Nov. 20, 1945. E. TYDEN 2,389,333

SPRINKLER HEAD

Filed July 21, 1944

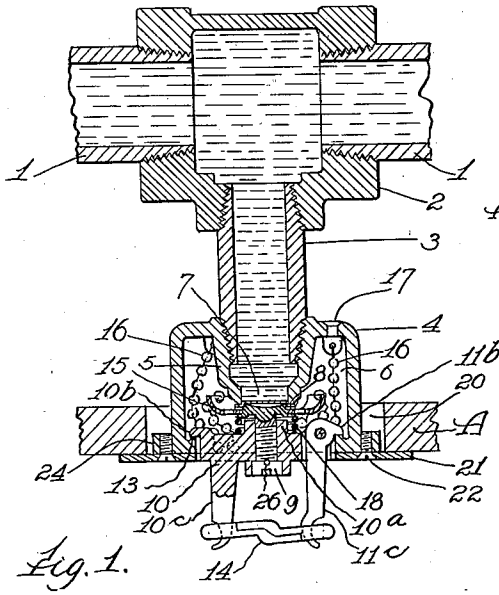


Fig. 1.

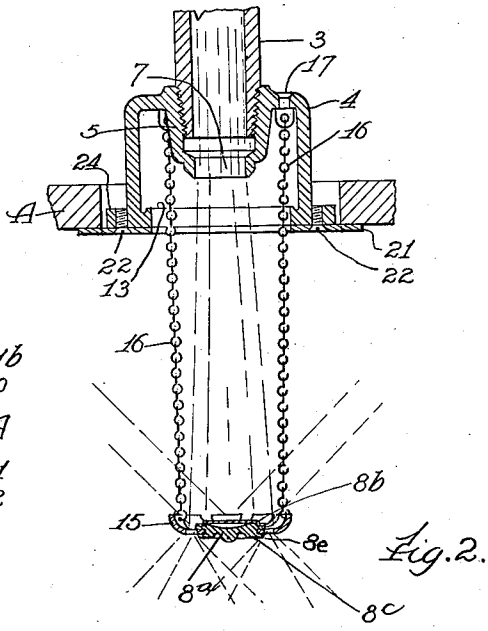


Fig. 2.

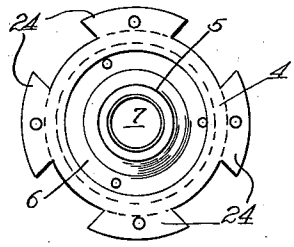


Fig. 7.

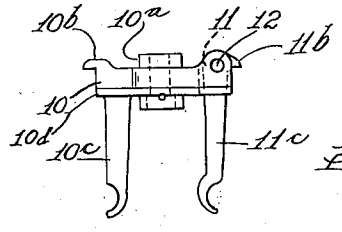


Fig. 3.

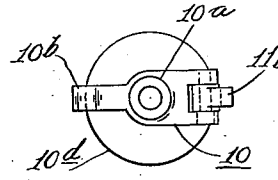


Fig 4.

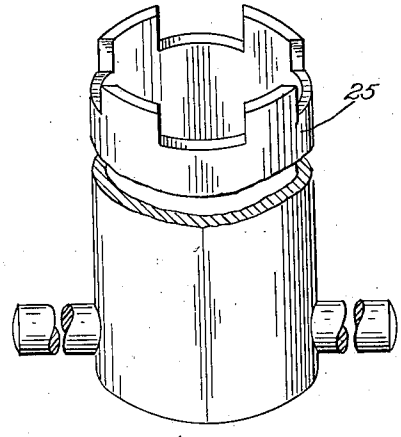


Fig. 8.

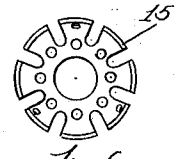


Fig. 6.

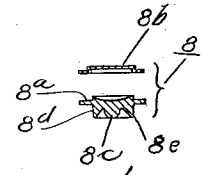


Fig. 5.

Inventor
Emil Tyden
by Burton & Burton
Attorneys

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2,389,333

SPRINKLER HEAD

Emil Tyden, Hastings, Mich.

Application July 21, 1944, Serial No. 545,989

16 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 substantially flush with 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 were considered unsightly, particularly in stores and office buildings where especial 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 and occupying a comparatively small space in a vertical direction and therefore adapted for installation 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 flush mounting in the ceiling and having a spreader or water 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 housed normally above the plane of the ceiling but with its fusible element disposed 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 housing having a water discharge port therein with a cap for said port and means controlled by a fusible element for releasing the cap, together with a water deflector normally contained within the housing but connected thereto by flexible elements such as chains and adapted to be lowered below the plane of the ceiling under fire conditions for proper distribution of the water discharged through the port.

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

Fig. 1 is a vertical sectional view 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 sectional view similar to Fig. 1 showing the sprinkler head in operation with the deflector lowered below the plane of the ceiling.

Fig. 3 is a detail elevation of the retaining toggle.

Fig. 4 is a plan view of the same.

Fig. 5 is a diametral section of the port closing cap and its liner in disassembled relation.

Fig. 6 is a plan view of the spreader.

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 herein shown and described 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 liquids 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 threaded nipple 3 onto which the housing 4 of the sprinkler head is secured. The housing is thus removable if desired, and is usually removed after a fire for replacement and resetting of the valve and other parts, but when it is attached to the fitting 2 by the nipple 3, the housing serves as a fixed anchorage for a movable spreader as hereinafter described.

The housing 4 is substantially cylindrical in form and 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 includes a central projection or knob 8c which is engaged by the upper end of the set screw 9 carried in the threaded hub 10a of the 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. 1 and 3. 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 shoul-

der 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 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 into which the hub 8d of the member 8 is fitted. The spreader 15 is anchored to the housing 4 by means of flexible suspending members which are shown as chains 16 each terminating in an anchor rivet 17 secured in the top wall of the housing 4. Preferably, three chains are employed and they are of a suitable length to support the spreader in operative position at a distance below the plane of the ceiling A, as shown in Fig. 2. However, when the spreader is disposed within the housing 4 as shown in Fig. 1 the chains 16 are collapsed and accommodated with the annular space 6 around the nozzle 5 and in the remaining available space within the housing 4. The toggle member 10 includes a circular disk portion 10d which closes the lower end of the housing and retains the chains therein.

Preferably, a spring 18 fitting loosely around the hub 10a of the toggle member 10 reacts upwardly against the spreader 15 and valve 8. As shown, the hub 8d of the valve terminates in a thin annular portion 8e which is peened or spun over against the spreader 15 rivet-fashion so that the valve or cap 8 and the spreader 15 are permanently assembled and the spring 18 actually reacts against this spun-over portion of the valve 8. This permanent connection of the parts 8 and 15 is not essential, but facilitates the placing and securement of the valve in setting the parts in the position shown in Fig. 1, and it also avoids loss of the part 8 when the sprinkler head goes into action.

The 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 18 upon the toggle member 10 insures initial movement of the toggle downwardly although normally 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. 2 in which it is suspended by the chains 16 directly below the port 7. Whether the valve cap 8 is attached to the spreader or not it will be unseated 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 its being discharged directly downward through the apertures and slots of the deflector 15. Incidentally, the chains 16 contribute to the dispersion and distribution of the water in lateral directions.

To provide a neat appearance for the sprinkler head as 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 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 the valve cap will be replaced in position over the port 7, with a new liner 8b, if necessary, and with the construction shown this will involve replacing the spreader 15 within the housing 4 and suitably nesting its collapsed chains 14 therein. Then, a new toggle assembly 9, 10, 11, with a spring 18 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 hub 10a and the screw 9 may be drilled to receive a cross pin 26 as a precaution against loosening of the screw under vibration and to prevent tampering therewith. As already noted, the fact that the supporting members for the spreader 15 are flexible and collapsible permits them to be accommodated in a housing 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.

I claim as my invention:

1. A sprinkler head for a fire extinguishing system comprising a housing, a water discharge port within said housing, a closure cap for said port, a spreader with collapsible means connecting said spreader to the housing, said means being dimensioned when extended to support the spreader at an operative position, a pair of levers pivoted together forming a toggle with their respective ends engaging a portion of the housing, arms extending from said levers, a fusible link connecting said arms, and means carried by the toggle holding said cap in port closing position with said spreader and its collapsible supporting means disposed within the housing.

2. A sprinkler head for a fire extinguishing system comprising a housing, a water discharge port within said housing, a closure cap for said port, a spreader with collapsible means connecting said spreader to the housing, said means being dimensioned when extended to support the spreader at an operative position, means including a fusible element normally holding the cap in port closing

position and retaining the spreader and its collapsed connecting means within the housing, but operable, upon fusing of said element, to release the cap and also the spreader, allowing said collapsed means to be extended for supporting the spreader in its operative position.

3. 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 flexible hangers connecting it to the housing, said hangers being dimensioned to suspend the spreader at an operative position, a closure cap for the discharge port carried on the spreader, and means including a fusible element normally upholding the cap in port closing position and retaining the spreader within the housing with its flexible hangers accommodated in said annular space but operable, upon fusing of said element, to release the cap and also the spreader, allowing its hangers to be extended for supporting it at operative position.

4. 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 with collapsible hangers connecting said spreader to the housing, said hangers being dimensioned when extended to suspend the spreader at an operative position below the ceiling, means including a fusible element and a member held in position thereby, said member being detachably engaged with the housing and extending under the discharge port, with a screw in said member adjustable to hold the cap in port closing position, said member also retaining the spreader and its collapsed hangers within the housing but being operable, upon fusing of said element, to release the cap and also the spreader, allowing the latter to descend to its operative position.

5. 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 with chains connecting said spreader to the housing, said chains being dimensioned to suspend the spreader in an operative position below the ceiling, means including a fusible element normally upholding the cap in port closing position and retaining the spreader with its chains in collapsed position within the housing, said means being operable, upon fusing of said element, to release the cap and also the spreader, allowing the latter to descend below the ceiling to the extent permitted by said chains.

6. A sprinkler head for a fire extinguishing system comprising a housing disposed with its lower end substantially flush with a ceiling, a downwardly opening discharge port within said housing, a closure cap for said port, a spreader with flexible hangers therefor attached to the housing at points laterally adjacent the port and attached to the spreader near its periphery, leaving the port unobstructed except by said cap, and means including a fusible element normally upholding the cap in port closing position and retaining the spreader and its flexible hangers within the housing, said means being operable upon fusing of said element to release the cap and also the spreader, allowing the latter to descend below the plane of the ceiling to the extent permitted by said flexible hangers.

7. 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 with collapsible hangers connecting said spreader to the housing, said hangers being dimensioned when extended to suspend the spreader at an operative position below the ceiling, 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, means extending upwardly from said member holding the cap in port closing position and retaining the spreader within the housing, said hangers being accommodated in collapsed form within the housing, the fusing of said link permitting the catch to swing about its pivot and disengage the shoulder of the housing whereby said member releases the closure cap from the port and releases the spreader from the housing.

8. 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 with collapsible means connecting said spreader to the housing, said means being dimensioned when extended to suspend the spreader at an operative position below the ceiling, a pair of levers pivoted together forming a toggle with their respective ends engaging the lower portion of the housing and having arms depending below the plane of the ceiling, a fusible link connecting said arms, and means carried by the toggle upholding said cap in port closing position with said spreader and its collapsible suspending means disposed within the housing, said toggle including laterally extending portions forming a disk which normally closes the lower end of the housing and retains the collapsible means therein.

9. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a fixed anchorage adjacent said conduit, a spreader having a portion adapted to serve as a closure for said port, flexible means connecting the said spreader to said fixed anchorage and dimensioned to support the spreader at an operative distance from said port but permitting the said spreader to be placed in port closing position, and means including fusible means normally holding the spreader in that position.

10. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a fixed anchorage adjacent and outside said conduit, a spreader having a portion adapted to serve as a closure for said port, collapsible means disposed entirely outside said conduit and connecting the spreader to said fixed anchorage, said means being dimensioned to support the spreader at an operative distance from said port but permitting the spreader to be placed in port closing position with said connecting means collapsed, and means including fusible means normally holding the spreader in that position.

11. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a fixed anchorage adjacent

said conduit, a spreader including a closure cap for said port, a plurality of flexible members connecting the spreader to said anchorage, said members 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 connecting members flexed, and means including fusible means normally holding the cap in that position.

12. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, anchorage means carried by and externally of said conduit, a closure cap for said port, a spreader with chains 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.

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

14. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a fixed anchorage adjacent said conduit, a closure cap for said port, a spreader with flexible hanger means therefor attached to said anchorage and attached to the spreader near its periphery, said hanger means being dimensioned to support the spreader at an operative distance from said port, and means including fusible means normally holding the cap in port closing position.

15. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a closure cap for said port, an anchorage structure externally adjacent the conduit, a spreader with hangers consisting of chains disposed laterally of the discharge port and engaging the spreader adjacent its periphery for connecting the spreader to said anchorage, said chains being dimensioned to support the spreader at an operative distance from said port, and retaining means including a fusible element, said retaining means being detachably engaged with said anchorage structure and normally holding the closure cap in port closing position.

16. A sprinkler head for a fire extinguishing system comprising a liquid supply conduit having a discharge port, a fixed anchorage adjacent said conduit, a closure cap for said port, a spreader with flexible hanger means therefor attached to said anchorage and attached to the spreader near its periphery, said hanger means being dimensioned to support the spreader at an operative distance from said port, and means including fusible means normally holding the cap in port closing position with the spreader closely adjacent thereto and with said hanger means flexed.

EMIL TYDEN.