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E. TYDEN

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SPRINKLER HEAD

Filed Sept. 11, 1944

2 Sheets-Sheet 1

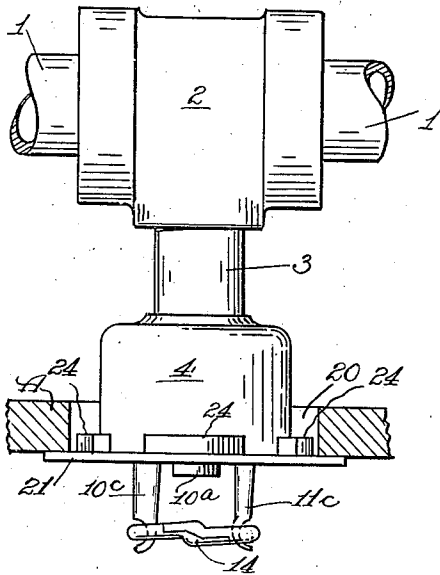


Fig. 1.

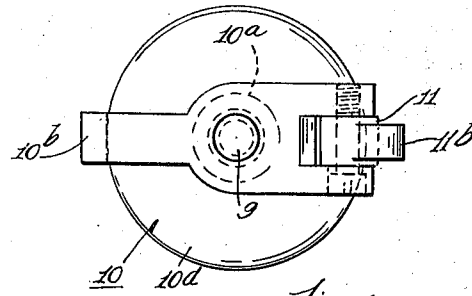


Fig. 3.

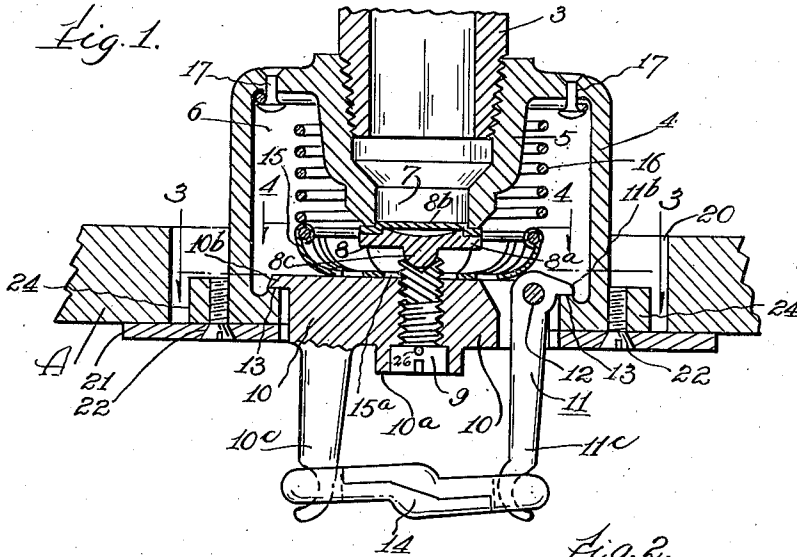


Fig. 2.

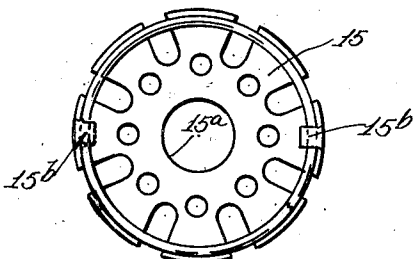


Fig. 4.

Inventor.
Emil Tyden.
by *Bent & Bent*
his Attorneys.

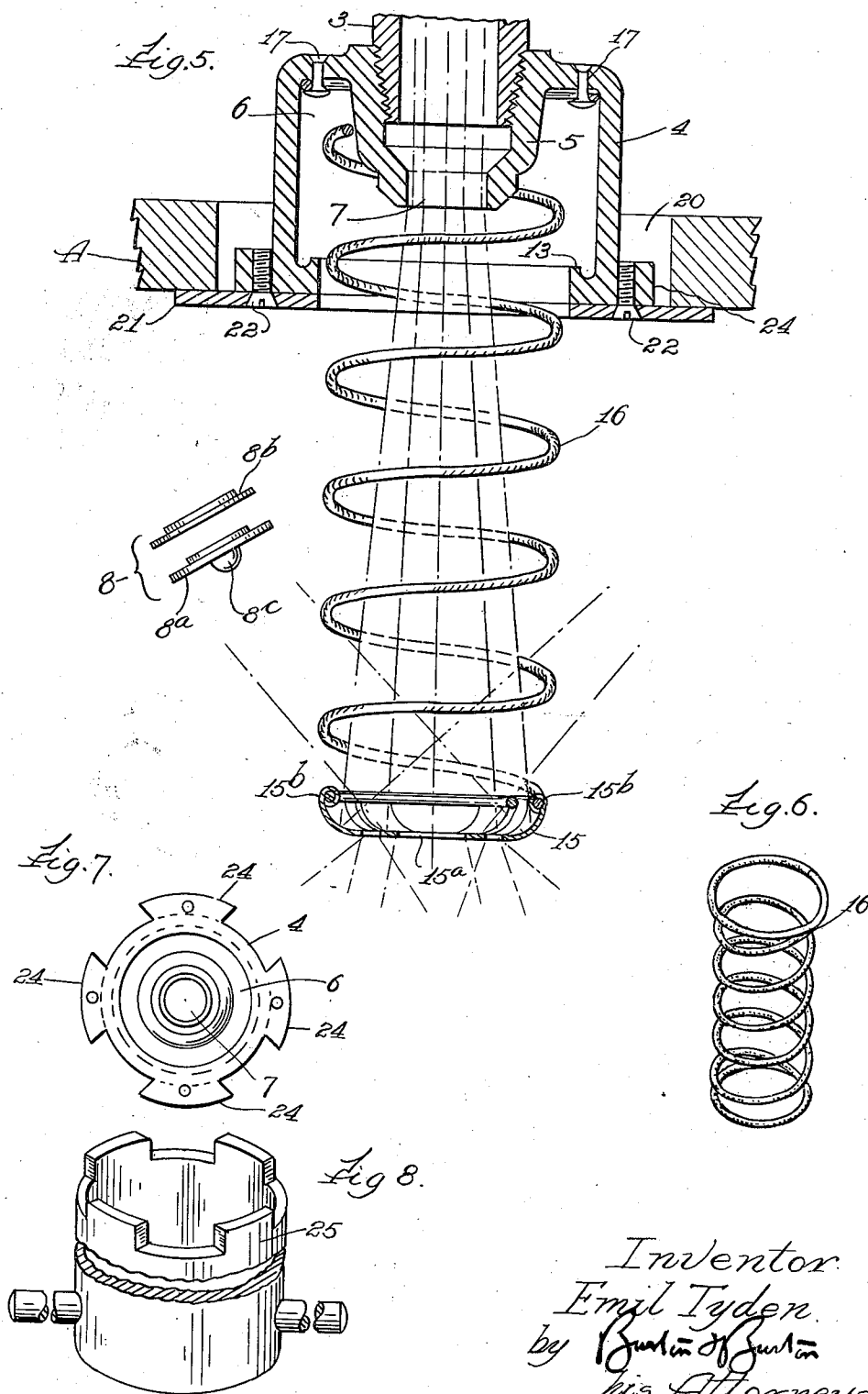
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UNITED STATES PATENT OFFICE

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SPRINKLER HEAD

Emil Tyden, Hastings, Mich.

Application September 11, 1944, Serial No. 553,541

11 Claims. (Cl. 169—40)

This invention relates to sprinkler heads designed for use in fire extinguishing systems, and one object of the invention is to provide a new and improved sprinkler head which is adapted to be installed with its lower end closely adjacent the plane of the ceiling of a room. This eliminates certain objections to standard sprinkler heads which have been customarily installed at a substantial distance below the ceiling of a room and which are sometimes considered unsightly, particularly in stores and offices where special attention is paid to the finish and decoration of wall surfaces.

Another object of the invention is to provide a sprinkler head of relatively simple and compact construction, occupying a comparatively small space in a vertical direction and therefore adapted for installation mainly between the ceiling and the floor above it even when the distance between these elements is quite limited.

A further object of the invention is to provide a sprinkler head adapted for mounting in the ceiling and having a water spreading or deflecting device arranged to be automatically lowered below the plane of the ceiling when the sprinkler becomes operative by reason of fire conditions.

It is also an object of the invention to provide a sprinkler head having its operative mechanism and its deflector disposed mainly above the plane of the ceiling but with its fusible element supported slightly below said plane for certain exposure to the currents of heated air flowing across the ceiling under fire conditions.

More specifically, it is an object of the invention to provide a sprinkler head mechanism which includes a water discharge port with a valve or cap for such port normally held in port closing position by a fusible element, and a deflector carried by flexible and collapsible supporting means retained normally in collapsed position by the fusible element and extensible, upon release, to support the deflector at an operative distance from the port. As disclosed herein the collapsible support for the deflector is resilient and therefore self-extensible upon release, but is also relatively rigid in directions transverse to its axis of collapse and extension, so that it will hold the deflector substantially opposite the port, whether the sprinkler head is installed with the axis of the port extending vertically or horizontally or obliquely.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawings in which:

Fig. 1 is a side elevation of a sprinkler head

embodying this invention showing it connected to a supply pipe and with the parts in normal position prior to operation.

Fig. 2 is a vertical and substantially axial sectional view on a larger scale than Fig. 1, also showing the parts in normal position.

Fig. 3 is a plan view of the retaining toggle.

Fig. 4 is a plan view of the spreader.

Fig. 5 is an axial section taken at the same plane as Fig. 2, but showing the sprinkler head in operation, with the spreader lowered to operative position.

Fig. 6 is a perspective view of the flexible and collapsible coil spring which serves as a support for the spreader, taken at the same scale as Fig. 1.

Fig. 7 is a bottom plan view of the sprinkler head housing.

Fig. 8 is a perspective view of a wrench for installing or removing the head.

While there is shown and described certain specific structure embodying the invention, it will be evident to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the invention except as indicated by the appended claims. It should also be understood that although the fire extinguishing liquid most commonly employed is water, the present invention is applicable to apparatus employing other fluids, and that wherever in the specification or claims water is referred to, it is intended as a generic term denoting any suitable fluid for use in fire extinguishing systems.

As shown in Fig. 1, a portion of the water supply pipe is indicated at 1 connected into a T fitting 2 with a depending nipple 3 onto which an anchorage member in the form of a housing 4 is screwed. The housing is thus removable if desired, and is usually removed after a fire for replacement and resetting of the valve and other parts.

The housing 4 is shown as substantially cylindrical in form and as seen in Fig. 2, it includes an integrally cast nozzle portion 5 disposed centrally within the housing and providing an annular space 6 around the nozzle. The nozzle terminates in a port 7 which is normally closed by a cap or valve member 8, preferably consisting of a metallic disk 8a and the thin sheet metal liner 8b shown in Fig. 5. The valve disk 8a has a central projection or knob 8c which is engaged by the upper end of the set screw 9 carried in the threaded central portion of a toggle member 10. The toggle consists of the member 10 which extends nearly across the lower end

of the housing 4, and the member 11 which is pivoted to the member 10 at 12, as seen in Figs. 2 and 5. The lower end of the housing 4 is formed with an inwardly projecting flange which provides an upwardly facing shoulder 13 and one end of the toggle member 10 is formed with a projection 10b which rests upon this shoulder 13. The toggle member 11 has a nose or projection 11b which is similarly supported on the shoulder 13 and the toggle members are formed with depending arms 10c and 11c, respectively, which are connected by a fusible link 14. When the set screw 9 is adjusted into position to clamp the cap or valve member 8 into port closing position it reacts with a tendency to force the toggle members downwardly and this tendency is resisted by the tension of the link 14, whereby the valve member 8 is maintained normally in closed position.

There is also carried within the housing 4 a deflector or spreader 15 which may be a disk of sheet metal with its peripheral portion preferably upturned and slotted, and having additional perforations as seen in Fig. 4, for directing and dispersing water as it strikes the upper surface of the deflector. For convenience, the deflector is normally disposed concentrically with the valve member 8 and may be formed with a central opening 15a providing clearance for the set screw 9 which holds the valve 8 seated. The spreader 15 is attached to the housing 4 by means of flexible suspending means which is shown as a coil spring 16 having its lower end attached to the spreader 15 and having its upper end secured in the top wall of the housing 4, as by small anchor rivets 17. The spreader may be formed with lugs 15b which are clinched over the terminal coil of the spring 16 at its lower end. The spring 16 is of a suitable length to support the spreader in operative position at a distance below the discharge port 7, as shown in Fig. 5. However, when the spreader is disposed within the housing 4 as seen in Fig. 2, the spring 16 is collapsed and accommodated within the annular space 6 around the nozzle 5, the uppermost coil being in a plane at right angle to the axis of the spring and being fitted snugly into the angle between the top wall of the space 6 and the cylindrical wall thereof. The toggle member 10 includes a circular disk portion 10d which closes the lower end of the housing when the parts are thus disposed.

The fusible link 14 is of the type commonly employed in sprinkler heads, comprising two members secured face to face by fusible material, such as solder, with the end of one member engaged with the arm 10c and with the end of the other member engaged with the arm 11c so that when subjected to a predetermined temperature the solder will melt and the two members will pull apart under the tension constantly exerted on them by the arms 10c and 11c. When the link 14 is thus released by a temperature indicating the presence of fire conditions, the pressure of the spring 16 upon the toggle member 10 insures initial movement of the toggle downwardly and the water pressure acting against the valve 8 and through the set screw 9 will operate with the same effect, causing the arm 11c of the toggle member 11 to swing about its pivot so as to unseat its nose or projection 11b from the shoulder 13 and thus release the toggle from the housing 4. As the toggle falls away the spreader 15 will drop to the position shown in Fig. 5 in which it is suspended by the spring 16 directly below the port 7. At the same time the valve or cap 8 will be unseated from

the port 7 so as to permit a deluge of water from the port 7 to impinge upon the spreader 15 and to be deflected and distributed thereby, part of the water being thrown against the ceiling A and a portion of it being discharged directly downward through the apertures and slots of the deflector 15. Incidentally, the coils of spring 16 contribute very materially to the dispersion and distribution of the water in lateral directions without noticeably obstructing it.

To provide a neat appearance for the sprinkler head when it is installed in the ceiling, and also to close the annular clearance opening 20 which is formed in the ceiling A around the housing 4, an annular plate 21 is removably attached in any convenient manner as by screws 22 to the lower end of the housing 4 and is dimensioned to overlap the opening 20. Upon the termination of the fire or other condition which caused operation of the sprinkler head the water supply in the pipe 1 is shut off at a remote control valve and the sprinkler head or housing 4 is preferably removed for servicing and resetting. This involves simply the removal of the screws 22 and plate 21 so as to expose the radially extending lugs 24 on the housing 4 which are engageable by means of a special wrench 25 of the type shown in Fig. 8. When the housing has been unscrewed from the nipple 3 a new valve cap 8 will be placed in position over the port 7, with a new liner 8b, since the cap and liner will usually be lost when the valve opens; and with the construction shown this will involve replacing the spreader 15 within the housing 4 and suitably nesting the collapsed spring 16 therein. Then, a new toggle assembly 9, 10, 11, will be adjusted in position and after application of a new fusible link 14 the set screw 9 will be tightened to secure the parts. If desired, the central boss 10a and the screw 9 may be drilled to receive a cross pin at 26 as a precaution against loosening of the screw under vibration and to prevent tampering therewith. As already noted, the fact that the supporting spring 16 for the spreader 15 is flexible and collapsible permits it to be accommodated in a housing or supporting anchorage 4 which is comparatively shallow in vertical dimension, and the simplicity of the valve controlling mechanism also permits the housing to be relatively small so that if necessary a sprinkler head of this type can be installed between the ceiling and the floor above it even when this space is quite limited.

It will be understood that the utility of this type of sprinkler head is not confined to situations in which it is disposed within an opening in the ceiling. In many cases the nipple 3 and even the supporting pipe line 1 may be mounted below the ceiling with the entire sprinkler head exposed to view, when this is not objectionable. With either arrangement it is found that unusually satisfactory distribution of the water is secured, partly because the wire of the supporting spring 16 is relatively slender and offers a minimum of obstruction, and partly because the coil spring 16, being disposed entirely outside the nozzle 5, does not impair the flow of water discharged at the port 7 and permits it to strike the spreader with full force, insuring maximum distribution for quenching a fire within the adjacent area. In some situations it is desirable to install a sprinkler head for discharge of the water horizontally or obliquely instead of in a strictly vertical direction. The present structure lends itself well to such conditions because, although the spring 16 is sufficiently flexible to be collapsed in axial

direction, it is stiff enough to support the deflector in operative position directly opposite the port 7 even when the axis of the spring is disposed in a horizontal or inclined direction. As seen in Fig. 6, the end turns of the spring 16 are disposed in parallel planes substantially perpendicular to the axis of the spring.

I claim as my invention:

1. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, a closure cap for said port, a spreader, a fixed anchorage, and resilient collapsible supporting means connecting the spreader to said anchorage and self-extensible to hold the spreader in operative relation to the said discharge port, together with means including a fusible element normally holding the cap in port closing position and retaining the spreader at a position with its supporting means collapsed, but operable, upon fusion of said element, to release said cap and said spreader, allowing the supporting means to be extended for presenting the spreader at operative position.

2. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, a fixed anchorage adjacent said conduit, a spreader, a closure cap for said port, a flexible and resilient member connecting the spreader to said anchorage, said member being dimensioned to support the spreader at an operative distance from the port but permitting the said cap to be placed in port closing position with the spreader closely adjacent thereto and with the connecting member flexed, and means including fusible means normally holding the cap and spreader in that position.

3. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, anchorage means carried by and externally of said conduit, a closure cap for said port, a spreader with a helically formed member connecting the spreader to said anchorage means and dimensioned to support the spreader at an operative distance from said port, and means including a fusible element normally holding the cap in port closing position and operable, upon fusing of said element, to release the cap.

4. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, a closure cap for said port, and anchorage structure externally adjacent the conduit, a spreader, a coil spring connecting the spreader to said anchorage dimensioned to support the spreader at an operative distance from said port, and retaining means including a fusible link, said retaining means being detachably engaged with said anchorage structure and normally holding the closure cap in port closing position and holding the spreader adjacent the cap with said coil spring compressed.

5. A sprinkler head for a fire extinguishing system comprising a water supply conduit terminating in a nozzle having a discharge port, a closure cap for said port, a spreader, a fixed anchorage adjacent said conduit and a coil spring connecting the spreader to said anchorage, said spring being substantially coaxial with the nozzle with its coils disposed outside the same in position to avoid obstructing a stream issuing therefrom, together with means including fusible means normally holding the cap in port closing position and operable upon fusion to release said cap.

6. A sprinkler head for a fire extinguishing sys-

tem comprising a water supply conduit for a discharge port, anchorage means carried by and externally of said conduit, a closure cap for said port, a spreader and spring means disposed laterally adjacent the port connecting the spreader to said anchorage means and dimensioned to support the spreader at an operative distance from said port, the port itself being unobstructed except by said cap, and means including a fusible element normally holding the cap in port closing position and operable upon fusion of said element to release the cap.

7. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, a closure cap for said port, a fixed anchorage externally adjacent the conduit, a spreader, a coil spring connecting the spreader to said anchorage and dimensioned to support the spreader at an operative distance from said port, and means including a fusible element and a member held in position thereby detachably engaged with said anchorage and securing the cap in port closing position, said member also upholding the spreader with said coil spring compressed, whereby upon fusing of said element the spring expands, dislodging said member to release the cap and the spreader and lowering the spreader to operative position.

8. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, a closure cap for said port, a fixed anchorage externally adjacent the conduit, a spreader, a coil spring connecting the spreader to said anchorage and dimensioned to support the spreader at an operative distance from said port, said anchorage having an upwardly facing shoulder, a member having one end lodged upon said shoulder, a retaining catch pivoted to the other end of said member and also lodged upon said shoulder, arms extending downwardly from said member and said catch respectively, with a fusible link connecting said arms, means extending upwardly from said member holding the cap in port closing position and retaining the spreader with its coil spring compressed, whereby upon fusing of said link the spring expands dislodging said member from the shoulder to release the cap and the spreader and lowering the spreader to operative position.

9. A sprinkler head for a fire extinguishing system comprising a housing disposed with its lower end substantially flush with a ceiling, a water discharge port within said housing, a closure cap for said port, a spreader, a coil spring connecting the spreader to said housing and dimensioned to support the spreader at an operative position below the port, said housing having an upwardly facing shoulder adjacent its lower end, a member having one end lodged upon said shoulder, a retaining catch pivoted to the other end of said member and also lodged upon said shoulder, arms extending downwardly from said member and said catch respectively, with a fusible link connecting said arms below the plane of the ceiling, and an adjustable screw extending upwardly from said member holding the cap in port closing position, the said member also supporting the spreader with its coil spring compressed for reacting between the housing and said member, whereby upon fusing of said element the spring expands, dislodging said member and its catch from the shoulder to release the cap and the spreader and lowering the spreader to operative position.

10. A sprinkler head for a fire extinguishing

system comprising a housing, said housing having a centrally disposed nozzle terminating in a downwardly opening discharge port and providing an annular space around said nozzle within the housing, a spreader with a coil spring connecting it to the housing and dimensioned to be accommodated in said annular space when compressed, said spring being dimensioned when extended to suspend the spreader at an operative position below the port, a closure cap for the discharge port and means including a fusible element and a member held in position thereby detachably engaged with said housing and securing the cap in port closing position, said member also upholding the spreader within the housing and with its coil spring compressed, whereby upon fusing of said element the spring expands, the cap is released, and the spreader is lowered to operative position.

41. A sprinkler head for a fire extinguishing system comprising a water supply conduit having a discharge port, anchorage means carried by

and externally of said conduit and including a transaxial surface facing in the same direction as the port, a substantially circular spreader, a closure cap for said port, a coil spring having its upper and lower turns in parallel planes perpendicular to its axis, means securing the upper turn of said spring to said transaxial surface of the anchorage, means securing the lower turn of the spring to the spreader adjacent its periphery with the axis of the spring substantially coincident with the axis of the port, a fusible element and a member held in position thereby, said member being detachably engaged with said anchorage and adapted to hold the cap in port closing position with the spreader disposed adjacent the cap and with said spring axially compressed whereby upon fusing of said element said member is released and the spring expands, dislodging the member to release the cap and lowering the spreader to operative position.

EMIL TYDEN.