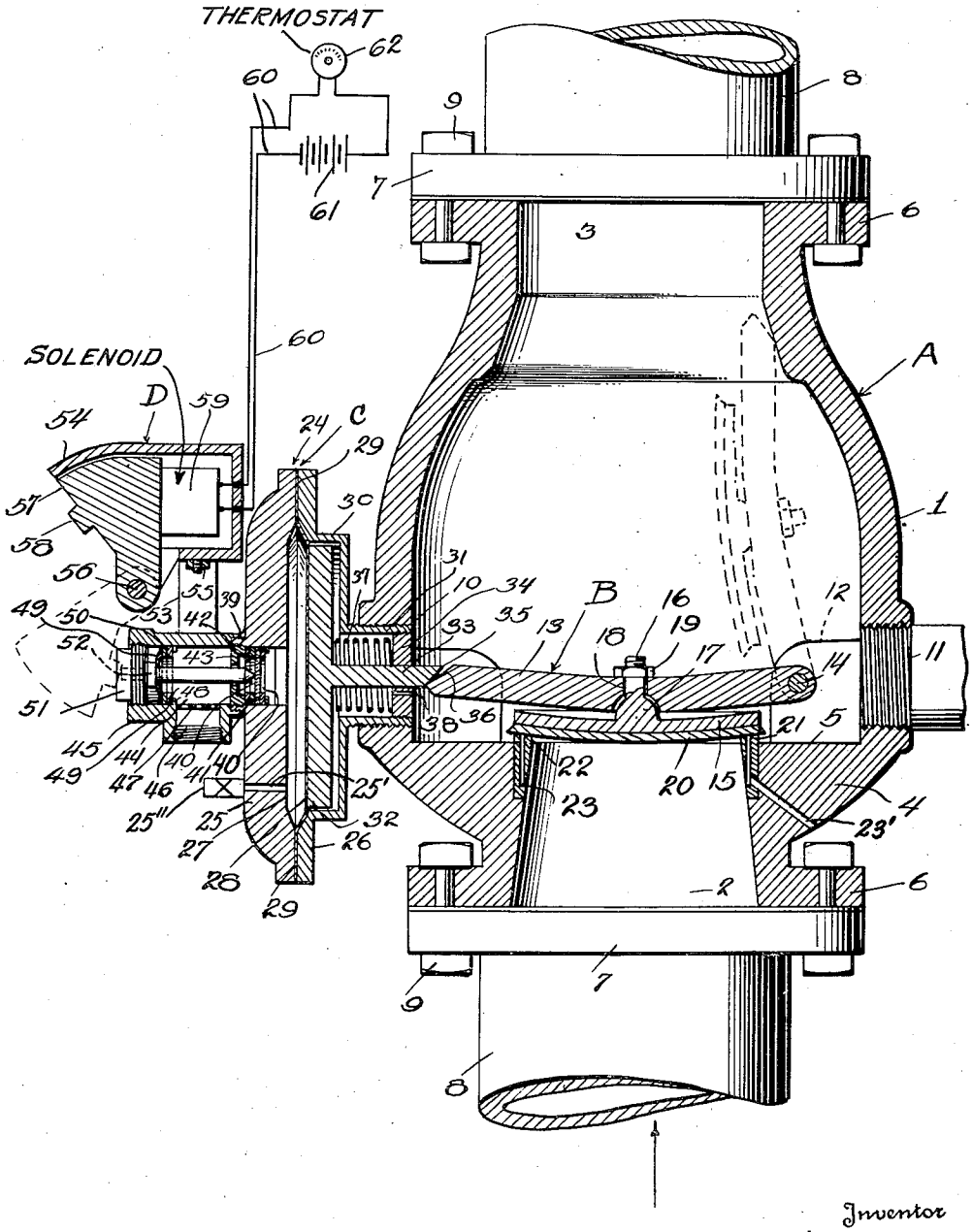
Oct. 9, 1934. C. W. HUTCHINSON 1,976,022

REMOTELY CONTROLLED DELUGE VALVE

Filed June 20, 1932



Inventor

Charles W. Hutchinson

By Shreve, Crowe & Gordon

Attorneys

Patented Oct. 9, 1934 1,976,022

UNITED STATES PATENT OFFICE

1,976,022

REMOTELY CONTROLLED DELUGE VALVE

Charles W. Hutchinson, Huntington, W. Va.

Application June 20, 1932, Serial No. 618,384

5 Claims. (Cl. 169—20)

Generically this invention relates to valves, but it more especially is directed to the thermostatically controlled type adapted for use in connection with automatic sprinkler systems and the like.

One of the principal objects of this invention is the provision of a straight-way deluge valve having remotely controlled means for maintaining the movable valve in closed position, said valve when released adapted to be instantly actuated by the fluid pressure to a position out of the path of the fluid flow, and whereby a straight-way deluge fluid flow through said valve is immediately effected.

Another important object of this invention is the provision of a deluge valve of this character having a longitudinal passage extending therethrough, a hinged valve member adapted to seat across and normally seal said passage, a releasable diaphragm mechanism coacting with said member to normally maintain the latter seated and releasable to permit said member to be instantly moved to open position and substantially beyond the path of the fluid and whereby capacity flow of said fluid through said passage is immediately effected.

A further important object of this invention is the provision of a valve structure formed with a straight-way passage therethrough, a valve member adapted to seat transverse of said passage and releasable thermostatic control diaphragm means coacting with one side of said member to maintain the same in seating position against the pressure from the opposite side, said valve member when released by said diaphragm mechanism being instantly removed by the fluid pressure beyond the path thereof and permitting uninterrupted passage of said fluid flow through said valve.

Another object of this invention is the provision of a valve structure having a straight-way fluid passage therethrough and a valve member hingedly connected adjacent one side of the passage adapted to seat across said passage, a plunger mechanism engageable with one side of said valve at its free end, a pressure controlled diaphragm coacting with the other end of said plunger, said latter pressure adapted to maintain the plunger in engagement with said valve member retaining the same seated against the fluid pressure, and thermostatic control means for destroying the pressure against the diaphragm causing disengagement of the plunger with said valve member and permitting its instant removal from said passage under the action of the fluid pressure, the pressure of said fluid flow maintaining the valve member in open position and the plunger mechanism in retracted position.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawing, in which like characters of reference indicate like parts throughout the figure, of which:

The figure is a vertical section through my improved valve assembly with pipe sections in fragmentary elevation.

The valve structures of this general nature with which I am familiar have proven unsatisfactory and deficient in many respects by reason of the restricted fluid flow therethrough and fluid pressure applied directly on top of the seat of the valve to maintain the same operatively seated against the normal fluid pressure on the opposite side, and for other reasons, and it was to overcome such deficiencies, and to provide a valve having a straight-way uninterrupted passage therethrough and a releasable diaphragm pressure controlled plunger mechanism coacting with the valve seat member to maintain the same in seating position against the normal fluid pressure on the opposite side, said valve member upon actuation of said plunger mechanism adapted to be instantly removed from said passage and permitting a deluge-like uninterrupted flow of fluid through said valve, that I designed the valve structure forming the subject matter of this invention.

In the illustrated embodiment characterizing this invention there is shown a valve A designated as a deluge valve, comprising in the present instance, a housing 1 formed with a bottom inlet opening 2 and a top outlet opening 3, the wall of 2 inclines slightly inwardly, said openings effecting a longitudinal or straightway fluid passage through said valve. The housing 1 is formed internally adjacent its lower end with a solid portion 4 forming a horizontal ledge 5, and externally with a lateral flange 6 adapted to engage the complemental flange 7 of a pipe section 8 by bolts 9. The upper end of housing 1 is formed with a similar flange 6 adapted to engage complemental flange 7 of a similar pipe section 8 by bolts 9. When so mounted valve A constitutes a continuation of pipe section 8 and is adapted to permit substantially the capacity volume fluid flow of said pipe 8 therethrough, as will hereinafter more fully appear. The housing 1 is formed adjacent ledge 5 with diametrically opposite threaded openings 10 and 11, respectively, for drain and other purposes as will directly appear. Adjacent each of said openings the housing is formed with a pair of laterally extending spaced ears 12.

Valve structure

In order to cut off and control the water or fluid flow from pipe 8 through inlet opening 2 a

valve or valve seat structure B is employed including a curved arm 13 hingedly mounted at one end between ears 12 on pin 14 suitably secured therein. A metal seat plate 15 of greater diameter than the opening 2 at its inner edge is mounted beneath arm 13 and formed at its center with an integral lug 16 having a ball-like enlarged base 17 and adapted to extend through a correspondingly shaped opening 18 formed in arm 13 to which it is firmly secured by lock nut 19. Suitably secured to the bottom face of plate 15 is a rubber seat member 20 of slightly larger diameter adapted to seat on the drain ring 21 suitably mounted in the countersunk cut out portion 22 formed in the wall of opening 2. The upper edge or seat 22 of said ring projects above the ledge 5 constituting a seat for member 20 and is formed with an annular drain 23 formed with a suitable outlet means 23' and so designed that should any fluid under pressure seep through seat 20 the same will waste away into the sewer or other open space and not continue through said seat 20 into the valve housing 1. While preferably I have shown opening 11 as adapted to be closed by a suitable threaded plug and the diaphragm or plunger structure C now to be described as mounted in opening 10, the latter may be mounted in opening 11 and valve structure B reversed as desired.

In order to exert pressure on and lock valve structure B in closed position against the fluid pressure exerted thereon in opening direction, a pressure controlled diaphragm plunger and pressure chamber structure C is employed, and which will now be described as follows:

Pressure controlled diaphragm structure

The structure C or differential pressure device includes a casing or housing 24 comprising complemental sections 25 and 26, respectively, and an intermediate sealed pressure chamber 27 in which a predetermined and suitable pressure is confined. An opening 25' is formed in section 25 in which is mounted a suitable check valve 25'' by means of which air is forced by any suitable means into said casing and against said diaphragm until the proper air pressure therein is obtained. Mounted in said chamber 27 is a diaphragm 28 constructed of rubber or other suitable material with its circumferential edge secured between the meeting edges of sections 25 and 26 as at 29. Housing section 26 is formed with a cylinder extension 30 terminating central thereof in a tubular hub-like extension 31 threadedly engageable in opening 10. Mounted in cylinder 30 in seating contact with diaphragm 28 is piston base 32 of plunger 33 adapted to extend centrally through tubular member 31 and similarly through the plunger guide disk 34 and terminates in cam face 35 adapted to engage the complemental face 36 formed on the upper edge of arm 13 to exert pressure on said arm and through structure B firmly seat and maintain member 20 in engagement with seat 22 of ring 21 as will be clear without further description.

As will hereafter more fully appear, when pressure is destroyed in chamber 27 the unequal pressure on the other side of diaphragm 28 will cause the same to move back with piston 32 and its plunger 33, disengaging the latter from arm 13, and to assist such movement a spring 37 is mounted on plunger 33 intermediate piston 32 and disk 34. Also a further force is applied to piston 32 in plunger retracting direction, when structure B is in open position, by fluid pressure admitted through small opening 38 formed in disk 34 and constituting a hydraulic plunger retaining or locking means.

Section 25 is formed with a tubular extension 39 in alignment with and of less diameter than the oppositely extending extension 31. Suitably mounted in extension 39 is a gasket 40 of rubber or any suitable material adapted to seal the pressure on the glass or other breakable member 41, and next to which is a similar gasket 40 and adjacent that a metal washer 42 and positioned adjacent thereto is a threadedly mounted metal perforated guide 43 for tightening gaskets 40 on glass 41 so that the same will hold the pressure applied thereto through by-pass 38, and for holding and guiding the free end of plunger pin 44, directly to be more particularly described.

The substantially cylindrical housing section 45 is supported adjacent section 25, threadedly mounted on extension 39 and is formed with right angular tubular outlet nipple 46, the wall portion at the base of the same being perforated as at 47 to catch the broken glass and constitute a pressure outlet for chamber 27 when glass 41 is pierced or broken by plunger 44 as and for a purpose hereinafter more fully appearing. Adjacent outlet 46 said member 45 is formed internally with a flange 48 against which is adapted to seat metal washer 49, next to which is placed rubber gasket 50, then a similar washer 49. A threadedly mounted lock nut structure 51 is adapted to engage the exposed washer 49, to lock said gasket and washers tight against the pressure when the same has been released at 41.

The plunger 44 is pointed at its inner end which slidably extends through guide 43, the opposite end extending through members 40, 41, 49, 50, and 51, the inner face of locknut 51 being cut out to permit limited movement of the boss 52 which prevents complete disengagement of said pin.

A standard 53 is formed on said tubular section 45 to support the thermostatic control housing and mechanism D, now to be described, or the same may be supported in any other desired manner.

Thermostatic control mechanism

The thermostatic control mechanism includes a housing 54 secured to standard 53 as at 55. Suitably mounted in said housing on pin 56 is a drop weight 57 formed with a hammer face 58 and which is normally held in raised and overbalanced position by a solenoid diagrammatically shown as at 59 connected by conductors 60 to a source of electric energy 61. As long as said solenoid is energized it will hold the weight as shown but will permit the same to fall when deenergized in any suitable manner, usually by the action of a temperature controlled mechanism or thermostat 62, also mounted in said circuit designated by conductors 60, for breaking the circuit.

Operation

While the operation of the device would seem to be clear from the above description, it might be well to further state briefly that so long as solenoid 59 is energized, weight 57 will be maintained in raised position, but upon deenergization of the same said weight will fall, face 58 striking pin 44 breaking glass 41 thereby releasing the pressure from chamber 27 which escapes through perforations 47 and outlet 46, the pressure on the other side of diaphragm 28 assisted by spring 37 causes the same with piston 32 to move back

disengaging plunger 33 from arm 13 which with valve seats 15 and 20 are instantly moved by the fluid pressure beneath said valve to open position permitting a deluge like fluid flow straightway through said valve, and at the same time the fluid pressure maintaining the valve structure B in the position shown in dotted outline and through opening 38 the piston and plunger structure in retracted position.

Conclusion

In conclusion, it is apparent that I have designed a novel remotely controlled deluge valve comprising few parts, simple in construction, manufacturable at a reasonable cost, and efficient for the purposes intended.

While preferably chamber 27 has been described as sealed under a predetermined pressure, it is to be understood that the pressure may be controlled in any suitable manner.

Although in practice I have found that the form of my invention illustrated in the accompanying drawing and referred to in the above description as the preferred embodiment is the most efficient and practical; yet realizing the conditions concurrent with the adoption of my invention will necessarily vary, I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described my invention, what I desire protected by Letters Patent is as set forth in the following claims:

1. A deluge valve for a water or fluid pipe line including inlet and outlet openings comprising a valve seat, a movable valve member engageable with said seat normally closing the inlet opening, a pressure device including a casing, a diaphragm mounted in and dividing said casing into an inferior pressure plunger chamber and a superior air pressure chamber, means for establishing a superior pressure in said superior pressure chamber, a piston plunger mounted in said inferior chamber coacting with said movable valve and normally held in valve closing engagement therewith by said diaphragm acted on by said superior air pressure, vent means communicating with said superior air chamber, a breakable closure sealing the vent, a plunger pin movable to break said closure and vent said chamber, means to disengage said plunger, and means for actuating said pin to closure breaking position.

2. A deluge valve for a water or fluid pipe line including inlet and outlet openings comprising a valve seat, a movable valve member engageable with said seat normally closing the inlet opening, a pressure device including a casing, a diaphragm mounted in and dividing said casing into an inferior pressure plunger chamber and a superior air pressure chamber, means for establishing a superior pressure in said superior pressure chamber, a piston plunger mounted in said inferior chamber coacting with said movable valve and normally held in valve closing engagement therewith by said diaphragm acted on by said superior air pressure, vent means communicating with said superior air chamber, a breakable closure sealing said vent, a plunger pin movable to break said closure and vent said chamber, means to disengage said plunger, a weight arranged to actuate said pin, and magnetic means for normally retaining said weight in elevated position, said weight being releasable upon deenergization of said magnetic means.

3. A deluge valve for a water or fluid pipe line including inlet and outlet openings comprising a valve seat, a movable valve member engageable with said seat normally closing the inlet opening, a pressure device including a casing, a diaphragm mounted in and dividing said casing into an inferior pressure plunger chamber and a superior air pressure chamber, means for establishing a superior pressure in said superior pressure chamber, a piston plunger mounted in said inferior chamber coacting with said movable valve and normally held in valve closing engagement therewith by said diaphragm acted on by said superior air pressure, vent means communicating with said superior air chamber, a breakable closure sealing said vent, a plunger pin movable to break said closure and vent said chamber, spring means to disengage said plunger from said movable valve, and means for actuating said pin to closure breaking position.

4. A deluge valve for a water or fluid pipe line including inlet and outlet openings comprising a valve seat, a movable valve member engageable with said seat normally closing the inlet opening, a pressure device including a casing formed with a tubular hub section, a plunger guide mounted in said hub section and formed with a fluid by-pass opening, a diaphragm mounted in and dividing said casing into an inferior pressure plunger chamber and a superior air pressure chamber, means for establishing a superior pressure in said superior pressure chamber, a piston plunger mounted in said inferior chamber movable through said guide coacting with said movable valve and normally held in valve closing engagement therewith by said diaphragm acted on by said superior air pressure, vent means communicating with said superior air chamber, a breakable closure sealing said vent, a plunger pin movable to break said closure and vent said chamber, means for actuating said pin to closure breaking position, means to disengage said plunger from said movable valve whereby said valve is moved to open position by the fluid pressure in said pipe line, said pressure cooperating with said plunger disengaging means to maintain the plunger in retracted position.

5. A deluge valve for a water or fluid pipe line including inlet and outlet openings comprising a valve seat, a movable valve member engageable with said seat normally closing the inlet opening, a pressure device including a casing, a diaphragm mounted in and dividing said casing into an inferior pressure plunger chamber and a superior air pressure chamber, means for establishing a superior pressure in said superior pressure chamber, a piston plunger mounted in said inferior chamber coacting with said movable valve and normally held in valve closing engagement therewith by said diaphragm acted on by said superior air pressure, vent means communicating with said superior air chamber, a breakable closure sealing the vent, a tubular housing connected to said casing in alignment with said vent, pin supporting guide means mounted in said housing, a plunger pin movable in said guide means to break said closure and vent said superior air pressure chamber, means to disengage said plunger from said movable valve, a weight arranged to actuate said pin, means for normally retaining said weight in elevated position, and temperature responsive means for controlling said retaining means to release said weight when subjected to a predetermined temperature.

CHARLES W. HUTCHINSON.