June 5, 1951 H. R. AUGUSTE 2,555,461

EMERGENCY SHUTOFF TOOL FOR FIRE SPRINKLERS

Filed Jan. 17, 1949 2 Sheets-Sheet 1

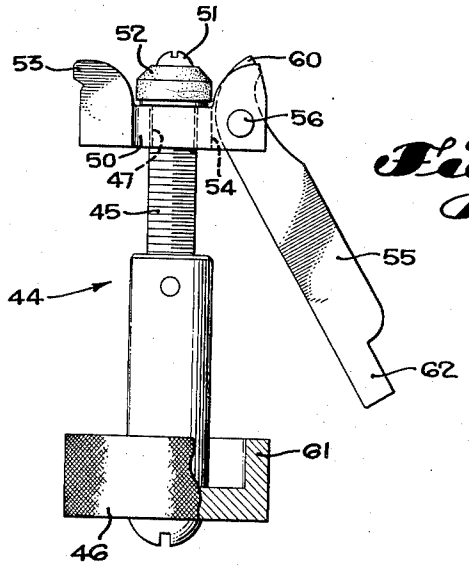


Fig. 2.

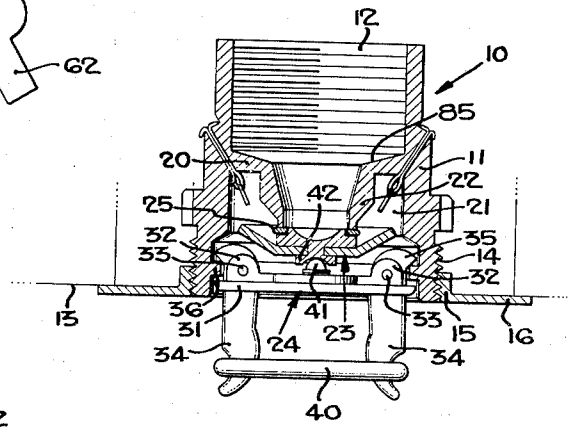


Fig. 1.

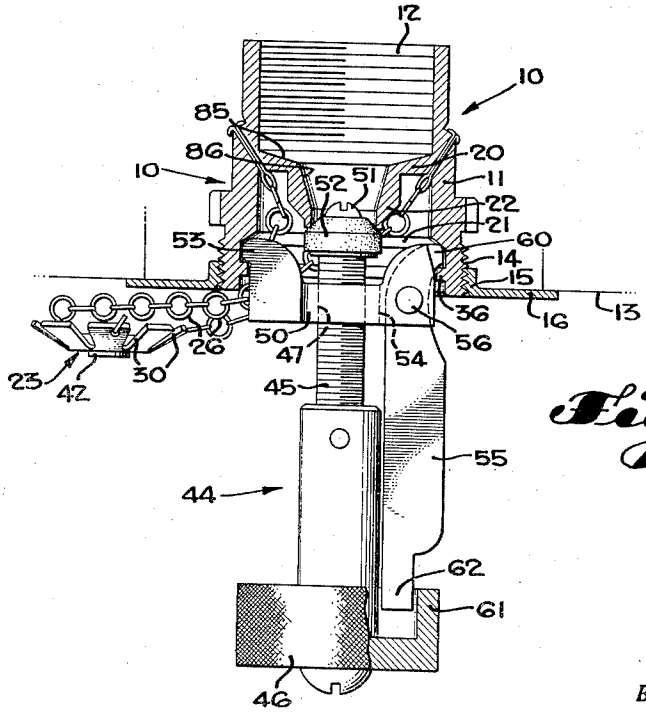


Fig. 3.

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EMERGENCY SHUTOFF TOOL FOR FIRE SPRINKLERS

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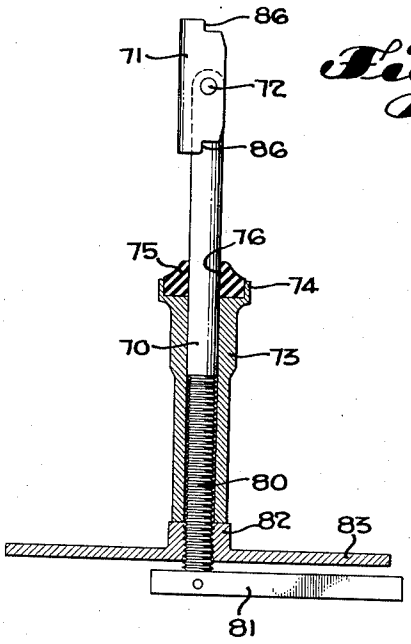


Fig. 4.

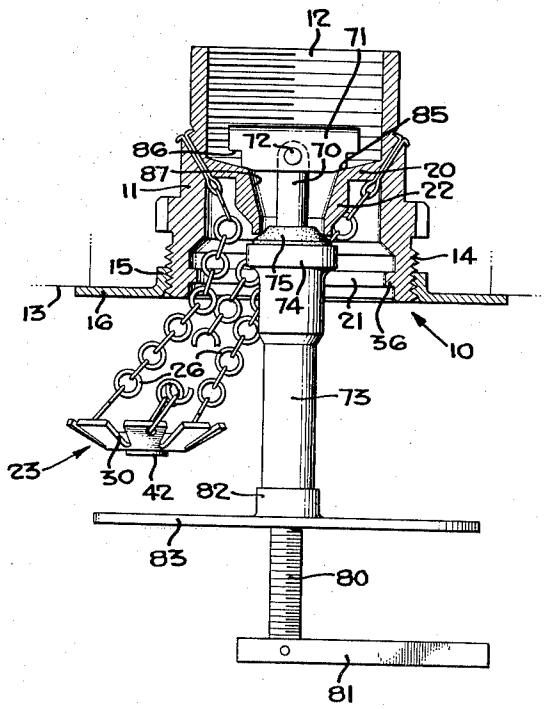


Fig. 5.

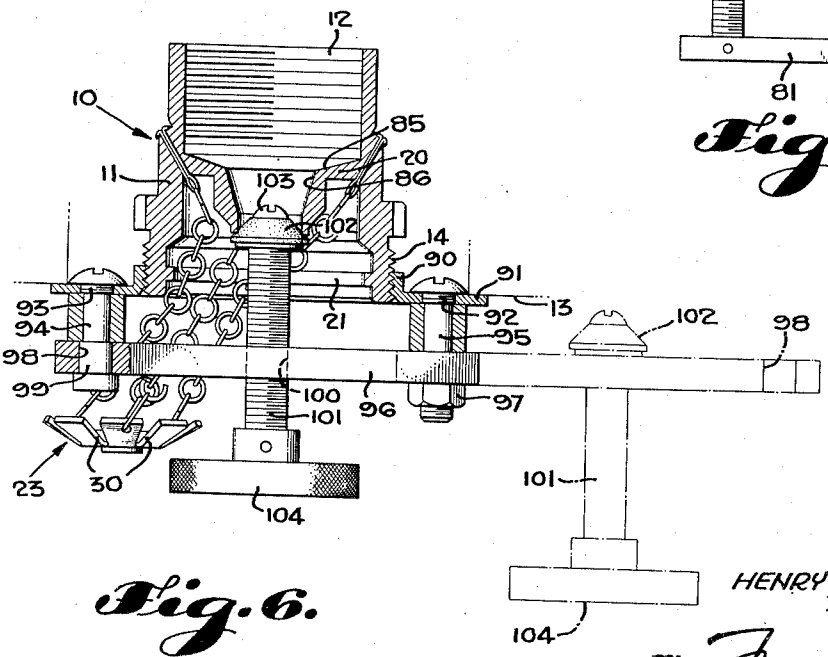


Fig. 6.

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Patented June 5, 1951 2,555,461

UNITED STATES PATENT OFFICE

2,555,461

EMERGENCY SHUTOFF TOOL FOR FIRE SPRINKLERS

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Application January 17, 1949, Serial No. 71,268

10 Claims. (Cl. 169—1)

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The present invention relates to an emergency tool for shutting off the flow of water issuing from an individual sprinkler head of the automatic fire extinguisher sprinkler systems used in most warehouses and in many public buildings, and is particularly designed for use with a relatively new type of sprinkler head which is mounted substantially flush with the ceiling. This new type of sprinkler head to which I refer comprises a body which is recessed into the ceiling so that its bottom end is flush with the ceiling surface, and formed in the exposed bottom end of the body is a cavity containing a recessed nozzle through which the water is discharged. The nozzle is normally closed by a chain-supported spreader or distributor, which is clamped tightly against the end of the nozzle by a cap having a pair of pivoted arms at opposite sides thereof. The top ends of the pivoted arms have outwardly facing lip portions that engage a shoulder flange formed on the inside of the cavity, and the lower ends of the arms are held together by a fusible link of metal which melts at a relatively low temperature. In the event of a fire, the abnormal heat melts the fusible link, releasing the arms and allowing the cap to fall away from the sprinkler head, whereupon the sprinkler head goes into action, discharging an umbrella-like water spray of considerable volume.

The emergency shut-off tool of the present invention is intended to stop the flow of water from an individual sprinkler head when no longer needed, so as to prevent further water damage to the building or its contents, without shutting off the entire system. As is well known to firemen and others engaged in the salvage or repair of fire-damaged buildings or their contents, the damage done by water pouring from the sprinkler heads of the automatic sprinkler system after the fire has been brought under local control sometimes greatly exceeds the actual damage due to the fire itself. In order to minimize this water damage, many fire-fighters are equipped with separate shut-off devices which are adapted to be affixed manually to each of the open sprinkler heads so as to stop the flow of water temporarily where it is no longer needed, yet without affecting the operation of other sprinkler heads in the system which may need to continue in operation so as to fight fire in their respective zones.

Prior sprinkler heads which project downwardly from the ceiling for a considerable distance, or which are connected into exposed water pipes, provide numerous points of attachment to which a shut-off implement can be secured, and there

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are many satisfactory implements for such sprinkler heads. The newly developed flush-type sprinkler head with which the present invention is concerned is entirely devoid of such external attaching surfaces, however, and therefore these prior shut-off implements cannot be used therewith. As a result, the flush-type sprinkler head presents a serious hazard in the form of excessive water damage in the event of a fire, or if the springler head should be set off accidentally by some other means.

The present invention has, as its primary object, therefore, the provision of an emergency shut-off tool which is particularly designed for use with the flush-type sprinkler head to shut off the flow of water issuing therefrom. This object is achieved in two of the embodiments of my invention by providing novel means for attaching the implement to certain upwardly facing shoulders on the inside of the sprinkler head body, while the third illustrative embodiment of my invention utilizes external threads on the bottom end of a sprinkler head to which an ornamental molding ring is normally attached.

Another object of my invention is to provide an emergency shut-off tool which is simple to operate and which can quickly and conveniently be attached to the open sprinkler head in the minimum time.

A further object of the invention is to provide an inexpensive shut-off tool of the class described which is compact in design and rugged in construction.

Other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of three illustrative embodiments thereof, reference being had to the accompanying drawings, wherein:

Figure 1 is a sectional view through a flush-type sprinkler head of the type referred to, showing the cap or closure in place;

Figure 2 is a partially cut away, elevational view of the preferred form of my invention;

Figure 3 is a sectional view through an open sprinkler head, showing the shut-off tool attached thereto;

Figure 4 is a partially sectioned view of another form of the invention, showing the pivoted cross head at the top end of the stem swung around to a position generally parallel to the stem so that it can be inserted through the nozzle of the open sprinkler head;

Figure 5 is a sectional view through a sprinkler

head, showing the same tool in operative position; and

Figure 6 shows still another form of the invention as it appears when attached to a sprinkler head.

The flush-type sprinkler head with which the present invention is concerned is designated in its entirety by the reference numeral 10, and comprises a generally cylindrical body 11 which is threaded internally at 12 so that it can be screwed onto one of the nipple fittings (not shown) of the water supply pipe. The bottom end of the body is substantially flush with the surface of the ceiling 13, and is threaded externally at 14 to receive an ornamental molding ring 15. The ring 15 has a wide radial flange 16 projecting therefrom which is brought up flat against the ceiling to conceal the edges of the hole in the ceiling through which the sprinkler head projects.

Formed on the inside of the body 11 at about the midpoint thereof is a partition 20 which constitutes the bottom of a downwardly opening cavity 21, and projecting downwardly from the center of the partition 20 is a nozzle 22 through which the water is discharged. The end of the nozzle 22 is spaced inwardly from the bottom end of the body 11 so that the nozzle is recessed entirely within the cavity. The nozzle 22 is normally closed by means of a spreader or distributor 23 which is clamped tightly against the end of the nozzle by a cap 24, with an intermediate soft copper gasket ring 25 between them to secure a water-tight seal, as shown in Figure 1. The distributor 23 is in the form of a circular disk which is attached to four chains 26 that are fastened to the partition 20, and when the sprinkler head has been set off, the distributor hangs straight down on the chains in the path of the solid stream of water issuing from the nozzle. A plurality of radially inwardly extending slots 30 are formed around the edge of the distributor, and the latter is dished slightly as shown, so that the stream of water impinging against it is broken up into a fine spray and scattered out over a considerable area.

The cap 24 consists of a generally circular metal disk 31 which is of a diameter to be received within the bottom end of the cavity 21, and formed on the top side of the disk are two diametrically opposed pairs of lugs 32 which are drilled transversely to receive pivot pins 33. Pivotally supported on the pins 33 and extending downwardly through suitable slots in the disk 31 are arms 34, each of which has an outwardly projecting lip 35 formed at its upper end. When the arms 34 are rocked about their pivots to swing the upper ends outwardly, the lips 35 engage the top surface of an upwardly facing, annular shoulder flange 36 formed on the inside of the body 11, so as to secure the cap 24 to the sprinkler head. The free lower ends of the arms 34 are held together by a fusible link 40 of metal having an extremely low melting point. As long as the link 40 remains intact, the lower ends of the arms 34 are held together and the lips 35 are spread outwardly in engagement with the shoulder flange 36. When the link 40 melts from the abnormal temperature caused by a fire, however, the lower ends of the arms 34 are released and allowed to swing outwardly away from one another, thereby retracting the lips 35 from the shoulder flange 36 so that the cap 24 is released and allowed to fall away from the sprinkler head. A screw 41 extending upwardly through the center of the cap 24 engages a button 42 on the bottom of the distributor cap 23 and holds the latter tightly against the end of the nozzle 22.

The preferred form of the invention designated generally by the reference numeral 44 in Figures 2 and 3, comprises a screw-threaded stem 45 having a knurled circular handle 46 attached to the bottom end thereof. The stem 45 is screwed upwardly through a tapped hole 47 formed at the midpoint of a supporting member or cross-bar 50, and attached to the top end of the stem by a screw 51 is a tapered-nosed valve plug 52 of rubber or like material which is adapted to seat on the end of the nozzle 22 to shut off the flow of water issuing therefrom. Formed on one end of the cross-bar 50 is an outwardly projecting lip 53 which is engageable over the shoulder flange 36 of the sprinkler head when the cap 24 is gone. The other end of the cross-bar 50 is slotted at 54 in the axial plane of stem 45, and positioned within this slot is the upper end of a lever arm 55. The lever arm 55 is connected to the cross-bar 50 by a transverse pivot pin 56, and is swingable between the unlocked position shown in Figure 2, extending outwardly from the stem 45 at an acute angle thereto, and the locking position shown in Figure 3, wherein the arm 55 is substantially parallel to the stem. An outwardly directed lip 60 is formed at the top end of the lever arm 55 and is engageable over the shoulder flange 36 of the sprinkler head when the arm is in the position shown in Figure 3.

When it becomes necessary to shut off an open sprinkler head, the lever arm 55 of the tool is first swung outwardly to the position shown in Figure 2, after which the left-hand end of the cross-bar 50 is introduced upwardly at an angle into the cavity 21 of the sprinkler head to engage the lip 53 over the shoulder flange 36. During this operation, the distributor 23 is, of course, held over to one side and out of the way. When the lip 53 is hooked onto the flange 36, the right-hand end of the cross-bar 50 is swung upwardly into the cavity 21, and the lever arm 55 is then brought down to the locking position shown in Figure 3, causing the lip 60 to engage the shoulder flange 36. The lever arm 55 is held in this position while the handle 46 is turned up rapidly to advance the stem 45, through the cross-bar so that the valve plug 52 seats on the end of the nozzle 22 to shut off the flow of water. The handle 46 is preferably circular, as shown, and is formed with an upwardly projecting annular flange 61 on its top side which is adapted to pass over and confine the bottom end 62 of the arm 55 to hold the latter in the locking position. It will be noted from the foregoing description that the tapped hole 47 in the supporting member 50 functions as a guiding means for the stem 45, and is positioned coaxial with the nozzle 22 when the tool is attached to the sprinkler head.

The operation of applying the implement to the sprinkler head requires only a few seconds, and enables the operator to cut off the flow of water quickly from that particular sprinkler head without interrupting the operation of other sprinkler heads in the system. When the fire has been completely extinguished, the water valve for the entire sprinkler system is shut off, and the sprinkler heads which have been put into operation are removed and replaced by new ones; the old heads being returned to a shop or to the factory to be reset and secured by a new fusible link 40.

Another embodiment of the invention, illus-

trated in Figures 4 and 5, approaches the problem of securing attachment of the tools to the sprinkler head from a different angle. In this case, the stem 70 has a supporting member or cross-head 71 pivotally attached to its upper end by a pin 72, the said cross-head being swingable between the inserting position shown in Figure 4, generally parallel to the stem 70, and the locking position shown in Figure 5, substantially perpendicular to the stem. Slidably mounted on the stem 70 is a tubular sleeve 73, having an annular flange 74 at its top end which forms a cup to receive a valve plug 75 of rubber or the like. The valve plug 75 is apertured centrally at 76 to permit passage of the stem 70. The lower portion of the stem 70 is provided with threads 80, and fixed to the bottom end of the stem is a handle 81. Screwed onto the threads 80 of the stem is a locking member 82 which is engageable with the bottom end of the sleeve 73 to press upwardly against the latter. The locking member 82 may take any desired form, and is herein shown as comprising a cylindrical hub having a wide, radial flange 83 at the bottom end thereof, the rim of which can be given a quick flip with one hand so as to spin the member rapidly up the threads 80.

In applying this form of the shut-off tool to an open sprinkler head, the cross-head 71 is first swung around to the inserting position shown in Figure 4, and is then thrust upwardly through the nozzle 22. When the cross-head 71 gets above the partition 20, the turbulence of the water causes the cross-head to swing around to the locking position shown in Figure 5, in which position the cross-head becomes lodged on the upwardly facing shoulder 85 formed by the top surface of the partition 20. Notches 86 are provided at each end of the cross-head 71 which enable the cross-head to catch on the corner formed at the intersection of the shoulder 85 with the throat 87 of the nozzle in the event that the cross-head becomes cocked at an angle or otherwise fails to catch squarely on the shoulder 85, as shown. When the cross-head 71 becomes lodged on the shoulder 85, the sleeve 73 is pushed upwardly against the end of the nozzle 22, and the locking member 82 is then spun rapidly up the threads 80 to press the valve plug tightly against the end of the nozzle and prevent the sleeve 73 from being pushed back along the stem by the pressure of the water. The sleeve 73 is preferably a snug sliding fit on the stem 70, and the hole 76 in the rubber valve plug 75 is slightly undersized so that the frictional resistance of the sleeve and valve plug to sliding movement along the stem is relatively high and tends to hold the sleeve against being pushed backwardly by the pressure of the water issuing from the nozzle, until the valve plug is substantially seated. The locking member 82, is advanced along the threaded stem to back up the sleeve 73 and hold the valve plug closed tightly against the end of the nozzle. In this case, the stem 70 serves as the guiding means for the valve plug, and the stem is located substantially coaxial with the nozzle 22 when the tool is attached to the sprinkler head.

The third form of the invention, illustrated in Figure 6, makes use of the external threads 14 at the bottom end of the sprinkler head body 11 to secure attachment of the tool thereto. To this end, the tool is provided with an internally threaded ring 90 which is adapted to be screwed onto the thread 14 after the ornamental molding

ring 15 has been removed. The ring 90 has a radial flange 91 at its lower edge which is drilled at one side to receive a downwardly extending pivot screw 92, and at the other side to receive a screw 93 which secures a post 94 to the under side of the flange. A spacer 95 is secured on the pivot screw 92 below the flange 91, and swingably mounted on the pivot screw at the bottom end of said spacer is a supporting member or cross bar 96, which is held in place by a nut 97.

The free end of the cross bar 96 has a notch 98 formed in one of the side edges thereof, which is adapted to receive a reduced-diameter portion 99 of the post 94 to secure the cross bar in operative position, transverse to the axis of the nozzle. Formed in the center of the cross bar 96 is a tapped hole 100 through which extends a screw-threaded stem 101. A tapered-nosed valve plug 102 is secured by a screw 103 to the top end of stem 101 and is adapted to seat on and close the nozzle 22. A knurled, circular handle 104 is attached to the bottom end of stem 101.

When this embodiment of the invention is used to shut off an open sprinkler head, the ornamental molding ring of the sprinkler head is first removed; after which the ring 90 is screwed onto the thread 14. During this time, the cross bar 96 is swung over to the position shown in phantom lines in Figures 6, out of the way of the stream of water issuing from the nozzle 22. When the ring 90 has been screwed onto the thread 14 for two or three threads, the cross bar 96 is swung over to operative position, with the notch 98 engaging the post 94. The stem 101 is then turned up rapidly to advance the valve plug 102 into seating engagement with the end of the nozzle 22. In this instance, the tapped hole 100 in the cross bar 96 serves as guiding means for the valve plug 102 as the latter is moved into seating engagement with the nozzle.

While I have shown and described the three illustrated embodiments of my invention in considerable detail, it is to be understood that such details are not in any sense restrictive, and that various changes may be made in the shape and arrangement of the several parts thereof without departing from the broad scope of the invention, as defined in the appended claims.

I claim:

1. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a downwardly directed nozzle through which water is discharged, said shut-off tool comprising a supporting member adapted to be attached to said body transverse to the axis of said nozzle, said supporting member having guiding means adapted to be aligned with the axis of said nozzle, and a valve plug movable axially along said guiding means to seat on and close said nozzle, said valve plug having a connection with said guiding means whereby the valve plug is held to its seating engagement with said nozzle against the pressure of the water.

2. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said shut-off tool comprising a supporting member adapted to be attached to said body transverse to the axis of said nozzle, said supporting member having a screw-threaded hole formed therein which is adapted to be positioned coaxial

with said nozzle, a stem threaded into said hole, and a valve plug on the end of said stem engageable with said nozzle to shut off the flow of water issuing therefrom.

3. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said cavity being formed with an upwardly facing shoulder concentric with said nozzle, said shut-off tool comprising a cross bar having end portions which are adapted to engage said shoulder when the cross bar is inserted into said cavity transverse to the axis of said nozzle, and a valve plug movable with respect to said cross bar to seat on and close said nozzle, said valve plug having a connection with said cross bar whereby the valve plug is held to its seating engagement with said nozzle against the pressure of the water.

4. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said cavity being formed with an upwardly facing shoulder concentric with said nozzle, said shut-off tool comprising a cross bar having end portions which are adapted to engage said shoulder when the cross bar is inserted into said cavity transverse to the axis of said nozzle, at least one of said end portions being retractable so as to disengage said shoulder and permit removal of said cross bar from said cavity, and a valve plug having a screw-threaded connection with said cross bar, said valve plug being adapted to seat on and close said nozzle to shut off the flow of water issuing therefrom.

5. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said cavity being formed with an upwardly facing shoulder concentric with said nozzle, said shut-off tool comprising a cross bar having a lip at one end engageable with said shoulder, a lever arm pivoted on the other end of said cross bar and having a lip engageable with said shoulder when the lever arm is in one position, a stem screw-threaded through said cross bar and having a valve plug on the top end thereof, said valve plug being adapted to seat on and close said nozzle, and means for holding said lever arm in said one position when said valve plug is seated on said nozzle.

6. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said cavity being formed with an upwardly facing shoulder concentric with said nozzle, said shut-off tool comprising a cross bar having a lip at one end engageable with said shoulder, a lever arm pivoted on the other end of said cross bar for swinging movement between a locking position generally parallel to the axis of said nozzle and an unlocked position at an angle thereto, said lever arm having a lip at one end engageable with said shoulder when said arm is in said locking position, said cross bar having a screw-threaded hole formed therein coaxial with said nozzle, a stem threaded through said hole, a valve plug fixed to the top end of said stem and engageable with said nozzle to shut off the flow of water issuing therefrom, a handle fixed to the bottom end of said stem, and an annular flange on said handle engageable with the other end of said lever arm to hold the latter in said locking position when said valve plug is screwed up against said nozzle.

7. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said body having an upwardly facing shoulder formed therein on the upstream side of said nozzle, said shut-off tool comprising a screw-threaded stem, a cross-piece pivotally connected at its midpoint to the top end of said stem, said cross-piece being swingable between a first position generally parallel to said stem and a second position substantially perpendicular thereto, said cross-piece being adapted to be inserted through said nozzle when in said first position, and to engage said shoulder on opposite sides of the axis of said nozzle when in said second position, a valve plug slidable on said stem to seat on and close said nozzle, and means having a screw-threaded engagement with said stem for holding said plug on its seat against the pressure of the water.

8. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said body having an upwardly facing shoulder formed therein on the upstream side of said nozzle, said shut-off tool comprising a screw-threaded stem, a cross-piece pivotally connected intermediate its ends to the top end of said stem, said cross-piece being swingable between a first position generally parallel to said stem and a second position substantially perpendicular thereto, said cross-piece being adapted to be inserted through said nozzle when in said first position, and to engage said shoulder on opposite sides of the axis of said nozzle when in said second position, a tubular sleeve encircling said stem and slidable thereon, an annular valve plug fixed to the top end of said sleeve and engageable with said nozzle to close the same, and a locking member having a screw-threaded connection with said stem and engageable with the bottom end of said sleeve to hold said valve plug closed on said nozzle against the pressure of the water.

9. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body mounted substantially flush with the ceiling and having a cavity formed therein containing a recessed nozzle through which water is discharged, said body being threaded externally to receive an ornamental molding ring, said shut-off tool comprising an internally threaded ring which is adapted to be screwed onto said body in place of said ornamental molding ring after the latter has been removed, a pivot bolt fixed to and projecting downwardly from one side of said ring, a cross bar swingably supported at one of its ends on said pivot bolt, a post fixed to and projecting downwardly from the other side of said ring diametrically across from said pivot bolt, said post being engageable with the other end of said cross bar to secure the same in operative position transverse to said nozzle, a stem screw-threaded through said cross bar coaxial with said nozzle, and a valve plug on the top end

of said stem engageable with said nozzle to shut off the flow of water issuing therefrom.

10. An emergency shut-off tool for use with automatic fire sprinkler heads of the type comprising a body having a cavity formed therein containing a downwardly directed nozzle through which water is discharged, said shut-off tool comprising a valve plug movable axially upwardly to engage said nozzle, concentric relatively rotatable internally and externally screwthreaded members threadedly engaging one another, said members axially alined with said plug, one of said members being operatively connected with said plug, and means connected with the other of said members embodying a cross-bar adapted to be disposed transverse of said cavity and to engage downwardly against said body for support against downward pressure, and means for rotating the

screwthreaded member connected to the valve plug to screw the latter towards and tightly against said nozzle, said cross-bar engaging downwardly against said body supporting said screwthreaded members and said plug against the stress arising from the pressural engagement of said valve plug with said nozzle.

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