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DELUGE VALVE

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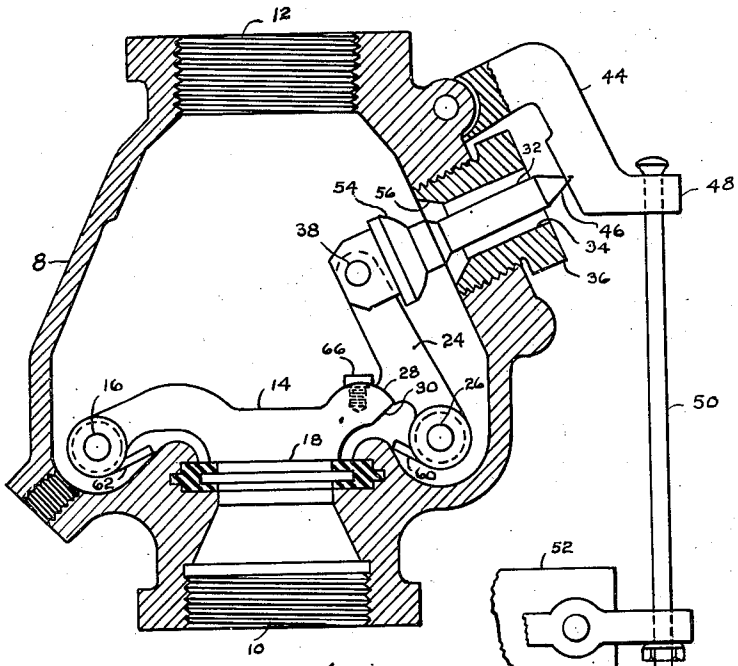


Fig. 1

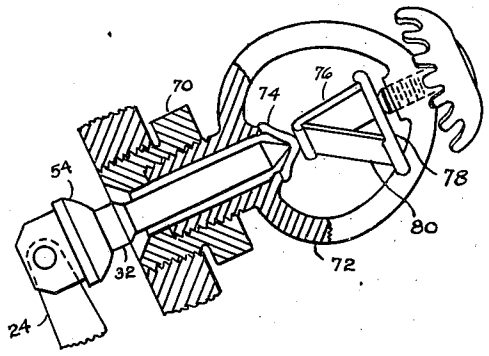


Fig. 2

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DELUGE VALVE

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1 Claim. (Cl. 169—19)

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The present invention relates to valves, and more particularly to so-called deluge valves for use in fire extinguishing systems. Such valves remain closed during stand-by operation of the system to prevent the admission of water from the supply main to the distributing pipes for one or more sprinkler heads, and are rapidly opened, generally by automatically operating means, upon the outbreak of fire so as to cause the system to go into immediate operation.

Because of the complexity and expense of the usual deluge valve, a relatively large number of sprinkler heads are generally supplied through a single deluge valve of large capacity. While this arrangement offers no serious objections when the conventional individually-fused sprinkler heads are used, the same arrangement is frequently not practical where open nozzle heads are employed, such as nozzles which discharge a fine mist of spray through a plurality of small apertures. Since it is generally not feasible to provide fusible link releasable closures or other individually responsive control devices for these fog or spray nozzles, all nozzles of the system necessarily discharge water when the deluge valve opens and the system goes into operation.

In order that nozzle heads of the fog or mist discharge type may be effectively utilized in installations employing automatically actuated means in control of system operation, the present invention has as an object the provision of a deluge valve of novel construction and arrangement, particularly adapted for the control of a relatively small number of nozzle heads so as to provide reliable automatic protection for hazards for which the spray or mist discharge is best suited.

More specifically, the invention is concerned with the provision of a deluge valve of simple and compact construction, adapted to provide rapid and dependable operation when used in conjunction with relatively simple, direct-acting release means.

According to one feature of the invention, the deluge valve is provided with non-locking clapper-holding means, the holding means instead being so arranged as to require the continued application of an external holding force in order to maintain the clapper closed against the water pressure of the supply. Removal of this holding force, therefore, by means responsive to outbreak of fire, allows the clapper under the influence of the water pressure to disengage itself immediately from its holding lever and to swing to fully open position. Through the use of this type of

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clapper-holding means, as distinguished from the positive latching type requiring the application of appreciable force, as by a falling weight, to dislodge the latch and release the clapper, a deluge valve capable of extremely rapid and reliable operation may be provided in a relatively simple construction.

As a further feature, the valve of the invention is provided with actuating connections extending through an opening in the valve body with substantial clearance between the parts, so as to avoid any possibility of jamming or sticking, said parts being so arranged, however, that after release of the holding means has been effected the opening in the valve body is automatically closed to avoid loss of water therethrough.

Still another feature of the invention concerns a construction and arrangement which permits the deluge valve to be directly controlled by a conventional sprinkler head, which may be directly associated with the deluge valve to control the release thereof upon melting of the fusible link of the sprinkler head. For installations where the deluge valve itself may be placed within the fire zone, such arrangement for direct control of the valve is highly advantageous.

The several features of the invention are illustrated in the accompanying drawings, in which Fig. 1 is a view of the valve in sectional elevation and Fig. 2 is a fragmentary view showing the assembly of the valve with a sprinkler head to provide direct-acting release means for the valve.

The valve in its preferred embodiment comprises a body 8 having an inlet 10 for connection to a supply main and an outlet 12 for connection to a distributing pipe for one or more nozzle heads, not shown. The valve is provided with a clapper 14 pivotally mounted at 16 for swinging movement within the valve body toward and away from the valve seat 18. This seat is preferably of resilient material such as a rubber or rubber-like material, and is of U-shaped cross-section in order that the water pressure itself may assist in providing tight sealing engagement between clapper and seat.

The clapper is held in closed position against the seat by a holding lever 24 pivotally mounted at one end within the body of the valve by a pin 26. Intermediate its ends, the holding lever is provided with a boss 28 adapted to engage a lug 30 forming a portion of the clapper body. In order that the release of the clapper may be effected in simple and reliable fashion with a minimum of external devices, the holding lever is so arranged relative to the clapper that a hold-

ing force on the lever is required to maintain the clapper in engagement with the seat against the force of the water pressure. To this end, the engaging faces of the boss and lug lie substantially in a plane which includes the lever pivot pin 26. Thus, there is no interlocking or self-locking engagement of the parts, as would be the case if the engaging faces were perpendicular to a line through the lever pivot and intersecting said faces.

A holding force is applied to lever 24 from outside the valve body by a holding member 32 extending with substantial clearance through an aperture 34 in a bushing 36 secured in the valve body. The inner end of the member is forked to embrace the upper end of lever 24, to which pivotal connection is made by a pin 38. At its outer end, the member 32 is engaged by a pivoted arm 44 having a recess to receive the pointed outer end 46 of the said member. The outer end 48 of the arm may be disposed at a suitable angle for connection by a tension link 50 which is normally under tension as a result of the water pressure on the clapper, but arranged to be released by conventional devices indicated generally at 52, responsive to the outbreak of fire within the zone or area covered by the nozzles connected to the valve.

In order to avoid loss of water from the valve as a result of the clearance provided between bushing 36 and member 32, the latter is provided with a valve 54 of resilient material such as rubber or a synthetic rubber, and the inner end of the plunger bushing 36 is beveled to provide a valve seat 56. As a result, upon release of holding force on the arm 44 and consequent opening of the clapper under the direct force of the water pressure thereon, the holding lever is moved out of engagement with the clapper and the holding member is displaced in a direction to bring the valve into engagement with the seat 56. To insure good sealing between the parts, the engaging surface of the valve 54 may be rounded to provide an approximately spherical contour, thereby permitting considerable variation in angular disposition of valve and seat without leakage.

To assist the valve in moving into sealing engagement with the bushing upon release of the holding force on arm 44, a spring 60 may advantageously be employed to urge the holding lever 24 away from the clapper. Likewise, a spring 62 is preferably arranged to urge the clapper into fully open position. The shock of impact of clapper on valve body at the limit of opening may be minimized by a pad 66 of resilient material secured to the clapper.

As an alternative to control by remotely disposed fire-detecting means, the deluge valve, by reason of its construction and mode of operation, is adapted to permit control by a conventional sprinkler head directly associated therewith. The sprinkler head is not used as a spray source after the clapper opens; it serves as the fire-detecting means and is arranged to provide a direct-acting release without special linkages or remotely-actuated connections. Such mode of use is particularly advantageous in installations where the deluge valve itself may conveniently be installed within the zone to be protected as in a transformer enclosure.

For such application, the bushing 36 may be replaced by a bushing 70 having internal threads to receive a conventional sprinkler head 72. The

parts are so arranged that when the head is in position, the point of the holding member 32 bears against the inner face of the sprinkler closure 74 which in turn is held in place by the usual system of levers 76 and 78 and fusible link 80. Accordingly, upon melting of the link as a result of fire, the holding system of the sprinkler falls away, permitting the member 32 to move outwardly through the bushing and allowing the clapper to fly open.

There has thus been disclosed a deluge valve of extremely simple and rugged construction, adapted for use with either remote or with directly associated fire detecting means, in either case the release of the valve clapper being effected without the application of a force to the valve parts. By utilizing the principle of valve release by removal of a holding force on the clapper, rather than by application of a releasing or unlatching force to a member positively locking the clapper in closed position, highly reliable operation may be provided with relatively simple installations.

I claim as my invention:

A quick release valve comprising a valve body having a valve seat, a pivotally mounted clapper movable into and out of engagement with said seat, a lever for releasably holding the clapper in closed position against fluid pressure, said lever being pivotally mounted within the valve body and having a surface adapted to overlie and engage the clapper when the lever is in holding position, said surface lying substantially in a plane that includes the pivotal axis of the lever to provide a non-self-locking engagement requiring the application of a holding force on the lever to maintain the clapper closed against fluid pressure, a holding member connected to the lever and extending through an open passage in the valve body to the exterior thereof, said passage being substantially larger than the holding member, means external to the valve body for releasably retaining the holding member against outward movement to cause the lever to maintain the clapper closed against fluid pressure, said external retaining means supporting the holding member substantially centered in the passage and out of contact with the valve body, a beveled valve seat surrounding the passage, and a valve carried by the holding member inwardly of the valve seat and complementary in shape to said seat to provide self-centering sealing engagement therewith upon release of the external retaining means and outward movement of the holding member.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
746,393	Shaw	Dec. 8, 1903
756,572	Bosworth	Apr. 5, 1904
761,701	Palmer	June 7, 1904
871,021	Allen et al.	Nov. 12, 1907
900,886	Rockwood	Oct. 3, 1908
1,614,002	Horton	Jan. 11, 1927
1,801,569	Phillips	Apr. 21, 1931
1,942,823	Lowe et al.	Jan. 9, 1934
2,342,589	Lewis	Feb. 22, 1944
2,366,520	Griffith	Jan. 2, 1945