

June 11, 1935.

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2,004,833

SPRINKLER HEAD FOR FIRE EXTINGUISHING SYSTEMS

Filed May 18, 1934

2 Sheets-Sheet 1

Fig. 3.

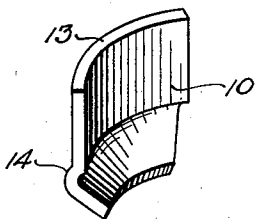


Fig. 2.

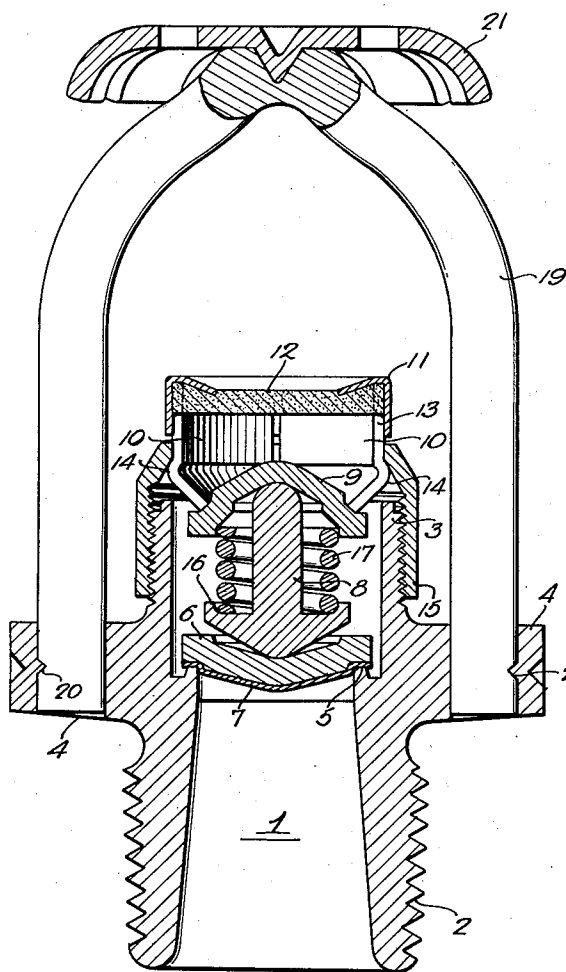


Fig. 1.

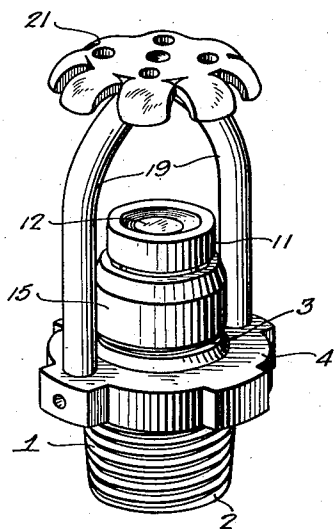
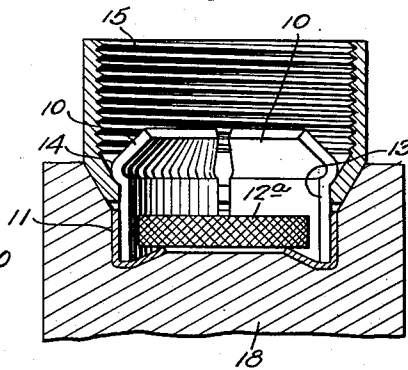


Fig. 4.



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2 Sheets-Sheet 2

Fig. 5.

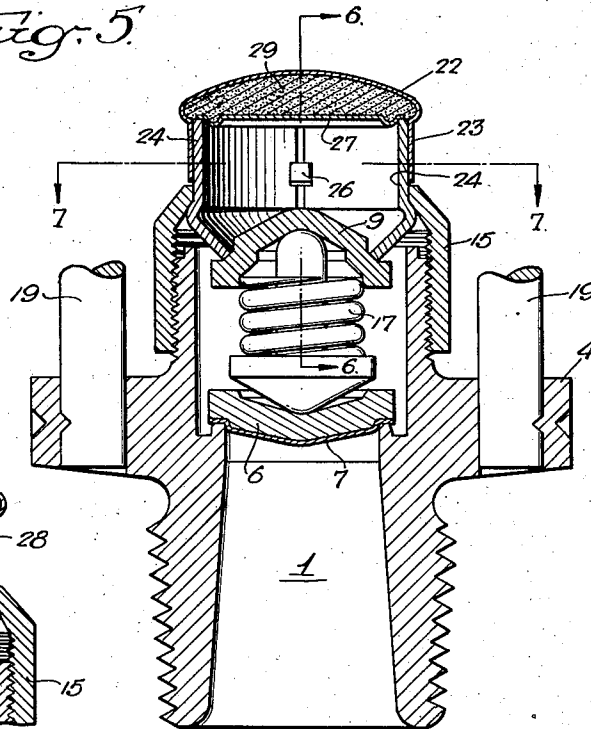


Fig. 6.

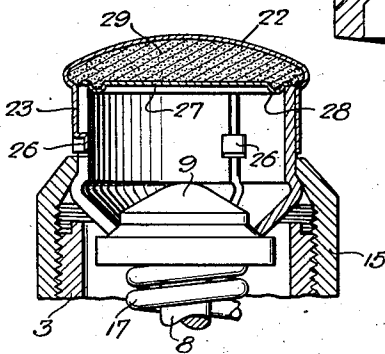


Fig. 7.

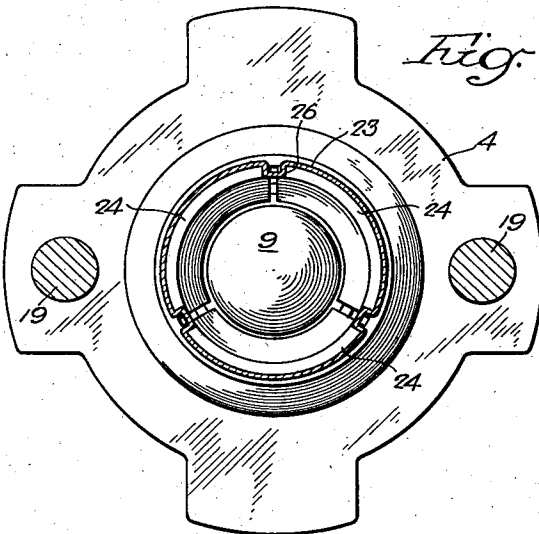
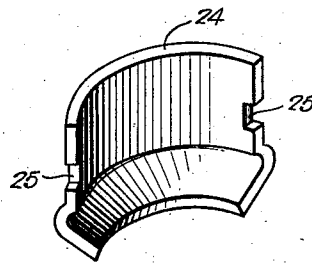


Fig. 8.



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UNITED STATES PATENT OFFICE

2,004,833

SPRINKLER HEAD FOR FIRE-EXTINGUISHING SYSTEMS

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Application May 18, 1934, Serial No. 726,360

8 Claims. (Cl. 169—38)

This invention relates to improvements in sprinkler heads for fire-extinguishing systems, and a principal object of the invention is to provide a sprinkler head of generally improved characteristics.

A more specific object of the invention is to provide a sprinkler head in which all of the working parts are housed and thereby substantially protected from the deteriorating effects of changing atmospheric conditions and accumulations of dirt and undesirable foreign substances.

Another object of the invention is to provide a sprinkler head which shall be relatively inexpensive to manufacture, more compact and of better appearance than the sprinkler heads of the prior art, less liable to faults affecting the operation of the device, and generally of more efficient construction.

Still another object of the invention is to provide a sprinkler head so constructed that the fusible material constituting the release element shall be subjected to a minimum of strain and shall be free from shearing stress, the strain to which the said material is subjected being entirely compressive.

The invention further resides in certain novel structural details and features hereinafter set forth and illustrated in the attached drawings, in which:

Figure 1 is a view in perspective of a sprinkler head made in accordance with my invention;

Fig. 2 is a vertical sectional view of the sprinkler head;

Fig. 3 is a view in perspective of one of the elements of the assembly;

Fig. 4 is a sectional view illustrating a method of assembly;

Fig. 5 is a fragmentary vertical sectional view of another embodiment of my invention;

Fig. 6 is a section on the line 6—6, Fig. 5;

Fig. 7 is a section on the line 7—7, Fig. 5; and

Fig. 8 is a view in perspective of one of the elements of the assembly shown in Figs. 5, 6 and 7.

With reference to the drawings, the sprinkler head in a preferred embodiment comprises a tubular body member 1, the extremities 2 and 3 of which are externally threaded and which is provided intermediate its ends with an outwardly projecting flange 4. The interior of the member 1 is formed with a seat 5 for a closure element 6, which element in the present instance takes the form of a concaved disk. In assembly a copper or other suitable gasket 7 is interposed between the element 6 and the seat 5 and completely covers the under side of the closure element. The ele-

ment 6 is held upon the seat 5 through the medium of a pin 8, one end of which rests in the concaved upper face of the element 6 and which is confined at its opposite end by an inverted dished element 9. Bearing against the upper surface of the element 9 is a plurality of segmental strut elements 10 which together and in normal assembly form a substantially closed annulus the upper ends of which are confined by a flanged retaining ring 11. Between the upper ends of the strut elements 10 is confined a disk 12 of a suitable fusible compound which holds the said upper ends of the strut elements against the side walls of the retaining ring 11. The strut elements 10, as illustrated in Figs. 2 and 3, are formed with an outer segmental portion 13, which as previously described fits within the retaining ring 11, and this portion 13 terminates at its inner end in an outwardly projecting shoulder 14, from which the strut inclines inwardly toward the inner edge which engages the beveled outer surface of the element 9.

Threaded on the extremity 3 of the body member 1 is a sleeve 15 the upper contracted end of which closely embraces the strut assembly at a point immediately above the shoulder 14 and which when turned down upon the body member forces the struts downwardly against the element 9, and thereby forces the element 9 down upon the upper end of the pin 8. This pin, as shown in Fig. 2, is provided adjacent its lower end, with a transversely projecting flange 16 which forms a seat for a spring 17 the upper end of which engages the under side of the element 9. In assembly, see Fig. 2, the spring 17 is held under compression between the flange 16 of the pin 8 and the element 9. It will be noted that sufficient clearance is provided between the adjoining side edges of the strut elements 10 to permit these elements to move inwardly in the release operation, as hereinafter described.

In assembling the elements of the device, see Fig. 4, the retaining ring 11 is placed in inverted position within a suitably formed die 18, and a disk 12a of the fusible composition inserted in the ring as illustrated. The portions 13 of the strut elements 10 are inserted through the contracted end of the threaded sleeve 15, which is placed in inverted position in the upper end of the die, and are located in their proper relative positions within the sleeve 11. Heat is then applied to fuse the disk 12a, which flows to the bottom recesses of the retaining ring 11 and assumes a position as illustrated in Fig. 2. Subsequent setting of the composition unites the elements of

the assembly in their proper relative positions. The closure element 6 and gasket 7 are then inserted in the body member 1, as are the pin 8, the spring 17 and the element 9 all in their proper relative positions. When now the sleeve 15 is turned down upon the extremity 3 of the casing 1, the inclined ends of the strut elements 10 engage the beveled upper surface of the element 9 and force the latter downwardly upon the pin 8, the spring 17 being placed under compression, and the closure element 6 through the medium of the pin 8 and the element 9 being forced by positive pressure upon the seat 5.

The sprinkler head further comprises a rod 19, bent to U-shape, the ends of which are inserted in apertures at opposite sides of the flange 4 of the body member 1. The inserted ends of the rod 19 are recessed, as indicated at 20, and impact through the medium of suitable tools upon the side surfaces of the flange 4 at points opposite the recesses 20 forces the metal of the flange inwardly into the recesses 20, and thereby locks the rod 19 in position. At the upper end of the yoke thus formed by the rod 19 is suitably secured, as by welding, a distributor plate 21 which functions in the usual well known manner.

It will be apparent that in the aforescribed assembly, the pressure applied through the sleeve 15 upon the struts 10, which forces the struts downwardly upon the element 9 and through the pin 8 exerts the retaining pressure upon the closure element 6, by reason of the cam action of the inclined surfaces of the sleeve 15 upon the rounded shoulders 14 of the strut elements will tend to force the upper projecting ends of the strut elements inwardly toward each other. This tendency is opposed by the body of fusible material 12, which is thus placed under direct transverse compression. This compression is uniformly distributed around substantially the entire peripheral edge of the disk 12. When under the influence of excessively high temperatures the material of the disk 12 fuses, the projecting ends of the strut elements 10 are released, and by reason of the tension of the spring 17 will be forced inwardly to an extent freeing the shoulders 14 from the sleeve 15. The struts 10 and the element 9 are thereupon expelled from the sleeve 15 by action of the spring which releases the pin 8, the closure element 6 and gasket 7, which are driven upwardly by fluid pressure within the sprinkler system. The water or other liquid fire-extinguishing medium which is then projected through the sprinkler head strikes the distributor disk 21 and is distributed in the usual manner over the area protected by the sprinkler head.

It will be noted that the extremity 2 of the body portion 1 which attaches to the sprinkler system is provided with an inwardly tapering bore terminating at the seat 5 which affords a nozzle effect and increases the efficiency with which the fire-extinguishing medium is projected from the sprinkler head.

In the sprinkler head described above, the yoke 19 functions only to support the distributor 21 and constitutes no element of the closure-retaining or working parts of the sprinkler head. The yoke may therefore be made of any suitable material having the necessary tensile strength and requires none of the accurate testing necessary where, as in the prior devices, the yoke has a functional part in the closure means. No cast metal is required in the construction of this device, and all the parts can be made of rod or tube

stock or stamped from sheet materials, so that the expense of manufacture is relatively low. The arrangement permits a relatively compact assembly of exceptionally good appearance, and a further desirable feature resides in the fact that the working parts of the device are effectively housed and thereby protected from the deteriorating effects of moisture and from accumulations of dirt and other undesirable foreign substances.

The aforescribed embodiment of my invention is adapted primarily for use with a fusible metallic solder, and in Figs. 5, 6, 7 and 8, I have shown a form of sprinkler embodying the principles of the invention best adapted for use, as a fusible element, of a chemical salt of the order of alphanonitronaphthalene, ptoluene sulfon dimethylamide, or acetyl P-phenetidine, which in the fused state display a relatively low specific gravity.

In this instance, the strut-retaining ring 11 of the aforescribed embodiment is replaced by a cap 22, the depending annular flange 23 of which embraces the upper ends of the strut elements 24. In this instance, the strut elements, one of which is shown in perspective in Fig. 8, are three in number, but are otherwise substantially the same as the elements 10 of the aforescribed embodiment and have essentially the same function. The strut elements 24 are provided in their side edges with recesses 25, which in assembly receive pressed-in portions 26 of the flange 23 of the retaining element 22, thus interlocking the element 22 with the struts and retaining the former in position. In conjunction with the element 22, I employ a disk 27 which in assembly seats upon the upper edges of the struts 24 and which is provided with an annular rib 28 which acts to locate the disk on the struts and normally to retain the outer ends of the struts in the normal position of assembly within the flange 23 of the retaining member 22. The chamber thus formed between the top of the element 22 and the disk 27 receives the fusible composition designated by the reference numeral 29. Normally this composition is in the form of a powdered or granulated mass, and is solidly packed within the chamber provided for its reception, and holds the disk 27 in its normal operative position with respect to the struts 24. In the fused state and as set forth above, the fusible composition possesses a low specific gravity and flows freely from its chamber through the interstices between the edges of the struts 24, thus permitting the cam action between the upper edges of the struts and the rounded rib 28 of the disk 27 to displace the said plate outwardly, and by thus releasing the upper ends of the struts permitting the strut assembly to collapse, as previously described.

The other elements of the sprinkler head are the same as those described in the embodiment illustrated in Figs. 1 to 4, and are given the same reference numerals. Collapse of the strut assembly as described above results in discharge of the strut assembly from the retaining sleeve 15, thereby releasing the closure element 6 and permitting flow of the fire-extinguishing medium through the sprinkler head.

In assembling this device, the fusible composition 29 is packed solidly in the inverted element 22; the disk 27 is inserted; and the strut elements 24 previously passed through the restricted end of the retaining sleeve 15 are then inserted in the element 22 and against the disk 27, the lugs 26 of the element 22 being entered in the recesses 25 provided in the said struts. The assembly is

then inverted and the retaining sleeve 15 threaded upon the body member 1, as previously set forth. It will be noted that in this instance, the fusible element 29 is substantially enclosed on all sides, and like the fusible element 12 of the previously described embodiment is subjected to a compressive strain.

I claim:

1. A sprinkler head comprising a tubular body member formed with a seat, a closure element seating on said seat, and retaining means for said element comprising a sleeve adjustable on said member, and a collapsible strut assembly embraced and forcibly held by said sleeve in closure-retaining position and including a body of fusible composition acting under compression to prevent collapse of said assembly.

2. A sprinkler head comprising a tubular body member formed with a seat, a closure element seating on said seat, and retaining means for said element comprising a sleeve adjustable on said member, a strut assembly embraced and forcibly held by said sleeve in closure-retaining position, said assembly being contractible and releasable from said sleeve by said contraction, and a body of fusible composition confined in said assembly and acting under compression to maintain the assembly in expanded condition.

3. A sprinkler head comprising a tubular body member formed with a seat, a closure element seating on said seat, and retaining means for said element comprising a sleeve adjustable on said member and having a contracted outer end, a strut assembly projecting into the said outer end of the sleeve and having portions engaging behind said sleeve contraction and being held thereby in closure-retaining position, said strut assembly being contractible and releasable from said sleeve by contraction, and a body of fusible composition confined between the elements of said assembly and acting under compression to normally prevent said contraction.

4. A sprinkler head comprising a tubular body member formed with a seat, a sleeve threaded on one end of said member, a closure element seated on said seat, retaining means for said closure element including a collapsible strut assembly embraced by the outer end of said sleeve, said strut assembly and the sleeve having cooperating cam surfaces, a spring confined under tension between said strut assembly and the closure element, said cam surfaces and the tension of said spring tending to collapse the strut assembly to thereby release it from the sleeve, and temperature responsive means held under compression at the outer end of said assembly and normally preventing collapse of said assembly.

5. A sprinkler head comprising a tubular body

member formed with a seat, a sleeve threaded on one end of said member, a closure element seated on said seat, retaining means for said closure element comprising a strut assembly embraced by and normally retained in said sleeve, and having a solid bearing against the closure element, a tensioned spring reacting against said closure element and said assembly and exerting a pressure on said assembly tending to collapse the latter, and means at the outer end of said assembly and including a temperature responsive element for normally preventing collapse of said assembly.

6. A sprinkler head comprising a tubular body member formed with a seat, a closure element for engagement with said seat, a sleeve threaded on one end of said member, and means embraced and normally retained by said sleeve for maintaining the closure element seated, said means including a collapsible strut assembly projecting into and substantially closing the outer end of said sleeve and comprising at its outer projecting end a fusible element normally preventing said collapse.

7. A sprinkler head comprising a tubular body member formed with a seat, a closure element seating on said seat, a sleeve threaded on one end of said member, and closure-retaining means releasably supported by said sleeve and comprising a collapsible strut assembly projecting into the outer end of said sleeve, said assembly comprising a plurality of segmental elements arranged in the form of a split annulus, a retaining ring embracing the outer ends of said segments, and a disk of fusible material confined between the outer ends of said segments and normally supporting said segments rigidly in proper relative positions within the retaining ring, fusion of said material permitting collapse and release of said elements from the said sleeve.

8. A sprinkler head comprising a tubular body member formed with a seat, a closure element for engagement with said seat, a sleeve threaded on one end of said member, closure-retaining means releasably supported by said sleeve and comprising a collapsible strut assembly projecting into the outer end of said sleeve, said assembly comprising a plurality of segmental elements arranged in the form of a split annulus, a retaining cap embracing the outer ends of said segments and releasably interlocked with the latter, a disk positioned at the outer ends of said segments and normally supporting said segments rigidly in proper relative positions within the retaining cap, and a fusible material confined between said disk and the cap and normally retaining said disk in operative position with respect to said segments.

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