Sept. 3, 1940. E. R. LOWE 2,213,527

SPRINKLER HEAD

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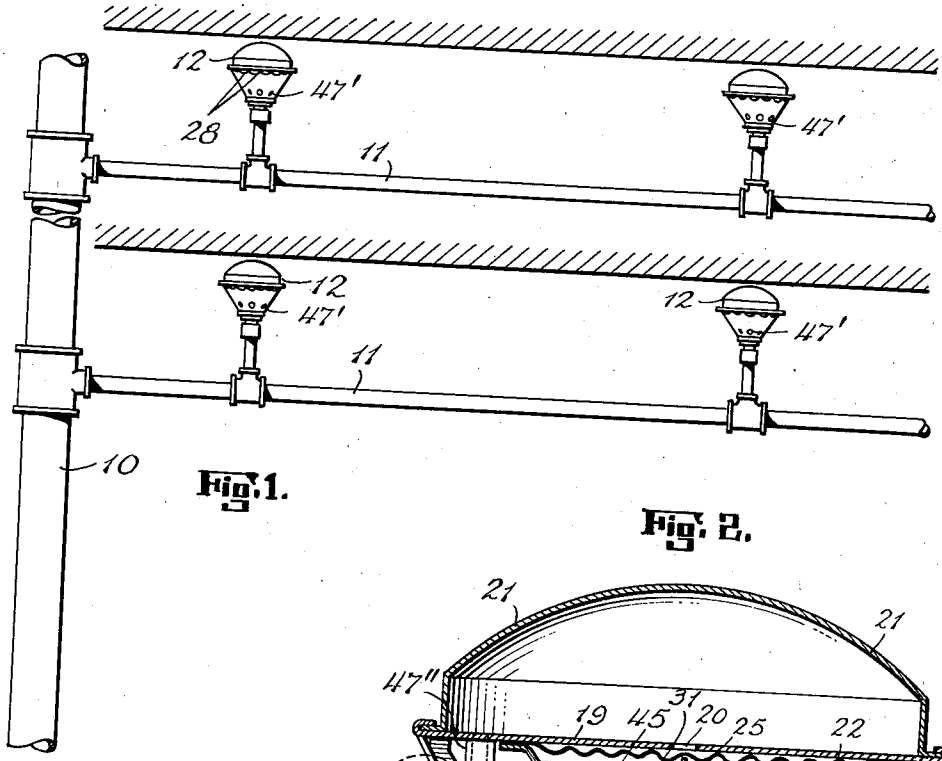


Fig. 1.

Fig. 2.

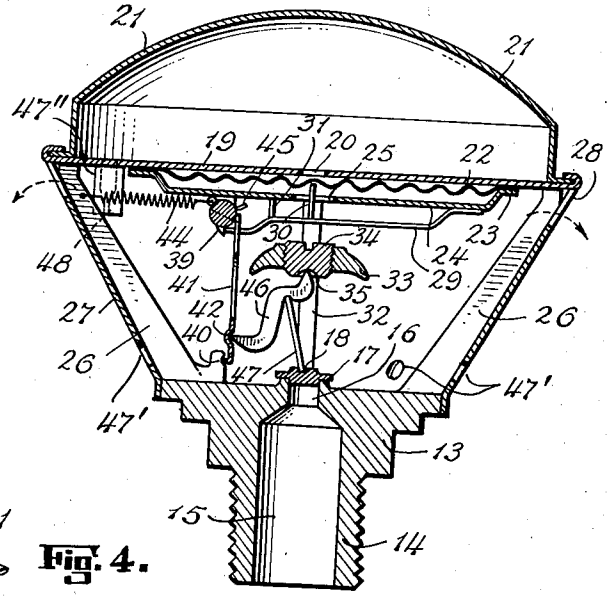


Fig. 3.

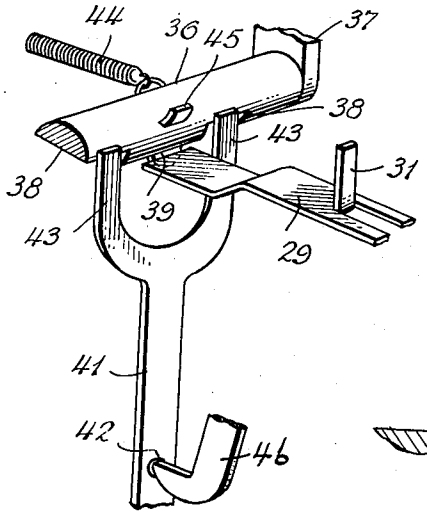
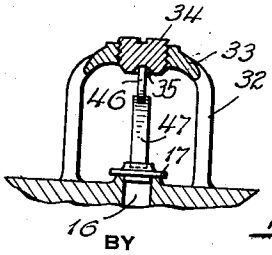


Fig. 4.



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SPRINKLER HEAD

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Application May 7, 1938, Serial No. 206,547

7 Claims. (Cl. 169—37)

This invention relates to automatic sprinkler systems or apparatus and more particularly to the specific construction of the sprinkler heads which are adapted to receive and discharge a fire extinguishing medium, such as water, to a fire should one occur.

The principal object of the invention is the production of an automatic and quick-acting sprinkler head so constructed as to function with ease and expedition when necessity arises.

A further object of the invention is the production of a sprinkler head which shall be constructed of few parts, easily replaceable, and which may be "set up" into operative position with ease and facility.

The sprinkler head constructed according to the present invention is one susceptible to a sudden rate-of-rise of temperature, such as that occasioned by a fire, in contradistinction to a sprinkler head adapted to operate when a predetermined degree of temperature has been reached. The device of the invention is described with reference to a so-called "wet" pipe system, that is, one in which a conventional riser pipe and distributing or branch pipes connected therewith are normally filled with water or other fire extinguishing medium, although the sprinkler head may also be used in conjunction with "dry" pipe systems in which the riser and branch pipes are normally empty or filled with compressed air.

Other and further objects of the invention will be apparent as the description thereof proceeds, the invention consisting in the novel and improved sprinkler head and parts thereof hereinafter more particularly described and then specified in the claims.

In the accompanying drawing illustrating a practical embodiment of the invention:

Fig. 1 is a fragmentary portion of an automatic sprinkler system showing the sprinkler heads of the invention connected to one or more distributing or branch pipes.

Fig. 2 is a horizontal section taken through one of the sprinkler heads.

Fig. 3 is a perspective view of a portion of the interior mechanism of the sprinkler head.

Fig. 4 is a side elevation of a portion of the mechanism of the sprinkler head.

Referring to the accompanying drawing:

The reference numeral 10 indicates a riser connected to a source of extinguishing fluid, such as water, and which is provided with a conventional and usual control valve (not shown) of any desired type. Other details of the system are also omitted as they are now well known and old in the art and therefore require no explanation. Leading from and connected to the riser 10 are branch pipes 11 which receive water from the riser 10, said riser and branch pipes being normally filled with water or other extinguishing medium for discharge from the sprinkler heads which are indicated generally at 12 and which are connected by pipes or any other suitable means to the distributing pipes 11 at spaced intervals thereon. The brief description of the system to which the improved sprinkler heads are applied is thought to be sufficient for a general understanding of the application of the sprinkler head of the invention and the manner in which it functions.

Referring now to Figs. 2 to 4 inclusive describing the specific construction of the sprinkler head:

The body of the sprinkler head is indicated at 13 and it is provided with a downwardly depending screw-threaded shank 14 preferably integral therewith adapted to be screwed directly to the branch or distributing pipes 11 or to connections fastened to said distributing pipes. A water passageway for receiving water from the distributing pipes for discharge by the sprinkler head is indicated at 15 and extends vertically through said shank 14 and body 13 and terminates in an outlet 16 of somewhat reduced diameter, as illustrated, which outlet is normally closed by a cap or closure 17 provided with a depression 18 preferably centrally thereof.

The upper portion of the sprinkler head comprises a chamber, preferably metallic in character, and provided with a base 19 having an opening 20 therein and a somewhat dome-shaped head 21 whose lower edge is preferably outwardly turned to form an annular flange interlocked with a corresponding flange on the edge of the base 19. A flexible diaphragm 22 is positioned beneath said base 19 and the edge thereof is anchored between said base and the annular flange 23 of a supporting member 24 which is provided with a central opening 25 therein preferably in alignment with the opening 20. The head 21 is connected to the body 13 in spaced relation thereto by upwardly and outwardly flaring arms or supports 26 and the interior mechanism is preferably protected from dust and exposure by an annular shield or cover 27, the lower flanged end of which frictionally engages the peripheral upper edge of the body 13. The upper edge of said shield is serrated or provided with openings

28 to permit the discharge of water from the sprinkler head in a plurality of streams.

A spring-like co-operating detent member comprising a flat spring metallic strip of the configuration illustrated is indicated at 29 and has one end secured to the supporting member 24 and also carries a pin 30 engaging the underside of diaphragm 22. It also is provided with a stop 31 adapted to engage the supporting member 24 to limit the upper movement of the free end of said member 29. The stop 31 may be cut out of the metal of member 29 if so desired.

The supporting arms of a strut support or frame are indicated at 32 and they are secured to the body 13 in any desired manner. Said strut support is provided with a deflector head 33, the outer edge of which flares downwardly for fluid deflecting purposes and said head is provided with a screw-threaded opening centrally thereof receiving a screw-threaded plug or nut 34 having a depression 35 in the lower side thereof.

A detent roller is indicated at 36. Its ends are suitably journalled in bearings 37 fastened to the underside of the support 24 and it is provided with a flat side 38 and with a detent lug 39 normally engaging the edge of the free end of the co-operating detent member 29, all as more clearly shown in Fig. 3. A recessed lug 40 is secured to the body 13 or to one of the arms 26 and the recess thereof receives the flanged end of a strut member 41 provided with a depression 42 and an upper forked end 43, the arms of which normally engage the rounded or high side of the roller 36. One end of a tension spring 44 is fastened to the roller 36 while the other end is anchored to any stationary part of the mechanism, such as one of the supporting arms 26. The action of the spring tends to rotate the roller in a counter-clockwise direction, the extent or degree of rotation being limited by stop 45 carried by said roller and adapted to engage the support 24.

A second shouldered strut member of the configuration illustrated is indicated at 46 and has its lower laterally-extended or flanged end engaging within the depression 42 of the strut 41 while its upper end engages within the depression 35 of the nut or plug 34. The shouldered portion of said strut 46 is received by the upper end of a strut member 47 and its lower end engages within the depression 18 of the cap 17.

When the mechanism of the sprinkler head which has been described is in "set" or operative position, the strut members assume the positions shown in Fig. 2 and they are collapsibly held in these positions by tightening of the nut of plug 34 within the head 33. When in such operative position, the fork members 43 of strut 41 engage against the high or rounded portion of roller 36.

Upon the occurrence of a fire occasioning a sudden rate-of-rise of temperature, the air in chamber 21 is heated and expands rapidly and such expanded air flows through the opening 20 and exerts downward pressure against the diaphragm 22. This has the effect of pressing the pin 30 and the attached spring metallic strip 29 downwardly to release the free end of said strip from its engagement with the detent lug 39 on the roller 36 whereby the action of the spring 44 will rotate the roller in a counter-clockwise direction to release the fork members 43 from their engagement with the rounded side of roller 36 and permit them to slide through the recessed portions of said roller.

Inasmuch as strut member 41 is then no longer supported, the entire strut mechanism comprising struts 41, 46 and 47 collapses and the cap 17 thereupon is automatically removed from its seat by the rush of water or other fluid from distributing pipe 11, through opening 15 and discharge opening 16. A part of said stream of water strikes against and is deflected downwardly by head 33 and through openings 47' and at the same time water is discharged outwardly through the serrated openings 28 in the shield 27. I preferably provide the base 19 of chamber 21 with a breather 47'' having an orifice 48 communicating with the chamber 21 and the outside atmosphere and acting to equalize the pressure on the upper and lower faces of the diaphragm 22. This compensates for any normal rise in temperature due to weather or other conditions occasioning a gradual increase in air pressure in the chamber 21. The orifice 48, however, is not large enough to accommodate the release of an abnormal expansion of air in chamber 21 due to a sudden rate-of-rise of temperature and such expanded air must therefore find an outlet through the opening 20, flex the diaphragm 21 and actuate the sprinkler head mechanism in the manner just described.

The sprinkler head is particularly efficacious for the reason that the detent mechanism holding the strut members from collapse and acting to retain the cap 17 on its seat is a very quick-acting one, as upon an abnormal rate-of-rise of temperature in the chamber 21, the spring 44 is instantaneously brought into action to release the inter-connecting parts and permit the mechanism to readily function in its intended and described manner.

The invention claimed is:

1. An automatic sprinkler head comprising a body provided with an outlet opening, a cap normally closing said opening, a chamber connected to said body and having an opening in a wall thereof, a flexible diaphragm associated with said chamber in proximity to the opening in said wall, inter-engaging strut members normally holding said cap in position to close the outlet opening in said body, a spring actuated detent normally holding said strut members in set position and means connecting said diaphragm and detent, said means being movable by the expansion of air in said chamber to release said detent and effect a collapse of said strut members and the consequent automatic removal of said cap from the outlet opening.

2. An automatic sprinkler head comprising a body provided with an outlet opening, a cap normally closing said opening, a chamber connected to said body and having an opening in a wall thereof, a flexible diaphragm susceptible of movement from the pressure of air flowing from said chamber and through its opening upon a sudden rate-of-rise of temperature, a spring element having a connection with said diaphragm and movable therewith, a spring-controlled detent engaging said spring element and means engaging said detent and connected to said cap and adapted to be disconnected therefrom to permit the automatic removal of said cap from said outlet opening when said spring element is disengaged from said detent by an increase of air pressure in said chamber.

3. An automatic sprinkler head comprising a body provided with an outlet opening, a cap nor-

mally closing said opening, an air chamber connected to said body and having an opening in a wall thereof, a flexible diaphragm susceptible of movement from the pressure of air flowing from said chamber and through its opening upon a sudden rate-of-rise of temperature, a spring element having one end anchored and the other end free, a spring-controlled rotatable detent normally engaging the free end of said spring element and collapsible means engaging said detent and said cap and adapted to be collapsed to automatically remove said cap from the outlet opening upon the disengagement of said spring element with said detent and upon rotation of said detent.

4. An automatic sprinkler head comprising a body provided with an outlet opening, a cap normally closing said opening, an air chamber connected to said body and having an opening in a wall thereof, a flexible diaphragm susceptible of movement from the pressure of air flowing from said chamber and through its opening upon a sudden rate-of-rise of temperature, a spring element movable with said diaphragm, a spring-controlled rotatable detent having a high and low side and engaging said spring element and collapsible means normally engaging the high side of said detent and connected to said cap and adapted to be collapsed to permit of the automatic removal of said cap from said outlet opening upon the disengagement of said spring element with said detent and the engagement of said collapsible means with the low side of said detent.

5. An automatic sprinkler head comprising a body provided with an outlet opening, a cap normally closing said opening, an air chamber connected to said body and having an opening in a wall thereof, a flexible diaphragm susceptible of movement from the pressure of air flowing from said chamber and through its opening upon a sudden rate-of-rise of temperature, a spring element movable with said diaphragm and having one end anchored and the other end free, a spring controlled rotatable detent comprising a roller having a flattened portion, said roller engaging the free end of said spring element, collapsible means engaging said roller and said cap and adapted to be collapsed to permit of the automatic removal of said cap from said outlet opening upon the disengagement of the free end of said spring element with said roller and the engagement of said collapsible means with the flattened portion of said roller and means to limit the degree of rotation of said roller.

6. An automatic sprinkler head comprising a body provided with an outlet opening, a removable cap closing said opening, an air chamber spaced from and connected to said body and having an opening in a wall thereof, a flexible diaphragm associated with said air chamber and adapted to be distended by the expansion of air flowing through said opening into contact with said diaphragm upon an abnormal rate-of-rise of temperature, a spring strip movable with said diaphragm, a spring-actuated detent engaging said strip, collapsible means connecting said detent and said cap and adapted to be collapsed to permit of the automatic removal of said cap when said spring strip becomes disengaged from said detent, a stationary frame or strut support supporting said collapsible means and means carried by said support for holding said collapsible means in set position.

7. An automatic sprinkler head comprising a body provided with an outlet opening, a removable cap closing said opening, an air chamber spaced from and connected to said body and having an opening in a wall thereof, a flexible diaphragm associated with said air chamber and adapted to be distended by the expansion of air flowing through said opening into contact with said diaphragm upon an abnormal rate-of-rise of temperature, a spring strip movable with said diaphragm, a spring-actuated detent engaging said strip, a series of inter-engaging strut members constituting a collapsible mechanism connecting said detent and said cap and adapted to be collapsed to permit of the automatic removal of said cap from the outlet opening when said spring strip becomes disengaged from said detent, a stationary frame or support, a head thereon supporting said collapsible mechanism and an adjustable plug carried by said head for holding said collapsible mechanism in set position.

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