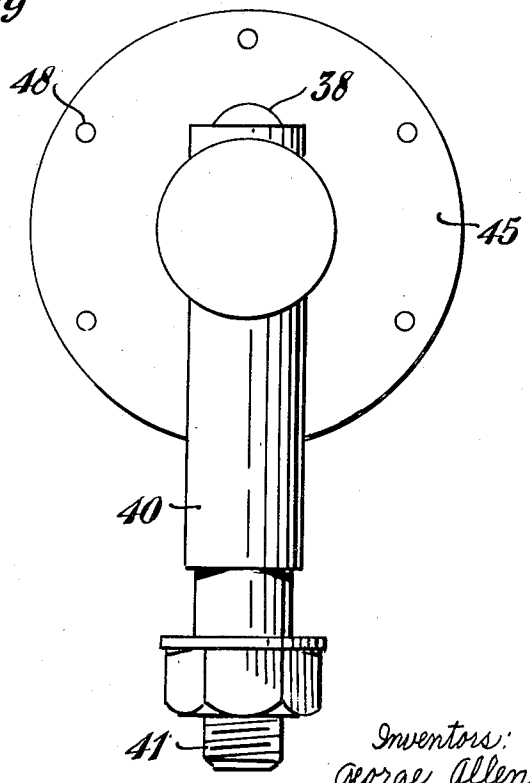



Fig. 5.

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United States Patent Office 3,098,527 Patented July 23, 1963



3,098,527

# SPRINKLER ALARM VALVE

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11 Claims. (Cl. 169—19)

This invention relates to alarm valves for sprinkler systems of the kind known as alternate sprinkler installations.

Alternate sprinkler installations are used when there is a danger of water in the sprinkler pipes becoming frozen under winter conditions, and during this period it is desirable to drain the system and pressurise it with air. In such installations it is normal practice to provide two alarm valves arranged one on top of the other i.e. a dry alarm valve arranged above a wet alarm valve so that either can be used according to whether the system is required for use in a dry or a wet state.

The use of two alarm valves has the disadvantage that it increases the cost of the installation and increases the space required for installing the equipment, and it is among the objects of the present invention to overcome this disadvantage.

According to the present invention there is provided an alarm valve for alternative sprinkler systems which comprises a valve body having a valve opening and an alarm port, a clack hingedly mounted within the body to effect closure of the opening and the alarm port, a lever system for co-operating with the clack, and means operable externally of the body for holding the lever system in an operative position to engage the clack in the dry state of the system and for holding the lever system in an inoperative position to leave the clack free in the wet state of the system.

Furthermore it has been found that the use of the conventional alarm port control means, that is to say an annular groove formed in or adjacent the seating of the valve opening, which groove is in communication with the alarm port and is under the control of the clack, increases the pressure differential on opposite sides of the clack beyond the desired ratio and leads to sluggish operation of the clack, particularly during testing of the alarm system, which must be carried out at regular intervals.

It is therefore a further object of the invention to provide improved means for controlling the alarm port so that the pressure differential on opposite sides of the clack is reduced and leads to more efficient operation of the valve.

According to the invention furthermore the closure for the alarm port comprises a vertically disposed communicating with the alarm port and arranged below and centrally of the clack, and an extension formed on the clack to engage the vertically disposed port and to effect closure thereof.

Thus in a preferred construction the clack is provided with two independent sealing faces, one of which engages and seals the valve opening and the other of which engages and seals the vertically disposed port.

The provision of a centrally arranged alarm port control means has the advantage over conventional means in that the surface area required in providing these means is much less than the surface area of conventional means which extend over the whole of the perimeter of the valve opening and thereby decrease the size of the opening. Thus according to the invention the pressure area on the water inlet side of the clack is increased thereby reducing



the pressure differential between opposite sides of the clack.

The invention is illustrated by way of example in the accompanying drawings in which,

FIGURE 1 is a cross-section through an alarm valve according to the invention,

FIGURE 2 is a corresponding side elevation,

FIGURE 3 is a section on the lines 3—3 of FIGURE 1,

FIGURE 4 is a cross-section through the trigger mechanism, and,

FIGURE 5 is a corresponding end elevation.

Referring to the drawings the alarm valve comprises a cast-iron body 1 having a flanged inlet 2 for connection to a water supply pipe and a flanged outlet 3 for connection to the sprinkler system. The body 1 also has an access opening 4 which is normally closed by a closure plate 5 secured to the body by means of bolts 6.

A clack valve element 7 provided on its underside with an annular sealing washer 8 is hingedly mounted within the body 1 on a spindle 9 journalled in bearings 10, 11.

The sealing ring 8 of the clack 7 is arranged to bear on an annular seating 12 positioned in the valve opening 13. The seating 12 is formed with an upwardly inclined pointed edge which engages the sealing washer 8 and provides knife-edge contact. This has the advantage that the minimum bearing area is required to effect sealing and thus leaves the maximum area which can be acted upon by the water pressure.

The hinged arms 14 of the clack 7 are formed with elongated holes 15 thereby giving the clack limited freedom of movement so that it rests squarely on the seating ring 12.

Centrally arranged on the underside of the clack 7 is a downwardly depending extension 16 the free end of which is provided with an annular washer 17 held in position by a retaining ring 18. The washer 17 is arranged to bear on the open end of a vertically disposed port 19 which is in communication, through a cross-pipe 20, with a port 21 which is connected to a suitable alarm system.

In its closed position the clack 7 is held in engagement with the seating 12 and the port 19 by a releasable valve holding means including a lever 22 which is pivoted on a spindle 23 arranged on the opposite side of the opening 13. The lever 22 is in turn held in a horizontal position by means of a second lever 24 which is pivoted on the spindle 9. The second lever 24 is held down by means of a crank lever 25 mounted on a shaft 26 which extends through a bearing assembly 27 mounted in the wall of the valve body 1.

The assembly 27 comprises a body portion 28 which is secured with a gasket interposed, in the valve body 1 by means of bolts 29. The body portion 28 is formed with a central counterbore 30 in which is housed, to surround the shaft 26, an annular seal 31 of U-shaped cross-section. The seal 31 is arranged so that the arms of the U face inwardly towards the interior of the valve body so that air or water pressure will tend to open the arms of the U and thereby increase the sealing effect. Suitable cover caps 32, 33 are provided on opposite ends of the body portion 28. It will be seen that the outer end of the assembly 27 is glandless and therefore has no external tightening-down nuts or bolts which can be tampered with by unauthorized persons.

Secured to the outer end of the shaft 26 is a bell crank lever 34 one arm 35 of which normally assumes a vertical position and the other arm 36 of which serves as a counterweight to effect rotational movement of the lever 34 as hereinafter described. The bell crank lever 34 and the crank lever 25 are arranged relative to one another so that when the arm 35 is in a vertical position the lever

25 is in a horizontal position where it can bear on the second lever 24 or on a projection 37 formed on the first lever 22.

The arm 35 of the bell crank lever 34 is normally in a vertical position by means of a ball element 38, which forms part of a trigger mechanism 39, which ball element engages a recess or opening formed in the end of the arm 35.

The trigger mechanism 39 comprises a T-shaped housing 40 the lower end 41 of which is adapted to be secured to a bracket 42 fixed to the inlet flange 2. The upper part of the T is formed as a housing 43 which is externally screw-threaded at 44 to receive a diaphragm housing 45. The housing 45 contains a rubber diaphragm 46 and is provided with a threaded spigot 47 for connection to the sprinkler system. The housing 45 is formed in two parts which are connected together, with the edge of the diaphragm 46 interposed, by means of bolts 48.

Also mounted in the diaphragm housing 45 is a pressure plate 49 which is attached, through an internally screw-threaded boss 50, to a plunger 51 slidably mounted in the housing 43. The upper part of the plunger 51 is provided with a cut-away portion 52 on which the steel ball element 38, which is movable within an annular projection 53, rests. The outer end of the plunger 51 is provided with a disc 54 which is secured by a bolt 55 between which bolt, and a boss 56 formed on a plug 57 adjustably mounted within the housing 43, is arranged a compression spring 58. The compression spring 58 urges the plunger 51 and thus also the pressure plate 49 in the direction of the diaphragm 46. The end of the housing 43 in which the plug 57 is mounted may be covered by a cap 59.

To ensure accurate sliding movement of the plunger 51 the lower part thereof is grooved to engage and run over one or more ball bearings 60 arranged in openings in the housing. The ball bearings 60 also serve to counteract the thrust of the ball element 38 which is caused by movement from its position in the cut-away portion 52 to a position where it bears on the upper surface of the plunger 51.

As further protection against unauthorised tampering the trigger mechanism and the bearing 27 assembly may be enclosed in a casing 61 provided with a hinged front 62, for access, the hinged front may be held closed by a padlock 63.

The valve body 1 is also provided with ports 64 and 65, the port 64 being used for testing the alarm system in the wet state and the port 65 being used for testing the alarm system in the dry state.

In use the valve is connected between the water supply pipe and the sprinkler system and is adaptable for use when the sprinkler system is to be operated in a dry state or in a wet state.

In the dry state the clack 7 is in the position shown in FIGURE 1 where the seals 8 and 17 are in engagement with the seating 12 and the port 19 to close the valve opening 13 and the alarm port 21. The levers 22 and 24 are in a horizontal position where they hold the clack 7 in its closed position and the crank lever 25 is in a horizontal position where it engages the free end of the lever 24. The arm 35 of the bell crank lever 34, serving as a selector means, is in its vertical position where it is held by the ball element 38 which is supported on the upper surface of the plunger 51. The ball element is held in this position by the action of the air pressures in the sprinkler system which, as shown in FIGURE 4, acts on the diaphragm 46 to move the pressure plate 49 and the plunger 51 against the action of the spring 58. Movement of the plunger causes the ball element to move from its inoperative position, where it rests in the cut-away portion 52, to its operative position where it bears on the upper surface of the plunger 51.

In this position the valve is primed, it being understood that the sprinkler system is filled with pressurized air and the inlet 2 is open to the water supply pressure. In the event of the air pressure in the system being released, normally by the actuation of a sprinkler head, the plunger 51 will move to its original position under the action of the spring 58 and the ball element 38 will return to its position in the cut-away portion 52. This action will release the arm 35 and, under the action of the counterweight arm 36, will allow the bellcrank lever to rotate and thus cause rotation of the crank arm 25 which releases the lever 24. The water pressure in the inlet 2 will cause pivotal movement of the clack 7 and the levers 22 and 24 and move them into the positions shown in dot dash lines in FIGURE 1 and thereby allow water to pass into the sprinkler system. At the same time water will pass into the port 19 and will cause operation of the alarm system.

Contrary to normal practice the air pressure required to prime the system is not dependent upon the water supply pressure. Thus in the present invention the air pressure can be less than that of the water pressure and is calculated according to the strength of the spring 58.

In the wet state the valve holding levers 22 and 24 are maintained in the released position shown in dot dash lines in FIGURE 1 by means of the crank lever 25 engaging the projection 37 on the lever 22. The crank lever 25 is held in its operative position by the selector bell crank 34 in the same manner as that described with reference to the dry state except that pressure is applied to the diaphragm 49 by the water in the sprinkler system and not by air pressure. The clack 7 in this case remains, by virtue of its weight, in its closed position where it seals the port 19.

In the event of actuation of one of the sprinkler heads, the movement of the water through the valve will cause the clack 7 to pivot into the position shown in dot dash lines in FIGURE 1 and thereby allow water to pass into the port 19 to operate the alarm system.

Thus the invention provides a simple and efficient alarm valve which can be used in an alternate sprinkler system both in the wet and in the dry state. Furthermore the use of a single clack having two sealing faces, one for the valve opening and one for the alarm port, leads to easier repairs and maintenance since the sealing washer for the alarm port can be replaced without interfering with the main sealing washer.

A further advantage of the valve according to the invention is that when either air or water pressure is applied above the valve it cannot be changed from wet to dry or vice versa by external means.

We claim:

1. An alarm valve for alternate sprinkler systems, comprising a valve body having an inlet opening and an alarm port arranged in said inlet opening, a clack hingedly mounted within said body to effect closure of said inlet opening and said alarm port, a lever system operatively co-operating with said clack, and means operable externally of said body for holding said lever system in an operative position to engage said clack in the dry state of the system and for holding said lever system in an inoperative position to leave said clack free in the wet state of the system.

2. An alarm valve as claimed in claim 1, in which said clack is provided with two separate sealing washers, one for sealing said inlet opening and one for sealing said alarm port.

3. An alarm valve as claimed in claim 2, in which said washer for sealing said alarm port is mounted on a downwardly extending extension fixed in a central position on said clack and the seating for said washer consists of a vertically disposed port which is in communication with said alarm port.

4. An alarm valve as claimed in claim 3, in which said inlet opening is provided with a seating having an upwardly inclined pointed edge arranged in substantially the same plane as that of said clack sealing washer to effect knife edge contact with said clack sealing washer.

5. An alarm valve for alternate sprinkler systems,

comprising a valve body, an inlet opening, an outlet opening, an alarm port arranged in said inlet opening, a clack hingedly mounted within said body, said clack having two separate sealing faces the first of said sealing faces serving to effect closure of said inlet opening and the second of said sealing faces serving to effect closure of said alarm port, a lever system operatively co-operating with said clack, said lever system consisting of a first lever hingedly mounted on the side of said opening opposite that of the hinge of said clack and arranged to bear on said clack and a second lever hingedly mounted on a common pivot pin with said clack and arranged to bear on said first lever, and means operable externally of said body for holding said lever system in an operative position to engage said clack in the dry state of the system and for holding said lever system in an inoperative position to leave said clack free in the wet state of the system.

6. An alarm valve as claimed in claim 5, in which said means for holding said lever system in an operative or an inoperative position comprise a glandless bearing assembly including an annular seal of U-shaped cross section mounted in the wall of said body, a shaft extending through said bearing assembly, a crank arm mounted on one end of said shaft internally of said body, and a bell crank lever mounted on the other end of said shaft externally of said body.

7. An alarm valve as claimed in claim 6, including a trigger mechanism by which one arm of said bellcrank lever is normally held in a vertical position, the other arm of said bellcrank lever serving as a counterweight.

8. An alarm valve as claimed in claim 7, in which said trigger mechanism comprises a housing, a plunger element slidably mounted within said housing, a diaphragm for acting on said plunger element, and a ball element movable into and out of engagement with said vertically arranged arm of said bellcrank lever, said trigger mechanism also including a compression spring for urging said plunger into an operative position where said ball element is in engagement with said vertically arranged arm of said bellcrank lever.



9. A valve mechanism for controlling delivery of fluid to a sprinkler system and being optionally settable for operation in either dry pipe sprinkler systems or wet pipe sprinkler systems, said valve mechanism comprising a valve body having an inlet opening and an outlet opening and a valve seat between said openings; a valve element normally engaging said seat but being movable therefrom; releasable valve holding means engageable with said valve element for holding said valve element in engagement with said seat to condition said valve mechanism for dry pipe sprinkler system operation; trigger means responsive to a pressure change in the dry pipe sprinkler system for releasing said valve holding means; and selector means other than said trigger means settable for normally maintaining said valve holding means in released position for thereby conditioning said valve mechanism for wet pipe sprinkler system operation.

10. Valve mechanism according to claim 9 in which said releasable valve holding means comprises a lever engageable with said valve element, and in which said selector means comprises a first member movably mounted on said valve body exteriorly thereof; and a second member within said valve body, operatively connected to said first member and being movable by movement of said first member into engagement with said lever for maintaining the latter disengaged from said valve element.

11. Valve mechanism according to claim 10 in which said lever is engageable with said valve element at a substantially central portion thereof with respect to said seat whereby to hold said valve element on said seat with an evenly distributed pressure.

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