

July 20, 1965

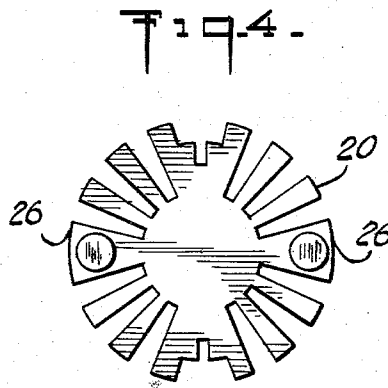
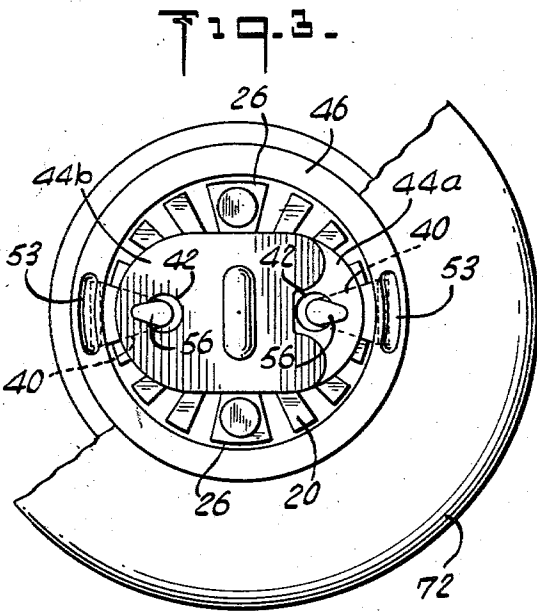
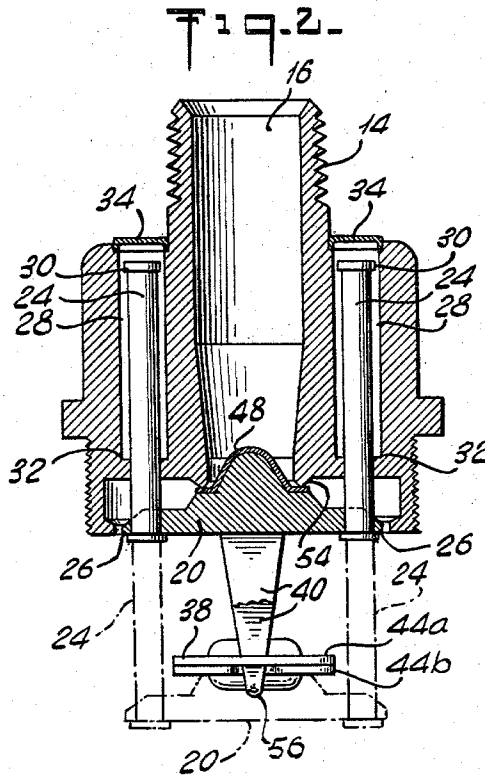
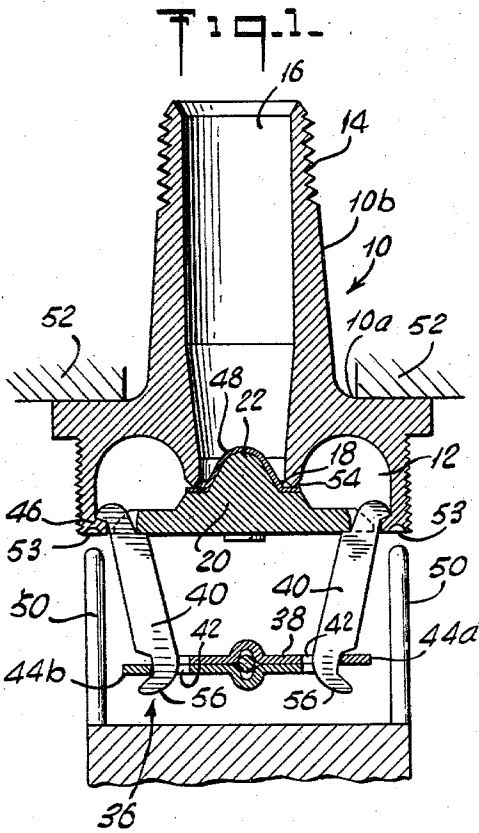
L. E. CAMPBELL ETAL

3,195,647

SPRINKLER HEAD AND METHOD OF ADJUSTING SAME

Filed Sept. 14, 1962

2 Sheets-Sheet 1



INVENTORS  
 LAYARD E. CAMPBELL  
 INGEMAR B. ASP  
 BY  
 Eyre, Mann & Lucas  
 ATTORNEYS

July 20, 1965

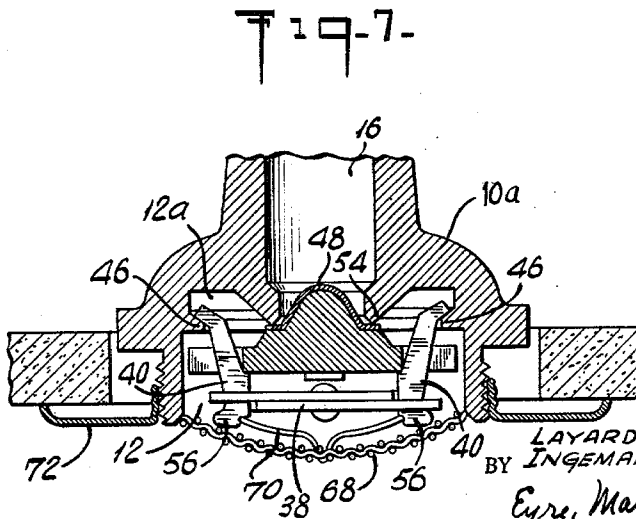
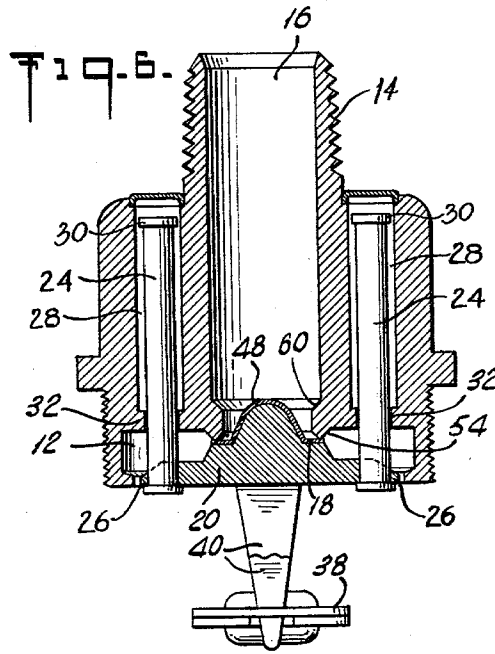
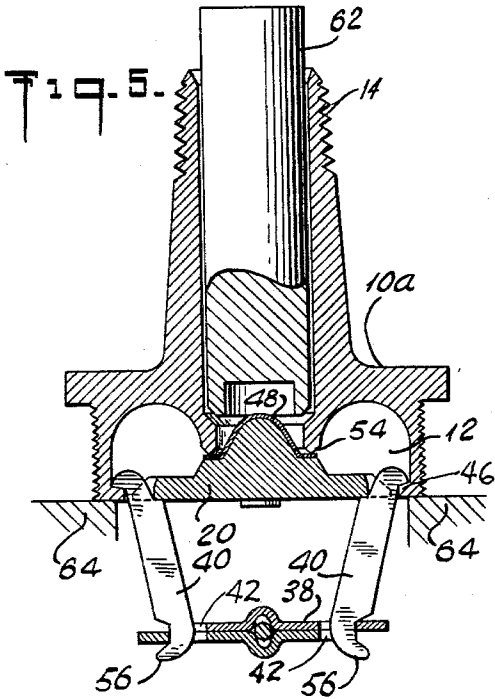
L. E. CAMPBELL ETAL

3,195,647

SPRINKLER HEAD AND METHOD OF ADJUSTING SAME

Filed Sept. 14, 1962

2 Sheets-Sheet 2



INVENTORS  
LAYARD E. CAMPBELL  
BY INGEMAR B. ASP  
Eyre, Mann & Lucas  
ATTORNEYS

1

3,195,647

**SPRINKLER HEAD AND METHOD OF ADJUSTING SAME**

Layard E. Campbell, Rowayton, Conn., and Ingemar B. Asp, Ossining, N.Y., assignors to The Reliable Automatic Sprinkler Co., Inc., a corporation of New York  
 Filed Sept. 14, 1962, Ser. No. 223,650  
 13 Claims. (Cl. 169--1)

The present invention relates to sprinkler heads, and, more particularly to a flush or flush type sprinkler head which opens when a temperature responsive connector, forming a part of the closing mechanism for the port of the sprinkler head, is subjected to heat. This mechanism in the present sprinkler head is simple and compact, is accurately and easily adjusted, and its action is certain, assuring positive opening and closing of the part.

The new sprinkler head comprises a body portion, with a cavity in one end, which is adapted to mount substantially flush within ceilings with the cavity facing downwardly. A conduit for fluid under pressure, with a port centrally located within the cavity, passes through the body portion and is provided at its upper end with means for attachment to a fluid supply pipe. An integral deflector and splitter, which in its operative position is suspended from the body portion by two arms, is normally supported within the cavity by the temperature responsive connector which is preferably a fusible link mechanism consisting of two lever arms that are joined by a fusible link. The lever arms rest on an internal ridge in the body, and when the fusible link is heated, the lever arms pivot on the ridge and fall away so that the deflector drops to its operative position to disperse the stream of fluid issuing from the conduit.

In the preferred embodiment of the invention, the internal ridge on which the lever arms are pivoted is deformable once a soft metal cap is positioned on the splitter. In this embodiment, after the fusibly linked lever arms are positioned to hold the integral deflector and splitter in its recessed position, the ridge is bent to exert pressure on the lever arms causing them to exert force on the fusible link. When this force is within predetermined limits the sprinkler head is properly adjusted and the soft metal cap seals the port.

In the other illustrated embodiment, the lip of the port is deformable and again a soft metal cap is positioned in the splitter. With this arrangement, the lip is extruded forward to press against the soft metal cap to exert force on the levers. When the lip is extruded, force is exerted on the link by the lever arms and when this force is within the predetermined limits the sprinkler head is properly adjusted and the soft metal cap seals the port.

One important feature of the invention is the manner in which the sprinkler heads are adjusted. By applying a uniform deforming force, the sprinkler heads may be accurately and easily adjusted. In addition, there is no requirement for a separate tension adjustment means for the sprinkler head.

Another important feature is the particular combination of a deflector, closure and fusible link mechanism which is compact and simple, and insures positive action. Further this particular combination is unobtrusive and may be completely camouflaged without a deterioration of the sprinkler head effectiveness.

These and other features and the advantages of the invention may be better understood by reference to the accompanying drawing, in which:

FIG. 1 is a section through a sprinkler head incorporating the preferred arrangement for tensioning the fusible link mechanism;

FIG. 2 is a section through a sprinkler head taken at right angles to the section in FIG. 1;

2

FIG. 3 is a bottom view of the sprinkler head incorporating the preferred embodiment of the invention;

FIG. 4 is a plan view of the bottom of the deflector;

FIG. 5 is a section through a portion of a sprinkler head incorporating an alternative arrangement for tensioning the fusible link mechanism;

FIG. 6 is a section taken at right angles to the section in FIG. 5; and

FIG. 7 is an alternative arrangement for supporting the fusible link mechanism of FIGS. 5 and 6 in the housing.

Referring to the embodiment of the invention shown in FIGS. 1 through 4, the body portion 10 of the sprinkler head is shown having an enlarged base portion 10a with a tubular stem portion 10b of the body portion extending upwardly therefrom. The base portion 10a has a cavity 12 which, with the sprinkler head properly mounted, faces downwardly, and the stem portion 10b is threaded at its upper end 14 for attachment to the piping system (not shown). Passing through the body portion 10 from the threaded top of the stem portion to the cavity 12 in the base portion is a conduit or a waterway 16 through which water or other fluid from the piping system may pass to a port or discharge opening or port 18 provided in a centrally located portion of the cavity 12.

A deflector 20 with a splitter 22 integrally mounted thereon is held in its extended operative position by two suspension members shown as rods 24. (See phantom view in FIG. 2.) These rods 24 are riveted or otherwise connected to two extending portions 26 of the deflector diagonally arranged on opposite sides of the splitter 22, and are movable in recesses 28 formed in the body 10 on either side of the waterway 16. Each rod 24 is provided with an enlarged head 30 which engages an annular shoulder 32 within the recess when the deflector is in the operative position. The upper ends of recesses 28 are provided with seals 34 which prevent foreign particles from collecting in the recesses.

The deflector 20 is normally held in the cavity 12 by a fusible link mechanism 36. The fusible link mechanism consists of a fusible link 38 and two lever arms 40 which pass through holes 42 in different portions 44a and 44b of the fusible link. The upper ends of the lever arms rest on a ridge 46 around the edge of the cavity 12. The deflector 20 in turn is supported on shoulders of the lever arms 40 with the splitter 22 extending into the opening 18.

In assembling, prior to placing the deflector 20 within the cavity 12, a soft metal cap 48 is placed over the splitter 22, and after the deflector 20 is placed within the cavity 12 and held there by the fusible link mechanism 36, force is exerted on the ridge 46 of the cavity at the pivot points of the lever arms by a ram 50 which forces the sprinkler head against a support 52. The ridge 46 is deformable and under force from the ram deforms, pressing metal against the lever arms 40 at the pivot points and leaving grooves 53 in the ridge. With deforming of the ridge 46, the lever arms rotate pressing up against the outer edges of the holes 42 in the fusible link 38 tensioning the sprinkler head and forcing the soft metal cap 48 against the lip 54 of the opening 18 so that the soft metal cap 48 and the integral deflector 20 and splitter 22 act as a sealing means for the opening on port 18. The ridge is bent in this manner until the force which the lever arms exert on the link 38 comes within the predetermined limits. When the force comes within desired limits, the force exerted by the ram 50 is removed from the ridge 46 leaving the sprinkler head properly sealed and tensioned. Therefore the soft metal cap 48 together with the deflector 20, the fusible link 38 and the arms 40 function as a closure for the port of the sprinkler head or in other words they form a tensionable port closing mechanism or means.

In the embodiment illustrated in FIGS. 5 and 6, the conduit 16 is provided with an inwardly extending flange 60 which acts as a seat for the end of a cylindrical tool 62 that is adapted to fit into the conduit 16. Support 64 is provided for the sprinkler head at the ridge 46 of the cavity 12 and force is exerted on the flange 60 by the tool 62 extruding the lip 54 forward into the soft metal cap 48. This forces the deflector 20 against the lever arms 40, increasing the force the lever arms exert on the ridge 46 and the outer edge of the holes 42 in the fusible link 38. The flange is extruded in this manner until the force which the lever arms exert on the link 38 comes within predetermined limits. When that force comes within the desired limits, the force exerted by the tool 62 is removed from the flange 60 leaving the sprinkler head properly sealed and tensioned.

In both the above embodiments, with a smooth application of force the tensioning of the sprinkler head may be done accurately and easily, requiring no separate sprinkler head tensioning means which may be disturbed by the installation of the sprinkler heads into an automatic sprinkler system.

An alternative arrangement for the ridge 46 is shown in FIG. 7. In this arrangement, the ridge 46 is positioned above the lip 54 of the port 18 in an annular groove 12a around the port 18. With the ridge so positioned, the fusible link mechanism 36 is recessed in the cavity 12 and is covered by a decorative covering shown as a wire mesh screen 68 held by a spring clip 70 between the two tips 56 of the levers 40. While this alternative arrangement for the ridge 46 is illustrated with respect to the embodiment of the invention shown in FIGS. 5 and 6, it is also applicable to the embodiment shown in FIGS. 1 and 2.

Both the preferred and the alternative embodiments may be provided with an escutcheon 72 which is threaded to the base portion 10a to cover the annular space usually left around the base portion when it is installed in a sealing.

In operation, when heat contacts the fusible link 38, the link melts, severing the connection between portions 44a and 44b of the link allowing the force exerted by the lever arms 40 to separate the portions of the fusible link. With this, the portions of the fusible link 44a and 44b, and the lever arms 40 fall away, removing the support from the deflector. With no support gravity and the fluid pressure cause the deflector to drop, with rods 24 sliding until the heads 30 contact the shoulders 32. With the port 18 open, water or other fluid pours out of the opening 18 in a stream formed by the tapering wall of the conduit 16. This stream is dispersed by the splitter 22 and the deflector 20 so that it covers a large area underneath the installation. With the arrangement shown in FIG. 7, when the lever arms 40 fall away the pressure exerted on the spring clip 70 is removed so that the screen or decorative covering 68 also falls away and does not interfere with the operation of the sprinkler head.

In the foregoing description the invention has been described with respect to the illustrated embodiments. It should be understood that the description is intended to cover not only these specific embodiments but also to cover all changes and modifications of the embodiments which do not constitute departures from the spirit and scope of the appended claims.

The following is claimed:

1. A sprinkler head comprising:

- (a) a body portion with a port therein;
- (b) sealing means for the port;
- (c) a temperature responsive connector which is held against the sealing means by a portion of the body portion to seal the port; and
- (d) a deformable portion of the body portion which is deformed to adjust the force the temperature responsive connector and the sealing means exert on each other by increasing the force the body portion exerts on the sealing means and upon the temperature responsive connector.

2. A sprinkler head comprising:

- (a) a body portion with a port therein;
- (b) a fusible link which when subjected to sufficient heat separates into two portions;
- (c) two lever arms which, at a first point of each lever arm, are pivoted on said body portion and which, at a second point of each lever arm exert force on said fusible link;
- (d) sealing means for said port supported in a port closing position on said lever arms intermediate said first and second point of each lever arm; and
- (e) a deformable lip on the port which is deformed to adjust the force the two levers exert on the fusible link by increasing the force the body portion exerts on the sealing means and the levers.

3. A sprinkler head comprising:

- (a) a body portion with a port therein;
- (b) a sealing means for said port;
- (c) two lever arms which contact the sealing means at a first point on each lever arm to hold the sealing means in a sealing position with respect to the port;
- (d) a fusible link joining the lever arms at a second point on each lever arm; and
- (e) deformable ridge means extending from the body portion to contact the arms at a third point on each lever arm, said deformable ridge means being deformed to exert force on the lever arms so that they in turn exert force on the sealing means and the fusible link to properly seal the port and tension the link.

4. The structure of claim 3 wherein said ridge means is bent to force it against each lever arm.

5. The structure of claim 2 wherein said lip is extruded forward to force it against said sealing means.

6. A sprinkler head for a fire extinguishing system comprising:

- (a) a body portion having a liquid conduit with a discharge opening, said body portion being adapted to mount overhead with the discharge opening facing downwardly;
- (b) a deflector having an operative and a sealing position with respect to the discharge opening, said deflector having suspension members which support the deflector in its operative position;
- (c) a fusible link means which is held against the deflector by a portion of the body portion to seal the discharge opening; and
- (d) a deformable portion of the body portion which is deformed to adjust the force the fusible link means and the deflector exert on each other to seal the discharge opening by increasing the force the body portion exerts on the deflector and fusible link means.

7. A sprinkler head for a fire extinguishing system comprising:

- (a) a main body portion which has a cavity in one of its ends and a waterway with an opening centrally located within the cavity, said main body portion being adapted to mount overhead with the cavity and the opening facing downwardly;
  - (b) a deflector having means for sealing said opening and having rods that slide vertically and are adapted to hold the deflector below the body portion to deflect water;
  - (c) fusibly linked lever arms pivoted within the cavity which support the deflector within the cavity in close proximity to the opening to seal the opening; and
  - (d) a deformable lip on the discharge opening of the main body portion which is deformed to adjust the force the fusibly linked lever arms and the deflector exert on each other to seal the discharge opening by increasing the force the main body portion exerts on the deflector and the fusibly linked lever arms.
8. The structure of claim 7 wherein said fusible means is two lever arms each with one end passing through a hole in a fusible link and the other end pivoted on a ridge

within a cavity in the body portion and with the deflector supported on the lever arms.

9. The structure of claim 8 including a cover held over the cavity by a retaining clip attached between the levers below the fusible link.

10. In the assembling of a sprinkler head with a main body portion having a port therein which is sealed closed by opposing forces exerted on a tensionable port closing means by the portion of the main body portion surrounding the port and another portion of the main body portion positioned against said tensionable port closing means, a method of sealing and tensioning the sprinkler head comprising:

- (a) assembling the parts of the port closing means in a port closing orientation; and
- (b) exerting a deforming force on the sprinkler head to deform the sprinkler head which increases the opposing forces exerted on the tensionable part closing means.

11. The method of claim 10 wherein the deforming force is exerted on the main body portion surrounding the port.

12. The method of claim 10 wherein the deforming force is exerted on the mentioned main body portion positioned against said tensionable port closing means.

13. A sprinkler head for a fire extinguisher system comprising:

(a) a main body portion which has a cavity in one of its ends and a waterway with an opening centrally located within the cavity, said main body portion being adapted to mount overhead with the cavity and the opening facing downwardly;

(b) a deflector having means to seal the opening and having rods that slide vertically which are adapted to hold the deflector below the body portion to deflect water;

(c) fusible linked pivoted arms which support the deflector within the cavity in close proximity to the openings to seal the opening; and

(d) deformable ridge means extending from the main body portion of the valve to contact the lever arms, said deformable ridge means being deformed to exert force on the lever arms so that they in turn exert force on the deflector to seal the discharge opening.

References Cited by the Examiner

UNITED STATES PATENTS

2,558,450	6/51	Martin	-----	169—37
2,591,872	4/52	Rider	-----	169—38

25 LOUIS J. DEMBO, *Primary Examiner.*

EUGENE F. BLANCHARD, *Examiner.*

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,195,647

July 20, 1965

Layard E. Campbell et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 17, for "part" read -- port --; column 4, line 26, for "deformaable" read -- deformable --; line 34, for "aaginst" read -- against --; line 73, for the claim reference numeral "7" read -- 6 --; same line 73, after "fusible" insert -- link --; column 6, line 2, for "it" read -- its --.

Signed and sealed this 18th day of January 1966.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents