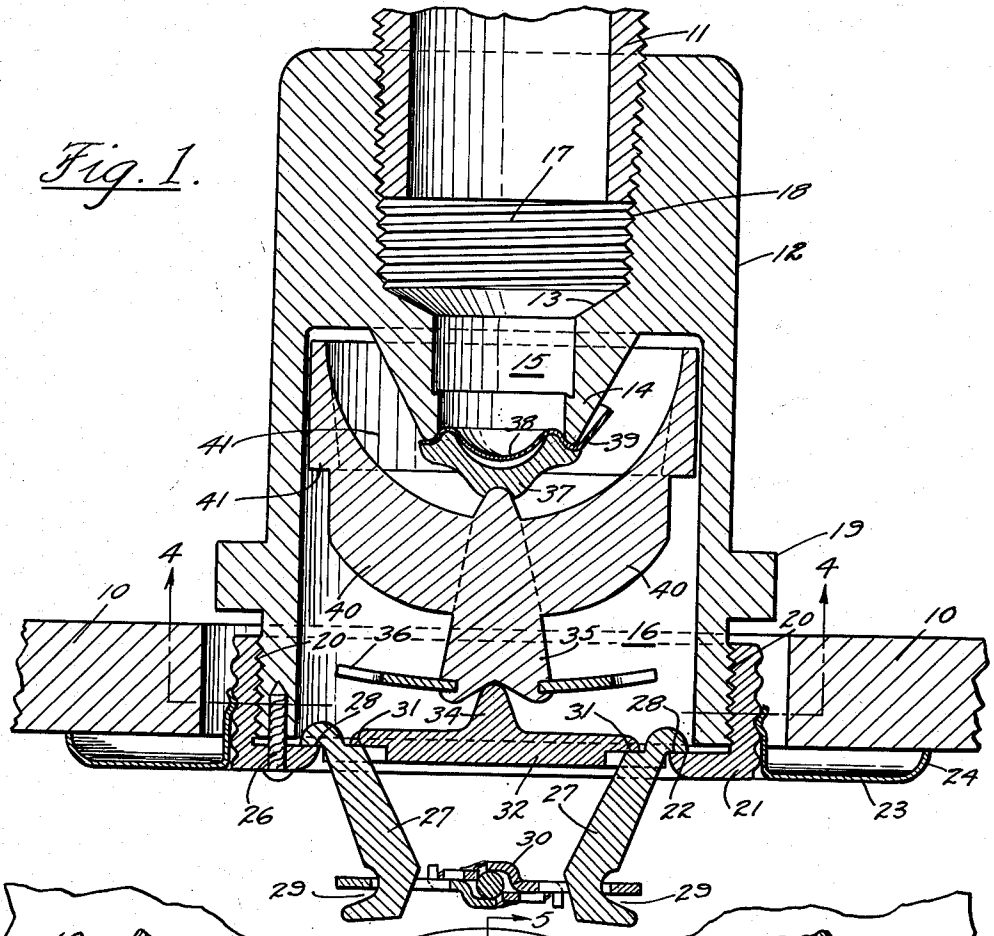
April 8, 1952 H. N. RIDER 2,591,872

AUTOMATIC SPRINKLER

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Fig. 1.



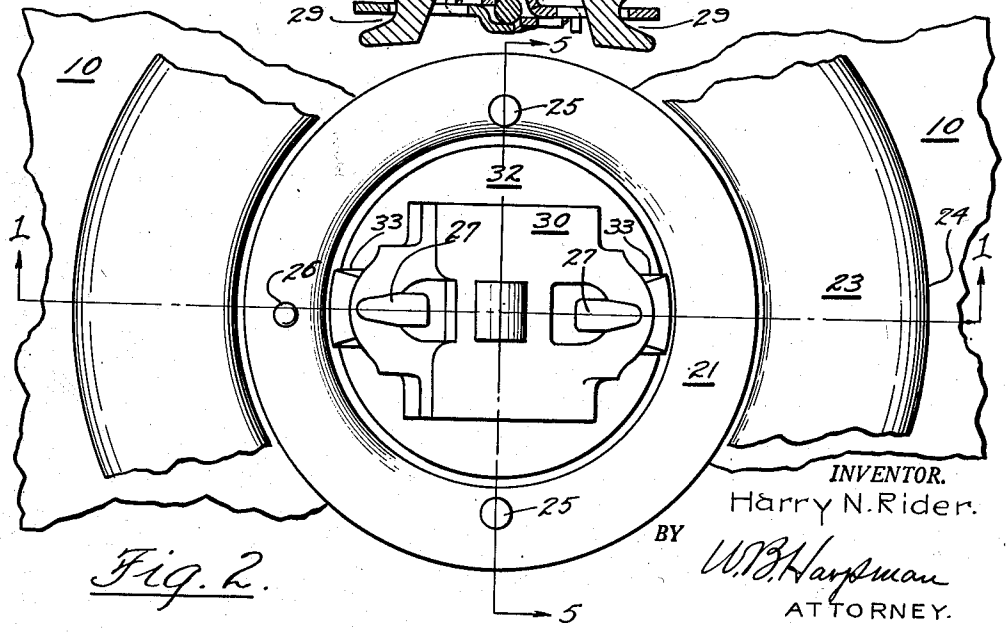


Fig. 2.

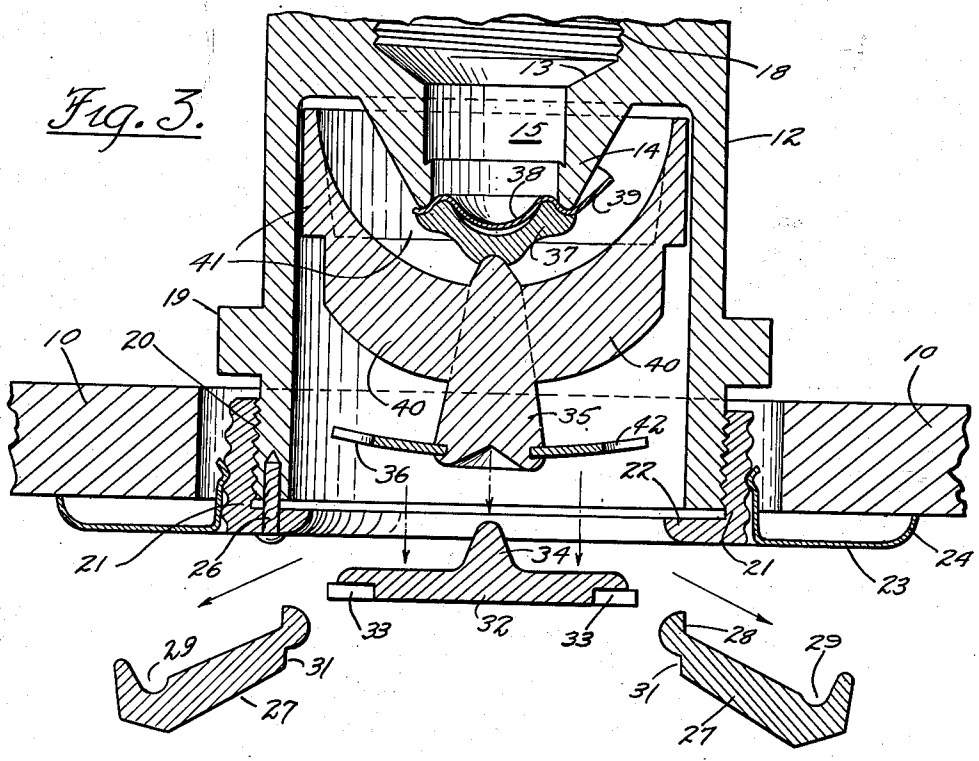
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April 8, 1952 H. N. RIDER 2,591,872

AUTOMATIC SPRINKLER

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Fig. 3.



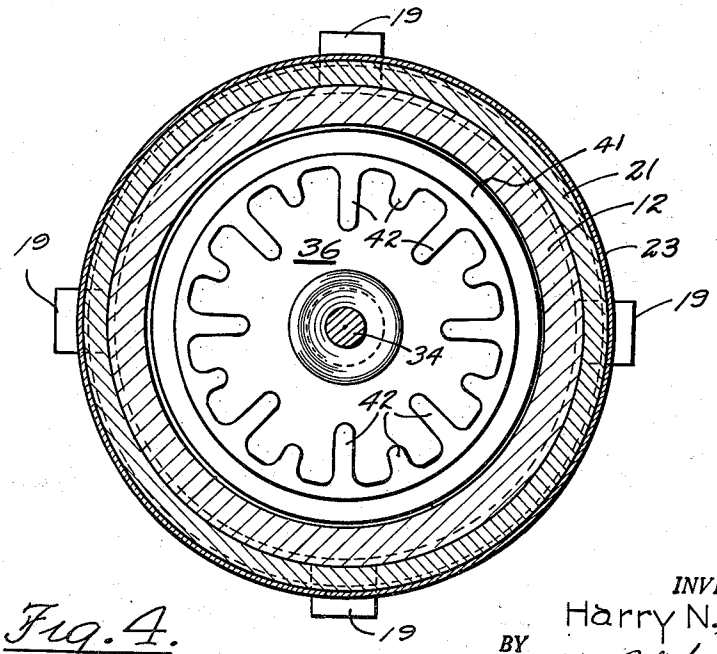


Fig. 4.

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Fig. 5.

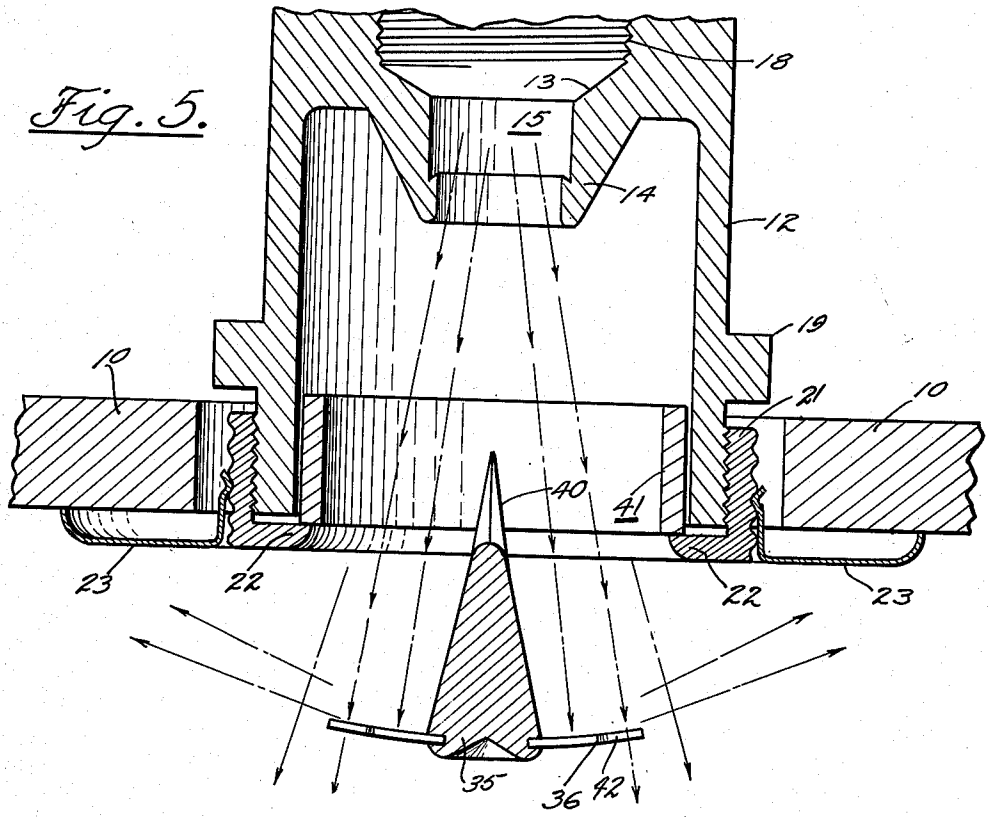


Fig. 7.

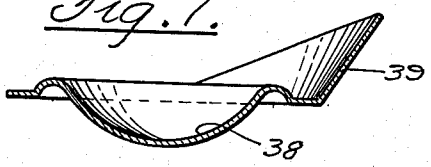


Fig. 6.

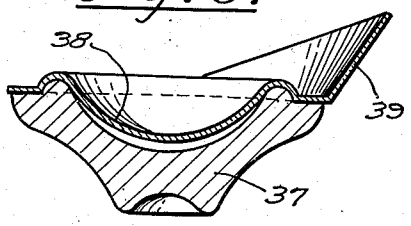
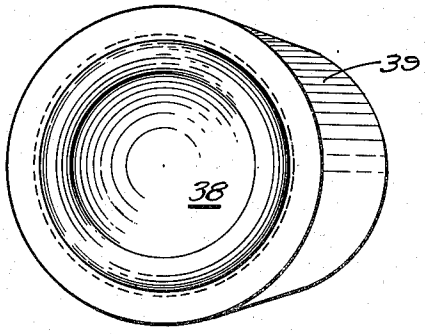


Fig. 8.



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2,591,872

UNITED STATES PATENT OFFICE

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AUTOMATIC SPRINKLER

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Application February 10, 1951, Serial No. 210,327

7 Claims. (Cl. 169—40)

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This invention relates to an improved form of automatic sprinkler and more particularly to an automatic sprinkler for fire extinguishing systems having distributing pipes located above the ceiling of an enclosure to be protected, the improved sprinkler being connected to such pipes through the ceiling and the majority of the sprinkler being concealed in the ceiling.

The principal object of the invention is the provision of an improved automatic sprinkler which may be substantially concealed above the surface of a ceiling and operable in the same manner as an automatic sprinkler in completely exposed position beneath a ceiling.

A further object of the invention is the provision of an automatic sprinkler all of the parts of which, with the exception of the fusible element, are self-contained and therefore capable of being mounted in flush position with a ceiling whereby the sprinkler is rendered inconspicuous.

A still further object of the invention is the provision of an automatic sprinkler of the concealed or flush type which may be efficiently mass produced, easily installed and which will meet the requirements of the Underwriters' Laboratories.

The improved form of automatic sprinkler disclosed herein has become increasingly popular due to the desire of various business establishments and the like to provide their premises with efficient automatic sprinkler systems and at the same time avoid the usual open distributing piping and automatic sprinklers positioned at intervals thereon. The current tendency in the reconstruction of various business places, new buildings and the like is to provide a distributing piping of the automatic sprinkler system in concealed position above the visible ceiling and to provide sprinklers spaced in the usual manner in depending position beneath the ceiling, each of the sprinklers being in communication with the distributing piping.

Several types of dependent automatic sprinklers have been utilized most of which resemble the ordinary form of automatic sprinkler in that the frame of the sprinkler, the fusible element and the water deflecting portions thereof are positioned in dependent relation to the ceiling surface and are therefore readily visible.

The present invention relates to an automatic sprinkler possessing the desirable operating characteristics of an ordinary sprinkler of either the upright or dependent type but so formed that it may be almost completely hidden in the ceiling with only the fusible element and levers holding

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the same projecting below the ceiling. The sprinkler is therefore rendered most inconspicuous and meets the requirements above mentioned.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is an elevation in vertical section showing the improved automatic sprinkler installed in relation to a ceiling.

Figure 2 is a bottom view with parts broken away of the sprinkler shown in Figure 1.

Figure 3 is an elevation in cross section showing the automatic sprinkler in operating condition.

Figure 4 is a horizontal section taken on line 4—4 of Figure 1.

Figure 5 is an elevation in cross section showing the automatic sprinkler in fully open water discharging position and turned 90 degrees with respect to the elevation of Figure 1.

Figure 6 is a plan view of the valve and cap assembly shown in Figures 1, 3 and 5 of the drawings.

Figure 7 is a vertical section of the cap shown in Figure 6.

Figure 8 is a top plan view of the cap shown in Figures 6 and 7 of the drawings.

By referring to the drawings and Figures 1 and 2 in particular it will be seen that an improved automatic sprinkler has been disclosed which is illustrated as being mounted in an opening in a ceiling 10 and in communication with a distributing pipe 11 of an automatic sprinkler system. The improved automatic sprinkler comprises a cylindrical body member 12 having a partition 13 formed inwardly from its ends, the lower surface of the partition 13 having a depending annular valve seat 14 integrally formed therewith. The center section of the partition 13 is cut away to form an opening 15 of substantially the same area as that defined by the depending annular valve seat 14 and in vertical alignment therewith.

The area within the cylindrical body member 12 and beneath the partition 13 forms a chamber 16 and the area above the partition 13 forms a smaller chamber 17 which is internally thread-

ed as at 18 so that the sprinkler may be secured thereby to the distributing piping 11 of the automatic sprinkler system which is not otherwise shown. The exterior of the cylindrical body member 12 is provided with a plurality of circumferentially spaced lugs 19 to facilitate the application thereof to the distributing piping 11. The lowermost portion of the exterior of the cylindrical body member 12 is threaded as at 20 to receive an adjusting ring 21 which is L-shaped in cross section, a horizontal portion of which extends inwardly of the cylindrical body member 12 and forms an annular shoulder 22.

The exterior of the ring 21 is threaded and is adapted to receive a circular flange 23, the peripheral edge of which is upturned as at 24 and which forms a closure with respect to the ceiling 10. Several circumferentially spaced openings 25 are provided in the ring 21 so that it may be rotated to adjust it vertically with respect to the cylindrical body 12 of the automatic sprinkler and one of the openings 25 is adapted to receive a pin 26 as shown in Figure 1 of the drawings which locks the ring 21 in adjusted position on the cylindrical body member 12 as will be hereinafter described. The ring 21 and more particularly the shoulder 22 thereon provides means for engaging a pair of oppositely disposed levers 27—27 on the automatic sprinkler. The uppermost ends of the levers 27—27 have outwardly extending flattened surfaces or bills 28—28. The levers 27—27 are provided with notches 29—29 on their opposite lower sides for engagement with a two-part fusible element 30 as known in the art.

The fusible element 30 includes a pair of flat body members secured to one another by fusible solder capable of fusing and permitting the two parts of the element 30 to separate at a predetermined temperature. The fusible element 30 is so formed that the tension normally existing between it and the levers 27—27 is carried upon the structural portions of the element rather than the fusible solder thereof as is also known in the art.

The upper inner sides of the levers 27—27 are provided with flattened ledges 31—31 which are adapted to seat a disc 32 and hold the same in elevated relation with respect thereto as shown in Figure 1 of the drawings. The disc 32 is notched at its opposite sides as at 33—33 as best shown in Figure 2 of the drawings to provide clearance for the uppermost portions of the levers 27—27 and thereby permit them to be engaged upon the annular shoulder 22 of the ring 21. The disc 32 is provided with an upwardly extending centrally located boss 34 which directly engages the lower portion of a body member 35 which in turn carries a disc-like deflector 36.

The upper portion of the body member 35 engages a valve member 37 which is provided with a valve cap 38, the valve member 37 and cap 38 being engaged on the annular valve seat 14 thereby forming a closure with respect to the opening 15 in the partition 13. The valve cap 38 has a wing 39 on one side thereof as may best be seen by referring to Figures 6, 7 and 8 of the drawings. It will be observed that the body member 35 has a pair of oppositely disposed, upwardly curving arms 40—40 which are integrally formed with a guide ring 41 which is reciprocally positioned in the chamber 16 of the cylindrical body member 12. The assembly comprises a yoke carrying the deflector 36.

It will thus be observed that in normally closed position the automatic sprinkler maintains the assembly and relation of parts illustrated in Figures 1, 2 and 4 of the drawings and wherein the levers 27—27 and more particularly the ledges 31 thereof bear upwardly against the disc 32 which in turn bears against the body member 35 and the same holds the valve member 37 and cap 38 against the annular valve seat 14 and thereby maintains the sprinkler in closed position with respect to fire extinguishing fluid in the chamber 17. The position of the levers 27—27 is maintained by the fusible element 30 which as heretofore explained resists the tendency of the levers 27—27 to move apart which is necessary to free the disc 32 and permit the body member 35 to move downwardly and away from the valve 37 and cap 38.

In Figure 3 of the drawings the automatic sprinkler is shown with the fusible element 30 separated as by fusing of the fusible solder thereof, the levers 27—27 having been permitted thereby to move outwardly and away from the disc 32 so as to free the same and permit the operation of the sprinkler.

In Figure 5 of the drawings the full operating position of the sprinkler is illustrated, it being observed that the parts of the fusible element 30 have fallen clear as have the levers 27—27 and the disc 32 and the body member 35 with the deflector 36 has moved downwardly so that the guide ring 41 to which it is integrally attached has seated on the shoulder 22 on the ring 21 and the valve member 37 and cap 38 have also fallen clear of the device. The valve cap 38 is formed with the wing 39 so that it will be forcibly moved to one side of the body member 35 by the fire extinguishing fluid and its falling clear of the sprinkler assembly thereby insured.

It will be observed that in full operating position the deflector 36 is spaced well below the surface of the ceiling 10 and that a stream of fire extinguishing fluid is directed downwardly thereagainst from the opening 15 and the annular valve seat 14 where it is deflected in the desired pattern to cover the required area. The deflector 36 is provided with a plurality of circumferentially spaced slots 42 as may best be seen by referring to Figure 4 of the drawings and it will be seen that these improve the pattern of discharge of the fire extinguishing fluid. The arms 40 on the body member 35 are tapered upwardly in cross section so that they offer little or no resistance to the flow of fire extinguishing fluid downwardly thereover and at the same time they enable the seating of the annular ring 41 on their outermost ends to positively and securely locate the deflector 36 upon the flange 22 with respect to the lower portion of the automatic sprinkler.

It will be observed that the desired tension for seating the sprinkler in closed position is readily obtained by the vertical adjustment of the ring 21 prior to the insertion of the pin 26. The levers 27—27 and the fusible element 30 are assembled with the disc 32 and the body member 35, valve member 37 and cap 38 in position as shown in Figure 1 and the ring threaded to move the shoulder 22 thereon upwardly until the desired tension is obtained. The pin 26 is then applied to lock the assembly and the device may then be installed on the distributing piping 11 of the sprinkler system without further adjustment.

It will be observed by those skilled in the art that differences in height between the ceiling level and the level of the horizontal distributing

piping of the sprinkler system (not shown) may be readily accommodated by varying the length of the vertical section of the distributing piping 11 which would ordinarily comprise a nipple or short section of pipe. This fitting and the application of the annular flange 23 are the only operations required in the field installation and it will therefore be seen to meet the several objects of the invention.

Having thus described my invention, what I claim is:

1. In an automatic sprinkler, the combination of a cylindrical casing open at its lower end and having a partition inwardly of its ends formed with a discharge opening, means at the upper end of said cylindrical casing for attaching the same in depending position in a sprinkler system; a yoke normally in a retracted position within the casing and having a ring reciprocally positioned in said cylindrical casing beneath said partition and normally in a raised position remote from the normally open lower end of the cylindrical casing and a pair of arms formed on and extending downwardly from said ring and at their lowermost ends joined to side portions of a vertically disposed body member, a deflector secured to said body member beneath said arms and disposed within the casing when the ring is in its raised position and assuming a position below the casing when the yoke is in an extended position, a valve member resting upon the upper end of said body member and normally held thereby in closing relation to the discharge opening, a disc loosely positioned in the open lower end of the cylindrical casing and engaging the lower end of said body member for supporting the yoke, a vertically adjustable support carried by the lower end of said cylindrical casing and having a portion disposed in position for engaging and limiting downward movement of said ring and thereby supporting the yoke in the extended position, a pair of oppositely disposed levers releasably suspended from said support and having portions normally fitting under said disc in supporting engagement therewith, and a fusible element inter-connecting lower portions of said levers and holding the same in engagement with the support, said disc being normally urged upwardly by said levers and thereby pressing the valve member upwardly to its closed position.

2. In an automatic sprinkler, the combination of a cylindrical casing open at its lower end and having an apertured partition inwardly of its ends, an annular valve seat formed on said partition about the aperture therein, means at the upper end of said cylindrical casing for attaching the same in depending position in a sprinkler system, a ring freely slidable vertically in said cylindrical body beneath said partition and normally disposed in a raised position remote from the open lower end of the casing, a pair of depending arms formed on and extending downwardly from said ring and joined at their lowermost ends to side portions of a body member having a portion extending downwardly therefrom, a deflector secured to said body member beneath said arms, a valve member resting upon the upper end of said body member and held thereby against said annular valve seat in a closed position, a disc positioned in the open lower end of the cylindrical casing and having an upstanding boss at its center supporting said body member, an inwardly flanged collar threadably engaged on the lower end of said cylindrical casing with its flange projecting into the path of movement of the ring for engagement by said ring to limit downward movement of the ring, a pair of oppositely disposed levers having upper ends normally extending under said disc to support the disc, said levers having bills normally resting upon the inwardly extending flange of said collar and thereby supporting the levers from the collar, and a fusible element interconnecting the lower ends of said levers, said disc being normally held by the levers in pressing engagement with the body member to maintain the valve member closed.

3. In an automatic fire extinguishing sprinkler, a casing formed with a chamber open at its lower end and above the chamber being formed with a liquid passage adapted for connection with a supply pipe and having its lower end communicating with the chamber, a closure in said chamber for the lower end of said passage entirely free from the casing and freely movable through the open lower end of the chamber when released, a yoke slidable vertically in said chamber through the open lower end thereof from a retracted position within the chamber to an extended position below the casing, said yoke when retracted engaging said closure and holding the closure in its closed position, a deflector carried by the lower end portion of said yoke and movable therewith into and out of said chamber, a ring screwed onto the lower portion of said casing and having an inwardly extending flange engageable by a portion of said yoke to limit downward movement of the yoke through said chamber to its extended position, a lip projecting laterally from said closure and engageable by liquid discharged downwardly from said passage for tilting the closure off of said yoke and downwardly through the open end of the chamber when the yoke is in its extended position, a disc constituting a closure for the lower end of said chamber, said disc being free from the casing and having a portion engaging the lower end of said yoke to support the yoke, levers under said casing supported upon said flange and having supporting engagement with said disc, and a fusible connection between said levers, said ring when turned in a tightening direction shifting the levers and the disc and the yoke upwardly and thereby pressing the closure upwardly into tightly closed relation to the passage.

4. In an automatic fire extinguishing sprinkler, a casing formed with a chamber open at its lower end having a liquid passage in its upper portion communicating with the top of the chamber and surrounded by a valve seat, a ring threaded to the lower end of said casing, a yoke slidable vertically in said chamber through the open lower end thereof from a normally retracted position in the chamber and limited in its downward movement to an extended position by contact with said ring, a valve resting upon said yoke and held in a closed position against the valve seat when the yoke is in its retracted position, said valve being tiltable off of the yoke and freely movable downwardly through the open lower end of the chamber when the yoke moves downwardly to its extended position, a closure for the open lower end of said chamber separate from and having supporting engagement with said yoke when in place, supports for said closure removably resting upon said ring and detachably engaging under said closure, and a fusible connection between said supports, said ring when turned in a tightening direction exerting upward pres-

sure upon said supports and thereby urging the disc and the yoke upwardly and holding the valve in a tightly closed position against the valve seat.

5. In an automatic fire extinguishing sprinkler, a casing having an open lower end and formed with a liquid passage through its top adapted for connection with a supply pipe, a ring screwed about the lower end of said casing and having a flange extending inwardly across the lower end of the wall of the casing, a yoke slidable vertically in said casing from a normally retracted position therein downwardly through the open lower end of the casing to an extended position and being limited in its downward movement by contact with the flange of said ring, a closure for said passage displaceably resting upon said yoke and held thereby in closing relation to the passage when the yoke is in its retracted position, a displaceable support for said yoke free from the casing, members removably supported upon the flange and normally holding said support in supporting engagement with said yoke, and a fusible element releasably holding said members in position for engagement with the flange and the yoke.

6. In an automatic fire extinguishing sprinkler, a casing open at its bottom and having a liquid inlet passage at its top, a closure for said passage movable in said casing, a deflector for spraying liquid discharged from said passage, said deflector being normally in a retracted position in the casing and movable downwardly through said casing and the open bottom thereof to an extended operative position below the casing, a carrier for said deflector normally positioned within the casing and movable vertically through said casing from a raised position to a lowered position in which the deflector is in its extended position, an abutment carried by said casing in

the path of movement of the carrier and limiting downward movement of the carrier by contact of the carrier with said abutment, said closure displaceably resting upon said carrier and being firmly held thereby in closing relation to the passage when the carrier is in a raised position, and a displaceable support for said carrier having securing means normally held in detachable overlapping engagement with said abutment by a fusible member.

7. In an automatic fire extinguishing sprinkler, a casing open at its bottom and having a liquid inlet through its top, a yoke normally housed in said casing and being movable downwardly through the casing to an extended position, said yoke consisting of a rigid ring having arms extending downwardly therefrom and at their lower ends being connected with each other, a liquid deflector carried by said yoke and disposed under said arms and moving with the yoke from a retracted position in the casing to a lowered position, an abutment member carried by said casing and engageable by said ring to limit downward movement of the yoke, a support for said yoke constituting a displaceable closure for the bottom of said casing, and securing members for said support displaceably held in overlapped engagement with said abutment by a fusible member.

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