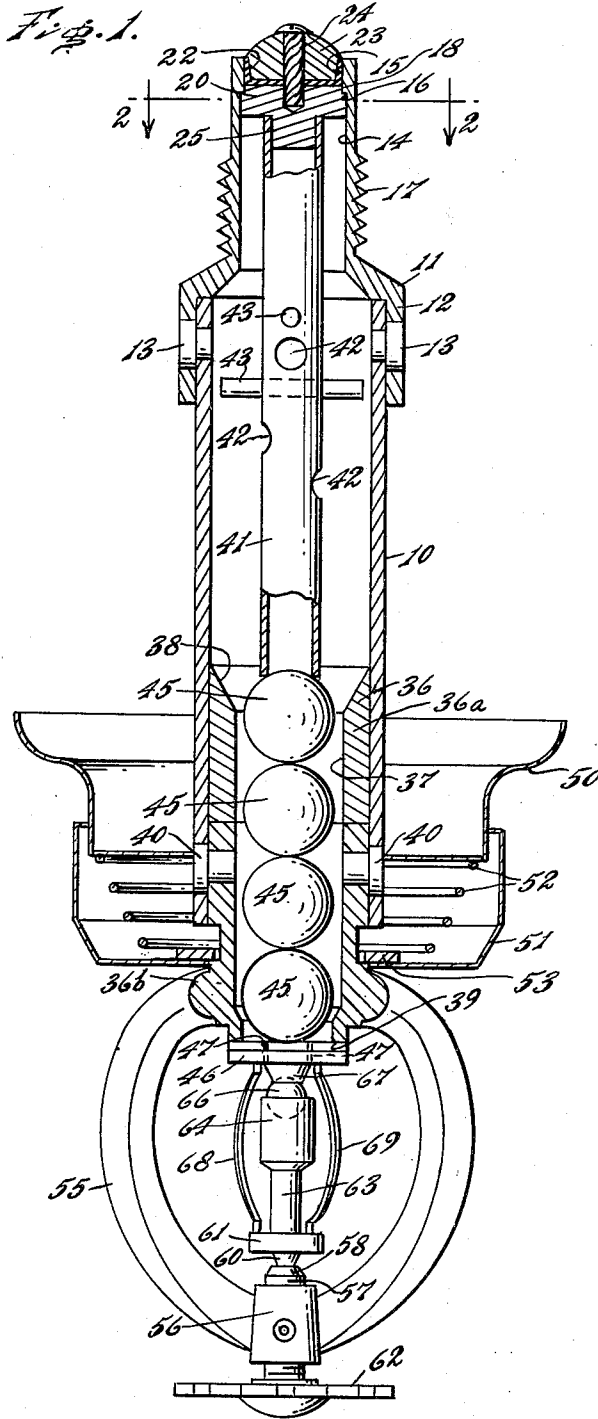
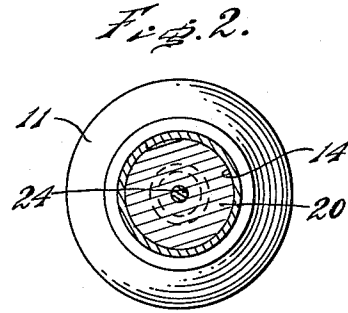
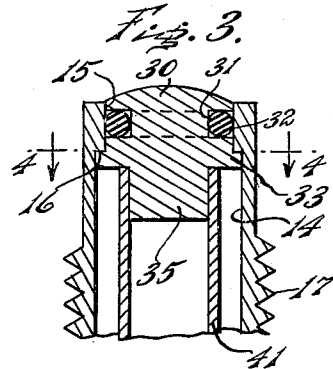
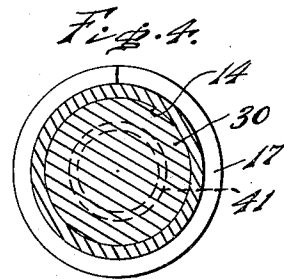


Nov. 7, 1961

F. A. GLOECKLER
 DRY PENDANT SPRINKLERS

3,007,528

Filed July 17, 1959



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1

3,007,528

DRY PENDANT SPRINKLERS

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Filed July 17, 1959, Ser. No. 827,783

10 Claims. (Cl. 169-41)

This invention relates to sprinklers and more particularly to sprinklers of the dry pendant type.

Various types of sprinkler systems have heretofore been proposed. The more common type of system is a wet type system wherein the liquid filling the system is subject to freezing.

In sprinkler systems installed in unheated areas and where temperatures, seasonal or imposed, are at low levels, provisions must be made to avoid freezing.

It is the principal object of the present invention to provide a dry pendant sprinkler suitable for use in unheated areas and the like, and in which the location of discharge can be separated to a considerable extent from the source of liquid under pressure.

It is a further object of the present invention to provide a sprinkler assembly having an automatic sprinkler component capable of complete and separate assembly, which can be assembled, set and tension tested as a separate entity and prior to installation in the system.

It is a further object of the present invention to provide an automatic sprinkler assembly of the dry pendant type which is independent of the assembly tension stress imposed in the sprinkler component.

It is a further object of the present invention to provide an automatic sprinkler component of the dry pendant type having an improved closure which is independent for tightness against leakage caused by upward stresses imposed during assembly.

It is a further object of the present invention to provide an automatic sprinkler component of the dry pendant type having an improved valve construction for isolating the fluid until the same is released for discharge.

It is a further object of the present invention to provide an automatic sprinkler component of the dry pendant type having suitable provisions for drainage of material tending to condense therein.

It is a further object of the present invention to provide an automatic sprinkler component of the dry pendant type having a valve for controlling the delivery of fire extinguishing fluid, in which a center support is provided for retaining the valve in closed position, but which is capable of release by temperature responsive components of known type.

It is a further object of the present invention to provide an automatic sprinkler component of the dry pendant type having a simple but effective center support assembly for controlling the release of fire extinguishing fluid, parts of the assembly being constructed and arranged to aid in the flow of the extinguishing fluid and to minimize any churning action or turbulence in the flow of the extinguishing fluid.

Other objects and advantageous features of the invention will be apparent from the description and claims.

The nature and characteristic features of the invention will be more readily understood from the following description, taken in connection with the accompanying drawings forming part thereof, in which:

FIGURE 1 is a vertical central sectional view of a preferred form of dry pendant sprinkler in accordance with the present invention;

FIG. 2 is a horizontal sectional view taken approximately on the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional view, enlarged, showing the details of construction of another preferred form

2

of valve employed in connection with the sprinkler component; and

FIG. 4 is a horizontal sectional view taken approximately on the line 4—4 of FIG. 3.

It should, of course, be understood that the description and drawings herein are illustrative merely, and that various modifications and changes can be made in the structure disclosed without departing from the spirit of the invention.

Like numerals refer to like parts throughout the several views.

Referring now more particularly to FIG. 1 of the drawings, a preferred form of dry pendant sprinkler is illustrated which includes a conductor tube 10 of any preferred material, such as brass or other material resistant to the corrosive action of the extinguishing fluid and to atmospheric exposure. The tube 10 at the upper end thereof is provided with an inlet nozzle 11 having a side wall portion 12 in close fitting engagement with the exterior wall of the tube 10 and held in fixed relation with respect thereto by a plurality of nozzle locking pins 13.

The inlet nozzle 11 has a valve therein, hereinafter more fully described, has a main bore 14 and has a bore 15 of reduced diameter with a limiting shoulder 16 at their meeting location.

The inlet nozzle 11 is externally threaded as at 17 for attachment to the extinguishing fluid supply. The nozzle 11 is placed at a location free from tendency to freezing.

One form of valve is shown in FIGS. 1 and 2 and includes a piston 20 which is slidably mounted in the bore 14 and has a portion 18 of reduced diameter extending into the bore 15. The piston 20 has a packing ring 22, of cup shape, mounted thereon, slidable in the bore 15, and held in position by a plug 23 with which a threaded fastener 24 is in engagement. The piston 20 opposite the packing ring 22 has a boss 25 extending therefrom.

Another form of valve is shown in FIGS. 3 and 4 and includes a piston 30 having a circumferential recess 31 for the reception of a sealing member 32, such as an O-ring of any preferred material, silicone rubber being particularly suitable.

The piston 30 has an enlarged flange 33 engageable against the shoulder 16 for limiting the upward movement of the piston 30. The flange 33 has a boss 35 extending therefrom.

Within the tube 10 a sprinkler bushing 36 is provided having upper and lower sections 36a and 36b. The bushing 36 has an interior bore 37 with a frusto-conical inlet 38 at the upper end and an end seat 39. The bushing 36 is held in engagement with the tube 10 by a plurality of pins 40 extending through the tube 10 and into engagement with the bushing 36.

Within the interior of the tube 10, a support pipe 41 is provided in engagement with the boss 25 as shown in FIGS. 1 and 2, or with the boss 35 as shown in FIG. 4.

The support pipe 41 is provided with a plurality of openings 42 in communication with the interior thereof and with one or more transverse stop and guide bars 43 for preventing tilting thereof and for limiting the downward movement thereof.

Within the interior of the bushing 36 a plurality of spacer balls 45 are provided, the uppermost of which is in engagement with the lower end of the support pipe 41 and the lowermost of which is in engagement with a sprinkler valve plug 46 in the form of a plate or disc engaging the end seat 39 of the bushing 36. The valve plug 46 can be provided with one or more vent holes 47 for the discharge of any condensate or other liquid tending to collect in the interior of the tube 10.

Escutcheons, preferably of telescoping type, may be provided, and including a base 50 which is adapted to

engage directly with the ceiling at the location at which the sprinkler is installed.

An escutcheon cup 51 can be provided in telescoping relation to the base 50 with a resilient member 52, such as a coil spring, in engagement with the base 50 and with a stop washer 53 which also centers the escutcheon cup 51 on the bushing 36.

The temperature responsive element of the sprinkler can be of any desired type, one suitable construction being that shown in U.S. Letters Patent No. 2,664,956. This construction includes a frame 55 integral with the lower bushing section 36b and having a boss 56 through which a threaded adjusting stem 57 extends. The stem 57 has an end socket 58 for engagement by a rounded projection 60 on a supporting disc 61.

The stem 57 has a distributing plate 62 secured thereto which also serves for turning the stem 57 upon assembly.

The disc 61 has an excess temperature responsive strut 63 mounted thereon with a socket 64 within which low melting point material (not shown) is provided and with which a ball 66 is in engagement. The ball 66 is also in engagement with a socket 67 on the lower end of the valve plug 46.

Interposed between the valve plug 46 and the supporting disc 61 a pair of bowed struts 68 and 69 are provided in compression and in unsymmetrical relation with respect to the central axis of the strut 64. The compression of the central strut 63 and of the bowed struts 68 and 69 is determined by the adjustment of the stem 57 in a conventional manner.

The mode of operation will now be pointed out.

The sprinkler temperature responsive element and the adjustment thereof is independent of the support of the piston 25 or 35 because of the abutment of the valve plug 46 against the end seat 39. Similarly, also, by reason of the engagement of the piston 25 or 35 with the shoulder 16, the adjustment of the position of the valve piston 25 or 35 as determined by the support pipe 41 and the balls 45 is also not affected by the adjustment of the temperature responsive element of the sprinkler.

Upon fusing of the low melting point material in the socket 64 brought about by excessive temperature in the vicinity of the strut 63, the support furnished by the center strut 63 is removed. The unsymmetrical bowed struts 68 and 69 tend to exert a force for displacing the strut 63 and the struts 68 and 69 so that the valve plug 46 is disengaged from the end seat 39. The displacement or collapse of these portions of the structure and the removal of the plug 46 permits the balls 45 to fall out of the interior of the bushing 36. The support tube 41 moves downwardly urged by the fluid pressure on the end of the piston 25 or 35. The tube 41 moves to a position with the lowermost of the guide bars 43 in engagement with the abutment provided by the upper end of the bushing portion 36a. Fluid delivery is thus available from the supply to the inlet nozzle 11 through the bore 15 to the interior of the bore 14 and thence to the interior of the tube 10. A portion of the fluid may also enter the support pipe 41 through the openings 42, thereby tending to reduce turbulence. Fluid delivered to the interior of the tube 10 is thus discharged downwardly through the bushing 36 and upon striking the distributing plate 62 is sprayed and sprinkled over a substantial area in the manner customary with sprinklers.

It will be noted that the piston 25 or 35 when in position in engagement with the shoulder 16 provides a fluid tight joint preventing leakage and that this is independent of the stresses required in the temperature responsive element for the setting thereof.

It will also be noted that the vents 47 permit the discharge of any condensate in or leakage into the pipe 10. Any tendency to freeze of entrapped liquid which might subsequently interfere with the operation of the sprinkler is avoided. At the same time the fluid to be dispensed for

sprinkling is adequately sealed against undesired discharge by the piston 25 or 35.

I claim:

1. A sprinkler having a tubular member for connection to a supply of fluid, said tubular member having an abutment at the upper end thereof, a closure member in abutting relation to the lower end of said tubular member for closing the lower end thereof, a temperature responsive element for retaining said closure member in position, said tubular member having an interior cylindrical wall portion, a valve member in the upper end of said tubular member having a cylindrical piston with a portion in engagement with said abutment for limiting the upper movement thereof, said piston having an end face exposed to the pressure of the fluid from said supply and having a peripheral portion in engagement with said wall portion sealing the upper end of said tubular member against access of fluid from said supply and being movable downwardly through said tubular member, and members in said tubular member interposed between said piston and said closure member and retained in supporting relation with respect to said piston by said closure member.

2. A sprinkler having a tubular member for connection to a supply of fluid, said tubular member having an interior shoulder at the upper end thereof, a closure member in abutting relation to the lower end of said tubular member for closing the lower end thereof, a temperature responsive element for normally retaining said closure member in position, said tubular member having an interior cylindrical wall portion, a valve member in the upper end of said tubular member including a cylindrical piston having a portion in engagement with said shoulder for limiting the upper movement thereof, said piston having an end face exposed to the pressure of the fluid from said supply and having a peripheral sealing member in engagement with said wall portion of said tubular member sealing the upper end of said tubular member against access of fluid from said supply and being movable downwardly through said tubular member, and members interposed between said piston and said closure member and normally retained in supporting relation with respect to said piston by said closure member.

3. A sprinkler as defined in claim 2 in which said closure member has a vent opening therethrough.

4. A dry pendant sprinkler comprising a conductor tube, an inlet member for connection to a supply of fluid secured to said tube at the upper end thereof, said inlet member having an interior cylindrical bore, a bushing member extending upwardly within said conductor tube from the lower end thereof, said bushing member having an interior bore of lesser diameter than the diameter of the said conductor tube, said bushing member having a seat at the lower end thereof, a temperature responsive element carried by said bushing member, said temperature responsive element including a closure member for engagement with said seat for closing the lower end of said bushing member and a temperature sensitive device for normally retaining said closure member in seated position on said seat but separable with respect thereto upon the occurrence of excessive temperature, a cylindrical piston slidably mounted in said inlet member and having a peripheral sealing portion in slidable engagement with said bore, and supporting devices in said conductor tube and said bushing member interposed between said piston and said closure member, said piston being movable downwardly to permit fluid flow into said conductor tube.

5. A dry pendant sprinkler comprising a conductor tube, an inlet member for connection to a supply of fluid secured to said tube at the upper end thereof, said inlet member having an interior cylindrical bore, a bushing member extending upwardly within said conductor tube from the lower end thereof, said bushing member having an interior bore of lesser diameter than the diameter of

5

the said conductor tube, said bushing member having a seat at the lower end thereof, a temperature responsive element carried by said bushing member, said temperature responsive element including a closure member for engagement with said seat for closing the lower end of said bushing member and a fusible device for normally retaining said closure member in seated position on said seat but separable with respect thereto upon the occurrence of excessive temperature, a cylindrical piston slidably mounted in said inlet member and having a peripheral sealing portion in slidable engagement with said cylindrical bore, and supporting devices interposed between said piston and said closure member including a supporting tube secured to said piston and a plurality of balls in axial alignment with said supporting tube, said balls being disposed in said bushing, the uppermost ball being in engagement with the supporting tube and the lowermost ball being in engagement with said closure member, said piston being movable downwardly to permit fluid flow into said conductor tube.

6. A dry pendant sprinkler comprising a conductor tube, an inlet member for connection to a supply of fluid secured to said tube at the upper end thereof, said inlet member having an interior bore and a cylindrical end bore of reduced diameter, a bushing member extending upwardly within said conductor tube from the lower end thereof, said bushing member having an interior bore of lesser diameter than the diameter of the said conductor tube, said bushing member having a seat at the lower end thereof, a temperature responsive element carried by said bushing member, said temperature responsive element including a closure member for engagement with said seat for closing the lower end of said bushing member and a fusible device for normally retaining said closure in seated position on said seat but separable with respect thereto upon the occurrence of excessive temperature, a cylindrical piston slidably mounted in said inlet member and having a portion in slidable engagement with said bore and a portion in slidable engagement with said end bore, the portion in slidable engagement with the end bore having a peripherally disposed packing portion in sealing engagement with the end bore, and supporting devices interposed between said piston and said closure member, said piston being movable downwardly to permit fluid flow into said conductor tube, and stop members limiting the downward movement of said piston.

7. A dry pendant sprinkler comprising a conductor tube, an inlet member for connection to a supply of fluid secured to said tube at the upper end thereof, said inlet member having an interior cylindrical bore, a bushing member extending upwardly within said conductor tube from the lower end thereof, said bushing having an interior bore of lesser diameter than the diameter of said conductor tube, said bushing having a seat at the lower end thereof, a temperature responsive element carried by said bushing, said temperature responsive element including a closure member for engagement with said seat for closing the lower end of said bushing and a fusible device for normally retaining said closure in seated position on said seat but separable with respect thereto upon the occurrence of excessive temperature, a piston slidably mounted in said inlet member and having a sealing portion in slidable engagement with said cylindrical bore, and supporting devices interposed between said piston and said closure member including a supporting tube secured

6

to said piston and having openings for establishing communication between the interior of said conductor tube and the interior of said supporting tube, said piston being movable downwardly to permit fluid flow into said conductor tube for discharge.

8. A dry pendant sprinkler comprising a conductor tube, an inlet member for connection to a supply of fluid secured to said tube at the upper end thereof, said inlet member having an interior bore and a cylindrical end bore of reduced diameter, a bushing member extending upwardly within said conductor tube from the lower end thereof, said bushing member having an interior bore of lesser diameter than the diameter of the said conductor tube, said bushing member having a seat at the lower end thereof, a temperature responsive element carried by said bushing, said temperature responsive element including a closure member for engagement with said seat for closing the lower end of said bushing and a fusible device for normally retaining said closure in seated position on said seat but separable with respect thereto upon the occurrence of excessive temperature, a piston slidably mounted in said inlet member and having a portion in slidable engagement with said bore and a portion in slidable engagement with said end bore, the portion in slidable engagement with the end bore having a peripheral packing portion in sealing engagement with the end bore, supporting devices interposed between said piston and said closure member including a supporting tube secured to said piston and a plurality of balls in axial alignment with said supporting tube, said supporting tube having openings therethrough for establishing communication between the interior of said conductor tube and the interior of said supporting tube, said balls being disposed in said bushing, the uppermost ball being in engagement with the supporting tube and the lowermost ball being in engagement with said closure member, said piston being movable downwardly to permit fluid flow into said conductor tube, and stop members carried by said supporting tube for engagement with the upper end of the bushing for limiting the downward movement of said supporting tube.

9. A sprinkler having a tubular member with one end thereof for connection to a supply of fluid, a closure member for closing the other end thereof, a temperature responsive element for retaining said closure member in position, said tubular member having at said one end thereof an interior cylindrical wall portion, a valve member including a cylindrical piston having an end face exposed to the pressure of the fluid from said supply and having a peripheral portion in engagement with said wall portion sealing said end against access of fluid from said supply and being movable downwardly through said tubular member, and an actuating connection between said closure member and said valve member for applying an upward force on the piston in opposition to the force on said end face and controlling downward movement of the piston.

10. A sprinkler as defined in claim 9 in which said closure member has a vent opening therethrough.

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