May 10, 1949. L. M. LEWIS 2,469,831

DELUGE VALVE

Filed Feb. 7, 1945 2 Sheets-Sheet 1

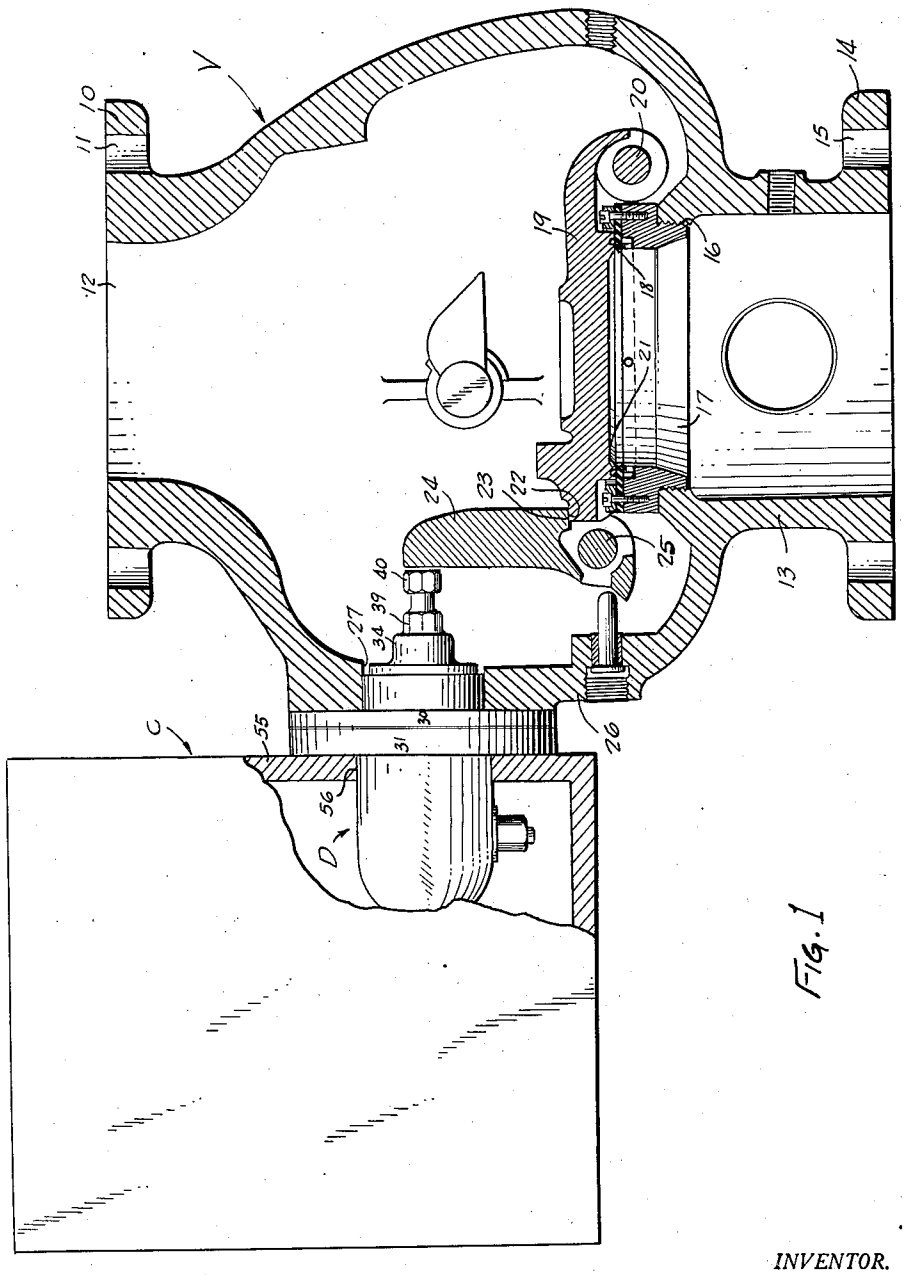

Fig. 1

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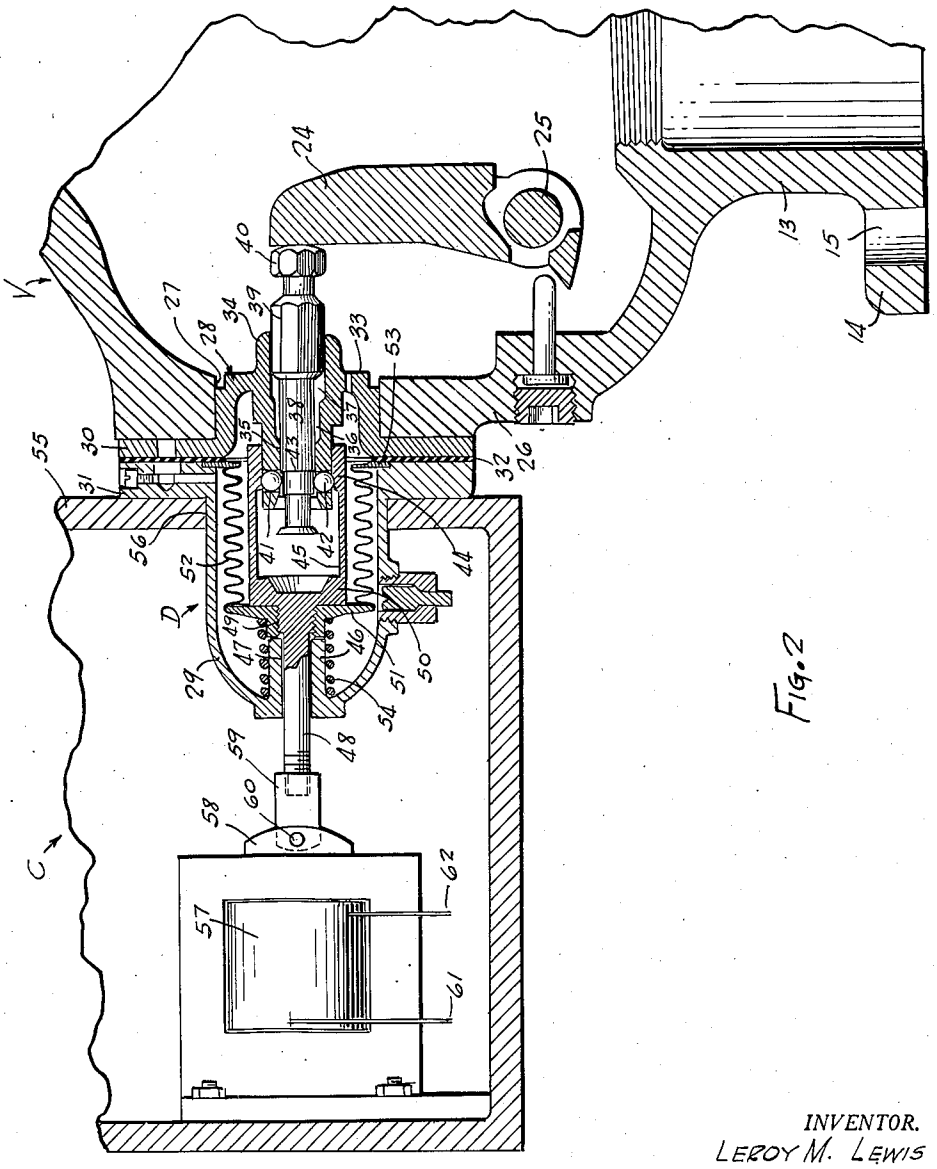

Fig. 2

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Patented May 10, 1949 2,469,831

UNITED STATES PATENT OFFICE

2,469,831

DELUGE VALVE

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Application February 7, 1945, Serial No. 576,663

3 Claims. (Cl. 169—19)

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This invention relates to valves and is concerned primarily with that type of valve employed in fire protective systems of the so-called "dry pipe" type, and which valve is generally known as a deluge valve.

At the present time, the use of "dry pipe" systems for fire protective purposes has become quite widespread. Dry pipe systems may be divided into two general classes. In one type, the pressure of air is maintained at a required level throughout the system including the casing of the deluge valve, and when this air pressure is reduced as by the opening of one of the spray nozzles, the deluge valve is opened and water is admitted therethrough to the system. The other type of dry pipe system is characterized by the use of an electrical circuit for controlling the opening of the deluge valve. It is this electrical dry pipe system with which this invention is directly concerned.

In the present day electrically controlled dry pipe systems, the conduits leading to the various spray nozzles are maintained dry and free from water. Appropriately located throughout the building or area which is to be protected are thermostats which usually take the form of a fixed temperature or rate of rise thermostat, now well known in this art. Such a thermostat is affected either by a predetermined rise of temperature, or the attainment of a fixed temperature to complete the circuit to the solenoid mechanism which controls the deluge valve. Thus, when the circuit is completed, the deluge valve is opened and water is admitted to the dry pipe system and is distributed through the various spray nozzles.

It is evident that these now known electrically controlled dry pipe systems are characterized by having the deluge valve opened upon the completion of the electrical circuit. It is equally evident that if there should be a power failure there is no current available to actuate the solenoid and open the deluge valve.

This invention is founded on the belief that in many instances it may be desirable to have the deluge valve open, not upon the completion of the electrical circuit, but rather upon failure or breaking of the electrical circuit. Accordingly this invention has in view as its foremost objective the provision of a deluge valve, together with associated instrumentalities which are electrically actuated to maintain the valve in closed position so long as the complete electrical circuit obtains, and which will open the valve upon failure of the electrical circuit.

In carrying out this idea in a practical embodiment, the conventional deluge valve, with casing

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and clapper gate, together with the dog for holding the clapper gate in closed position are employed. A detailed object is the provision, in association with such a deluge valve, of electrical energized means which cooperates with the dog to hold the clapper gate in closed position.

Yet another object of the invention is the provision of instrumentalities which upon deenergizing of the electrical means release the dog and permits the clapper to open upon the pressure of water from the source of supply.

Various other more detailed objects and advantages of the invention such as arise in connection with carrying out the above noted objects in a practical embodiment will in part become apparent, and in part be hereinafter stated as the description of the invention proceeds.

The invention, therefore, comprises a deluge valve including a clapper which is held in closed position by a dog. Associated with this dog is means which when electrically energized maintains the dog in valve closing position, but which when deenergized releases the dog to permit opening of the clapper.

For a full and more complete understanding of the invention, reference may be had to the following description and accompanying drawing wherein:

Fig. 1 is a side view partly in elevation but mostly in section of a deluge valve made in accordance with the precepts of this invention, and

Fig. 2 is a fragmentary enlarged detailed view of the instrumentalities for controlling the dog, which in turn governs the clapper.

Referring now to the drawings, wherein like reference characters denote corresponding parts, and first more particularly to Fig. 1, the deluge valve of this invention is shown as including a valve casing which is referred to in its entirety by the reference character V. The valve casing V preferably takes the form which is now considered as conventional in this field. It includes a flange 10 provided with openings 11, whereby a dry pipe system (not illustrated) may be connected to the casing V. This flange 10 surrounds an opening 12 through which water passes as it is admitted to the dry pipe system which is connected to the flange 10.

Substantially opposite to the opening 12, the casing V carries a short tubular section 13 which terminates in a flange 14 that is provided with openings 15 whereby it is adapted to be connected to a source of supply of water under pressure. At the inner end, the tubular section 13 terminates in an internally threaded ring 16 which is in-

tegral with the casing V. A valve seat ring 17 has an externally threaded portion complemental to the internally threaded ring 16, and the valve seat ring is screwed thereinto. The upper free face of this seat ring 17 carries a gasket 18.

A clapper or gate valve 19 is pivotally mounted as indicated at 20 within the casing V, and is formed with a valve surface on a ring portion 21 which is designed for sealing engagement with the gasket 18, when the clapper is in closed position.

At the side remote from the pivotal mounting 20, the clapper 19 is provided with a shoulder 22 which in closed position is engaged by complemental shoulder 23 on a dog 24 which is pivotally mounted within the valve casing V as indicated at 25. All of the structure above described is the conventional well known mechanism of a deluge valve proper.

The side of the casing V immediately adjacent to the dog 24 carries a flat portion 26 and this flat portion is formed with an opening 27. To this flattened portion 26 and extending into and through the opening 27 is the mechanism which either holds the dog 24 in the closed position illustrated, or releases it therefrom, thus permitting opening of the clapper 19.

This mechanism includes a diaphragm assembly which is referred to in its entirety by the reference character D, together with a control box and solenoid which are referred to generally by the reference character C.

The diaphragm assembly D includes a housing defined by the parts 28 and 29 that carry complemental flanges 30 and 31 which meet with a sealing element such as a gasket shown at 32 interposed therebetween. The housing part 28 is fitted into the opening 27 and carries an end wall 33 that is disposed substantially within the casing V. This end wall 33 in turn carries a tubular part 34 having a bore 35 and counter bores 36 and 37.

A locking pin 38 is slidably received in the bore 35 and carries an engagement 39 which is slidably received in the counter bore 37. This locking pin 38 also is provided with a head 40 which normally engages the dog 24 to hold the latter in closed position.

The tubular part 34 is formed with openings 41 in which are received retaining balls 42. These balls under certain conditions project into the bore 35 and engage a shoulder 43 on the locking pin 38. When the balls 42 so engage the shoulder 43, the locking pin 38 is held against the dog 24, thus holding the latter in clapper closing position.

A ball retainer 44 takes the form of a ring which snugly fits over the inner portion of the tubular part 34. This ring 44 is formed as an integral part of a cylindrical member 45 which has an internal diameter greater than the bore of the ball retainer 44. Thus, when the member 45, together with the ball retainer 44 are moved inwardly, speaking with reference to the valve casing, the increased diameter permits the balls 42 to be retracted from the shoulder 43, thus permitting outward movement of the locking pin 38 and release of the dog 24, which in turn releases the clapper 19.

The housing part 29 is formed with an inwardly extending stub 46 having a bore 47. A cylindrical link 48 is slidably received in the bore 47 and its inner end is enlarged and externally threaded as shown at 49, and further enlarged at 50 with the enlarged portion 50 integrally joined to the cylindrical member 45.

Threaded onto the enlarged part 49 is a cap member 51 and attached to the outer peripheral edge of this cap member 51 is a bellows diaphragm 52 which it will be noted is spaced from the cylindrical member 45. The inner end of the bellows 52 is secured to a ring 53 which in turn is anchored between the flanges 30 and 31. It will be noted that the member 28 is formed with an opening that communicates with the interior of the bellows 52, thus permitting expansion and contraction of the latter.

An expansion coil spring 54 is interposed between the cap 51 and inner end wall of the housing part 29 and functions to supplement the force and effect of the bellows diaphragm 52.

The control box C includes a side wall 55 formed with an opening 56 through which extends the housing part 29. The control box C also carries a solenoid 57 having a plunger 58 which is connected to a head 59 by a pin 60. The head 59 is in turn screwed onto the threaded free end of the link 48. Wires shown at 61 and 62 are connected to the solenoid 57 and extend to the electrical circuit of the dry pipe system.

While the operation of the above described mechanism is believed to be obvious, it may be briefly outlined by noting that under ordinary normal conditions, the electrical circuit including the various thermostats and the solenoid 57 is maintained complete, thus energizing the solenoid 57. This causes the plunger 58 to remain in a retracted position. This means that the link 48 is kept outwardly, speaking with reference to the housing part 29, thus compressing the spring 54 and distending the bellows 52. In this position, the ball retaining ring 44 is held immediately opposite to the balls 42, thus holding the latter against the shoulder 43. The balls 42 thereby hold the pin 38 against outward movement, speaking with reference to the valve casing V. This means that the head 40 is kept against the dog 24 whereby the shoulders 22 and 23 are kept in engagement and the clapper 19 thus held closed against the pressure of water in the conduit section 13.

Should a dangerous condition in the zone which is being protected by this fire protective system be created to actuate one of the thermostats, or should the power fail, the solenoid 57 will be deenergized, and this releases the plunger 58, which in turn releases the link 48. The bellows 52, together with the spring 54 will now move the cylindrical member 45 and ball retainer 44 inwardly, thereby permitting the bals 42 to fall free from the shoulder 43. The locking pin 38 is thus released and moves outwardly, speaking with reference to the valve casing V. This outward movement is caused by the pressure of water on the clapper 19, which is transmitted through the shoulders 22 and 23 to the dog 24, and head 40 to the link 38. Thus, the dog 24 is pivoted and disengages the shoulders 22 and 23 to permit the clapper 19 to open under the influence of water pressure. The water from the source of supply thus passes through the valve casing V to the opening 12, and thence to the dry pipe system which include the usual spray nozzles.

While a preferred specific embodiment of the invention is hereinbefore set forth, it is clearly understood that the invention is not to be limited to the exact construction illustrated and described, because various modifications of these details may be provided in putting the invention into practice within the purview of the appended claims.

What is claimed is:

1. In a deluge valve, including a valve casing, a clapper pivotally mounted within said casing, a dog pivotally mounted within said casing and operatively associated with said clapper, a locking pin extending through an opening in the wall of said casing, and having its inner end in operative engagement with said dog, a ball engaging said locking pin to hold said dog in clapper closing position, spring means normally tending to release said ball, and a solenoid normally overcoming said spring means to maintain said ball in effective engagement with said locking pin.

2. In a deluge valve of the character described, a casing, a clapper pivotally mounted in said casing, a dog pivotally mounted within said casing and normally engaging said clapper to hold said clapper in closed position, a diaphragm housing mounted in a wall of said casing, a locking pin slidable in said housing, said locking pin having a head engaging said dog and a shoulder within said housing, ball elements normally engaging said shouder to hold said locking pin in position in which it affects said dog to hold said dog in clapper closing position, a ball retainer normally engaging said ball elements to hold the latter within engagement of said shoulder, a diaphragm within said housing and operatively connected to said ball retainer, said diaphragm normally tending to move said ball retainer out of ball retaining position, and a solenoid which when energized overcomes said diaphragm and maintains

said ball retainer in position holding said balls against said shoulder.

3. A deluge valve including a valve casing, a clapper valve pivotally mounted within said casing, a locking dog pivotally mounted in said casing and operatively associated with said clapper valve, a locking pin extending through an opening within the wall of said casing and having its inner end in operative engagement with said dog, the outer end of said pin being formed with an annular shoulder, radially movable elements engaging said shoulder to hold said dog in clapper closing position, cam means retaining said elements in engagement with said shoulder, spring means normally tending to release said elements from said shoulder and a solenoid directly connected wtih said cam retaining means and normally overcoming said spring means so as to maintain said radialliy movable elements in effective engagement with said shoulder.

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