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(54) **A SPRINKLER HEAD TRIGGERING APPARATUS**

VORRICHTUNG ZUR AUFLÖSUNG EINES SPRINKLERKOPFES

DISPOSITIF DE DECLENCHEMENT D'UNE TETE DE SPRINKLEUR

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Description

FIELD OF THE INVENTION

[0001] The present invention refers to a sprinkler head triggering apparatus, comprising a spray nozzle with an actuator being releasable by heating to a certain temperature, and which normally holds a valve piston in a closed position against a valve seat, which valve piston, at release of the actuator, is movable in a piston sleeve in the direction away from said seat, for opening a flow passage from a feed line for pressurized water to the spray nozzle.

BACKGROUND OF THE INVENTION

[0002] Sprinkler heads are used in sprinkler systems for fire extinguishing inside plants, buildings and on ships. Often, such a sprinkler head is provided with a triggering device comprising an actuator, e.g. a glass bulb which is actuated by heating to a high ambient temperature. It is also known from WO-A-9321998 to provide such a glass bulb with an electrode which may explode the bulb electrically by remote control, e.g. by a signal from a smoke detector or for functional testing.

[0003] A drawback with sprinkler systems which are equipped with such actuator means is that the functional testing of the system is very difficult to perform. For example, each bulb must be exchanged and the restoration of the system to normal function thus takes a long time. Normally there are regulations for performing such function testing according to a certain regularity.

[0004] Therefore, demands for the opportunity of a simple and effective functional testing has led to the development of sprinkler systems with one or more centrally located actuator apparatuses with electrically controlled flow valves for actuation of an optional number of spray heads, either for functional testing or for detection of an alarm, e.g. via a smoke detector. Thus, the spray heads at these sprinkler systems are not provided with the actuator, and the feed lines between valve units and spray heads are consequently dry.

[0005] A substantial drawback with these "modern" sprinkler systems, is that each individual spray head, or individual group of sprinkler heads, which shall be individually manoeuvrable, must be provided with a separate feed line to the valve unit. This involves installation of a lot of feeder pipes in parallel, which makes the installation more expensive. Also, such a system leads to a higher flow resistance than a system which branches away from a common main line.

THE TECHNICAL PROBLEM

[0006] One purpose of the present invention is therefore to provide a triggering apparatus which can be released directly both mechanically by means of a heat fuse, and also by means of electrical remote control, e.g. via a smoke detector, without the need for particular flow valves. Another object is to provide a triggering apparatus which is simple to test functionally.

THE SOLUTION

[0007] This is accomplished according to the invention, in that the flow passage is openable in the normal closed position of the valve piston with intact actuator, via a remote control operated pilot piston, that the valve piston is provided with a central bore and a first angular passage, and that the central bore and the first angular passage together with a second annular passage through a bulb screw, and a space form the flow passage which may be opened by the pilot piston.

[0008] Advantageous variants of the invention are described in the depending claims.

DESCRIPTION OF THE DRAWINGS

[0009] The invention will be described hereinafter with reference to embodiments shown in the enclosed drawings, wherein

- Fig. 1 is a partly sectioned view of a triggering apparatus designed in accordance with the invention,
- Fig. 2 shows in a slightly larger scale a secondary piston belonging to the triggering apparatus,
- Fig. 3 shows a valve piston belonging to the triggering apparatus, and
- Fig. 4 shows a bulb screw belonging to the triggering apparatus.

DESCRIPTION OF EMBODIMENTS

[0010] The triggering apparatus according to the invention is in the following embodiment shown together with a sprinkler head of a special high pressure type, but the invention is not limited to this type of sprinkler nozzles.

[0011] The nozzle comprises a holder 10 which forms an attachment for a nozzle head 11. This head 11 is in its turn mounted in the holder 10 by means of a bulb screw 12 which projects with one of its ends into the holder and which carries a bulb protector 13 at its other end. A glass bulb 14 is mounted at the outer end of a valve piston 15 which is movable journalled inside the bulb screw 12, in such a way that the piston 15 is held in a closed position against a valve seat. This valve seat is formed by a conical part 16 of a secondary piston 17.

[0012] If the glass bulb 14 is subjected to heat above a certain temperature, e.g. 70°C, the bulb breaks and the valve piston 15 is able to move in the direction downward in Fig. 1, by the action of a fluid pressure prevailing within the space 18. This pressure is transmitted to the space via a feed line which is not shown in the drawing and which is connected at right angle to said space, act-

ing against the end edge of said valve piston 15, which in this end portion is provided with an axially projecting, central bore 19. Thus, when the valve piston 15 is pressed away from the seat of the secondary piston 17, water penetrates into the central bore 19 and flows further via a first angular passage 20 through the piston wall and a second angular passage 21 through the bulb screw 12 into a space 22 between the holder 10 and the sprinkler nozzle head 11.

[0013] Now the water is able to flow out of the sprinkler head via not shown channels in the contact surfaces between the holder 10 and the nozzle head 11. These contact surfaces, except said channels, are sealed by means of an O-ring 23.

[0014] Thus, the above described working process takes place when the glass bulb is heated above a certain temperature. At the above described high pressure sprinkler system, it is convenient if the pressure fall in the feed line, at release of the sprinkler head, influences a pressure detecting valve which starts pumping for supply of sprinkler water with a high pressure, e.g. 200 bar.

[0015] Functional testing or release of the sprinkler head in any other way, e.g. via a smoke detector or from a command central, is made possible in accordance with the following.

[0016] The secondary piston 17 is movable journalled in a piston sleeve 24 inside the holder 10, which piston sleeve is coaxial with the guide for the valve piston 15 in the bulb screw 12. A helical spring 25 rest on a angle shoulder 26 inside a pilot piston cylinder 27 which is screwed on to the upper end of the holder 10. The spring 25 presses with a small force against an end edge 28 on upper side of the secondary piston, as it is shown in Fig. 1, or the left side as it is shown in Fig. 2.

[0017] As is best shown in Fig. 2, the secondary piston 17 is provided with a first channel 29, which between the two ends of the two ends of the piston 17 and which forms a connection between the space 18 at one side of the piston, and the space 30 which houses the helical spring 25, so that equal pressure prevails on both ends of the piston. Also, the secondary piston 17 is provided with a second channel 31 arranged in parallel, which has a larger cross section than the first channel 29. This second channel 31 runs along the centre axis of the piston and is normally closed by a pilot piston 32 which is movable arranged inside the pilot piston cylinder 27, coaxial with the valve piston 15 and the secondary piston 17.

[0018] The pilot piston 32 is normally held in its closed position against the outlet of the second channel 31 of the secondary piston 17 by the action of a helical spring 33. Also, the pilot piston is manoeuvrable by means of a solenoid 34 which is electrically controlled via a cable connection 35.

[0019] During activation of the solenoid 34, the pilot piston 32 is pulled upwards in Fig. 1 against the action of the helical spring 33. This opens the channel 31, which leads fluid from the space 30 via the central bore 19 of the valve piston, the angular passages 20, 21 and the sprinkler channels and the space 22 out of the sprinkler head. At the same time a smaller flow of fluid takes place from the space 18 via the second channel 28. This limited flow does not manage to compensate for the pressure difference between the two ends of the secondary piston, i.e. between the two spaces 18, 30, which results in that the piston 17 is pressed/pulled in the direction upward in Fig. 1. This opens the valve seat between the secondary piston 17 and the end of the valve piston 15 and feeding of sprinkler water takes place in the same manner as in the preceding example of function.

[0020] This flow may be interrupted by a deactivation of the solenoid. This shuts off the channel 31 and the secondary piston 17 is pressed down in Fig. 1 against the end of the valve piston 15 and closes the bore 19.

[0021] Thus, the functional testing can be made by means of a short activation of the solenoid.

[0022] The invention is not limited to the above described embodiment, instead more variants are conceivable within the scoop of the following claims. For example, the valve piston, the secondary piston and the pilot piston do not have to be coaxially arranged along a common longitudinal axis. The electrically controlled release of the sprinkler head do not have to take place via a secondary piston, but the pilot piston may act directly against the valve piston.

Claims

1. A sprinkler head triggering apparatus, comprising a spray nozzle with an actuator (14) being releasable by heating to a certain temperature, and which normally, via a bulb screw (12), holds a valve piston (15) in a closed position against a valve seat, which valve piston, at release of the actuator, is movable in a piston sleeve in the direction away from said seat, for opening a flow passage (19-22) from a feed line for pressurized water to the spray nozzle,
   characterized in that the flow passage (19-22) is openable in the normal, closed position of the valve piston (15) with intact actuator (14), via a remote control operated pilot piston (32), that the valve piston is provided with a central bore (19) and a first angular passage (20), and that the central bore and the first angular passage together with a second angular passage (21) through a bulb screw (12), and a space (22) form the flow passage which may be opened by the pilot piston (32).

2. A triggering apparatus according to claim 1,
   characterized in that the pilot piston (32) is movable mounted inside a piston sleeve between a secondary piston (17) and at least one spring means (33).

3. A triggering apparatus according to claim 2,

characterized in that the valve piston (15) is coaxially arranged with the pilot piston (32), that the secondary piston (17) is located between the pilot piston (32) and the valve piston (15), and that the valve piston is displaced from its resting position by the action of a fluid pressure acting on one side of said valve piston.

4. A triggering apparatus according to claim 2 or 3, **characterized in that** one end of the secondary piston (17) constitutes a seat for the valve piston (15).

5. A triggering apparatus according to claim 4, **characterized in that** the secondary piston (17) is provided with a first channel (29) with a small cross section, said first channel running through this piston and transmitting the fluid pressure from one end of the piston to the other.

6. A triggering apparatus according to claim 5, **characterized in that** the secondary piston (17) also is provided with a second channel (31) with a larger cross section, which second channel also runs from one end of the piston to the other.

7. A triggering apparatus according to claim 6, **characterized in that** the second channel (31) can be opened and closed by means of the pilot piston (32), wherein the opening of this channel leads to a pressure reduction at the opposite end of the secondary piston (17) with reference to the seat, so that said secondary piston is displaced in the direction from the valve piston (15) by the pressure difference, for opening of the flow passage (19-22) from the feed line for pressurized water to the spray nozzle.

8. A triggering apparatus according to any of the above claims, **characterized in that** the pilot piston (32) is manoeuvrable by means of an electromagnet (34).

9. A triggering apparatus according to any of the preceding claims, **characterized in that** the feed line for pressurized water is directly connected, without particular valve means, to one or more feed pumps via a pressure detector which starts said pump when detecting a change in pressure.

Patentansprüche

1. Auslösevorrichtung für einen Sprinklerkopf, die eine Sprühdüse mit einem Betätigungsorgan (14) aufweist, das durch Erhitzung auf eine bestimmte Temperatur auslösbar ist, und die normalerweise über ein Lampen-Schraubgewinde (12) einen Ventilkolben (15) gegen einen Ventilsitz in einer geschlossenen Position hält, wobei der Ventilkolben bei der Auslösung des Betätigungsorgans in einer Kolbenhülse in Richtung weg vom Sitz bewegbar ist, um einen Strömungsdurchgang (19 - 22) von einer Zulaufleitung für Druckwasser zur Sprühdüse zu öffnen,
dadurch gekennzeichnet ,
dass der Strömungsdurchgang (19 - 22) in der normalen, geschlossenen Position des Ventilkolbens (15) mit unversehrtem Betätigungsorgan (14) über einen ferngesteuert betätigbaren Steuerkolben (32) öffenbar ist, dass der Ventilkolben mit einer zentralen Bohrung (19) und einem ersten abgewinkelten Durchgang (20) versehen ist, und dass die zentrale Bohrung und der erste abgewinkelte Durchgang gemeinsam mit einem zweiten abgewinkelten Durchgang (21) durch ein Lampen-Schraubgewinde und ein Raum (22) den Strömungsdurchgang bilden, der durch den Steuerkolben (32) geöffnet werden kann.

2. Auslösevorrichtung nach Anspruch 1,
dadurch gekennzeichnet ,
dass der Steuerkolben (32) beweglich innerhalb der Kolbenhülse zwischen einem Sekundär-Kolben (17) und mindestens einer Federeinrichtung (33) angebracht ist.

3. Auslösevorrichtung nach Anspruch 2,
dadurch gekennzeichnet ,
dass der Ventilkolben (15) mit dem Steuerkolben (32) koaxial angeordnet ist, dass der Sekundär-Kolben (17) zwischen dem Steuerkolben (32) und dem Ventilkolben (15) lokalisiert ist, und dass der Ventilkolben von seiner Ruheposition durch die Wirkung eines Flüssigkeitsdruckes verstellt wird, der an einer Seite des Ventilkolbens wirkt.

4. Auslösevorrichtung nach Anspruch 2 oder 3,
dadurch gekennzeichnet,
dass ein Ende des Sekundär-Kolbens (17) einen Sitz für den Ventilkolben (15) bildet.

5. Auslösevorrichtung nach Anspruch 4,
dadurch gekennzeichnet ,
dass der Sekundär-Kolben (17) mit einem ersten Kanal (29) kleinen Querschnitts versehen ist, wobei der erste Kanal durch diesen Kolben verläuft und den Flüssigkeitsdruck von einem zum anderen Ende des Kolbens überträgt.

6. Auslösevorrichtung nach Anspruch 5,
dadurch gekennzeichnet,
dass der Sekundär-Kolben (17) ausserdem mit einem zweiten Kanal (31) versehen ist, der einen grösseren Querschnitt besitzt, wobei der zweite Kanal ebenfalls von einem zum anderen Ende des Kol-

bens verläuft.

7. Auslösevorrichtung nach Anspruch 6,
dadurch gekennzeichnet,
dass der zweite Kanal (31) mittels des Steuerkolbens (32) geöffnet und verschlossen werden kann, wobei die Öffnung dieses Kanales zu einer Druckreduktion am gegenüberliegenden Ende des Sekundär-Kolbens (17) in Bezug zum Sitz führt, so dass der Sekundär-Kolben in der Richtung vom Ventilkolben (15) durch die Druckdifferenz verstellt wird, um den Strömungsdurchgang (19 - 22) von der Zulaufleitung für Druckwasser zur Sprühdüse zu öffnen.

8. Auslösevorrichtung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet ,
dass der Steuerkolben (32) mittels eines Elektromagneten (34) steuerbar ist.

9. Auslösevorrichtung nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet ,
dass die Zulaufleitung für Druckwasser ohne spezielle Ventilmittel direkt an eine oder mehrere Zuführpumpen über einen Druckdetektor angeschlossen ist, der die Pumpe startet, wenn er eine Druckänderung erfasst.

Revendications

1. Dispositif de déclenchement d'une tête d'asperseur, comportant une buse d'aspersion munie d'un actionneur (14) pouvant être déclenchée par un chauffage jusqu'à une température déterminée, et qui normalement, via une vis d'ampoule (12), maintient un piston de soupape (15) dans une position fermée contre un siège de soupape, lequel piston de soupape, lors d'un déclenchement de l'actionneur, est mobile dans une chemise de piston dans la direction l'éloignant dudit siège, pour ouvrir un passage d'écoulement (19-22) à partir d'une conduite d'alimentation en eau sous pression jusqu'à la buse d'aspersion,
caractérisé en ce que le passage d'écoulement (19-22) peut être ouvert dans la position fermée, normale du piston de soupape (15), l'actionneur (14) étant intact, via un piston-pilote actionné par commande à distance (32), que le piston de soupape est muni d'un alésage central (19) et d'un premier passage angulaire (20), et que l'alésage central et le premier passage angulaire associés à un second passage angulaire (21) par l'intermédiaire d'une vis d'ampoule (12), et à un espace (22) forment le passage d'écoulement qui peut être ouvert par le piston-pilote (32).

2. Dispositif de déclenchement selon la revendication 1, **caractérisé en ce que** le piston-pilote (32) est mobile monté à l'intérieur d'une chemise de piston entre un piston secondaire (17) et au moins un moyen formant ressort (33).

3. Dispositif de déclenchement selon la revendication 2, **caractérisé en ce que** le piston de soupape (15) est agencé de manière coaxiale par rapport au piston-pilote (32), que le piston secondaire (17) est situé entre le piston-pilote (32) et le piston de soupape (15), et que le piston de soupape est déplacé à partir de sa position de repos par l'action d'une pression de fluide agissant sur un côté dudit piston de soupape.

4. Dispositif de déclenchement selon la revendication 2 ou 3, **caractérisé en ce qu'**une extrémité du piston secondaire (17) constitue un siège pour le piston de soupape (15).

5. Dispositif de déclenchement selon la revendication 4, **caractérisé en ce que** le piston secondaire (17) est muni d'un premier conduit (29) ayant une petite section transversale, ledit premier conduit s'étendant à travers ce piston et transmettant la pression de fluide à partir d'une extrémité du piston jusqu'à l'autre.

6. Dispositif de déclenchement selon la revendication 5, **caractérisé en ce que** le piston secondaire (17) est également muni d'un second conduit (31) ayant une section transversale plus grande, lequel second conduit s'étend également à partir d'une extrémité du piston jusqu'à l'autre.

7. Dispositif de déclenchement selon la revendication 6, **caractérisé en ce que** le second conduit (31) peut être ouvert et fermé par l'intermédiaire du piston-pilote (32), dans lequel l'ouverture de ce conduit entraîne une réduction de pression à l'extrémité opposée du piston secondaire (17) par rapport au siège, de sorte que ledit piston secondaire est déplacé dans la direction provenant du piston de soupape (15) par la différence de pression, pour ouvrir le passage d'écoulement (19-22) à partir de la conduite d'alimentation en eau sous pression jusqu'à la buse d'aspersion.

8. Dispositif de déclenchement selon l'une quelconque des revendications ci-dessus, **caractérisé en ce que** le piston-pilote (32) peut être manoeuvré par l'intermédiaire d'un électroaimant (34).

9. Dispositif de déclenchement selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la conduite d'alimentation en eau sous pression est directement reliée, sans moyen parti-

culier formant vanne, à une ou plusieurs pompes d'alimentation via un détecteur de pression qui démarre ladite pompe en cas de détection d'un changement de pression.

FIG. 1

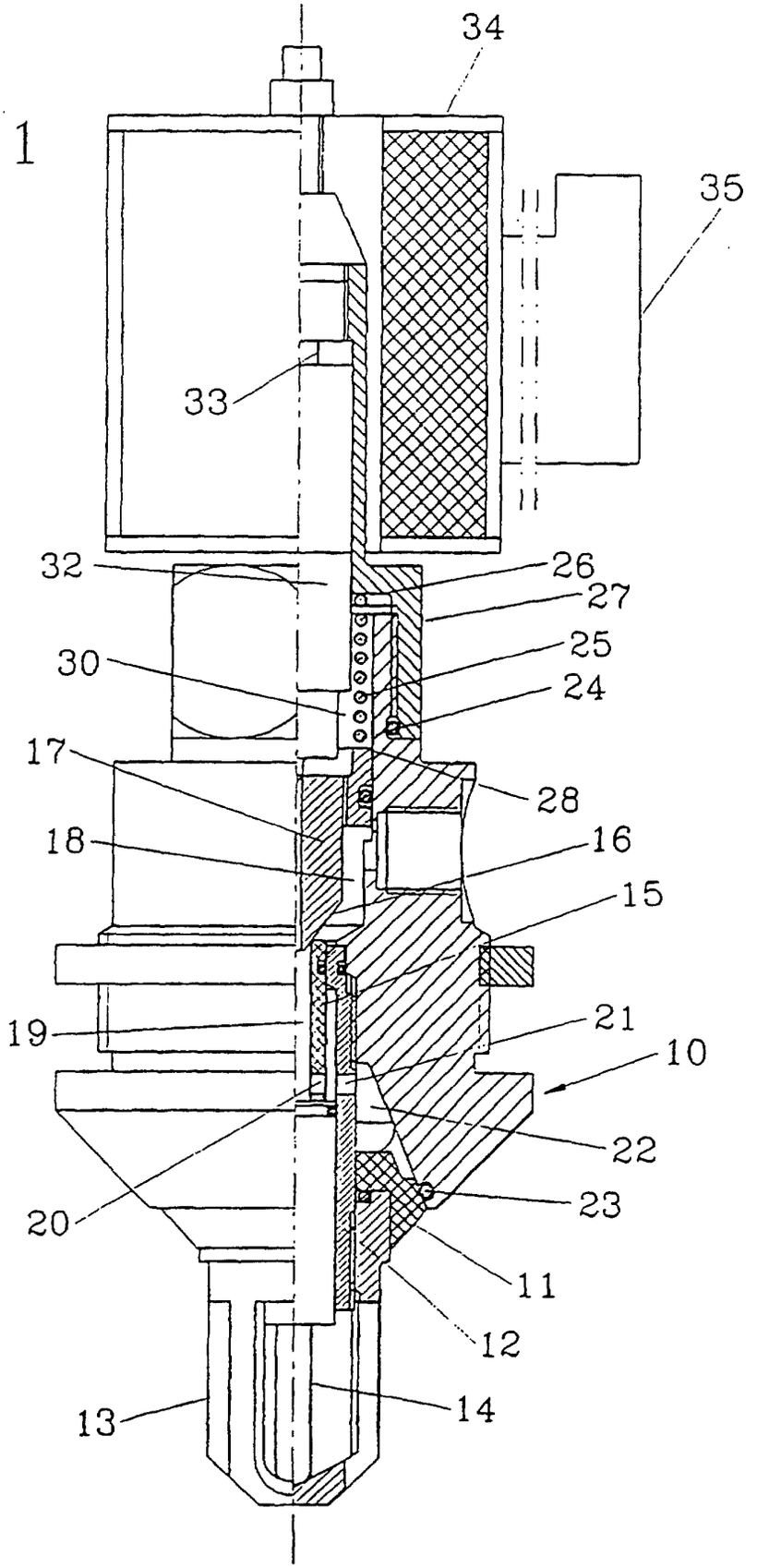


FIG.2

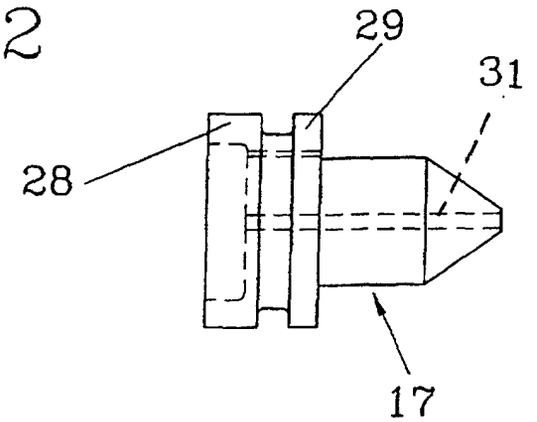


FIG.3

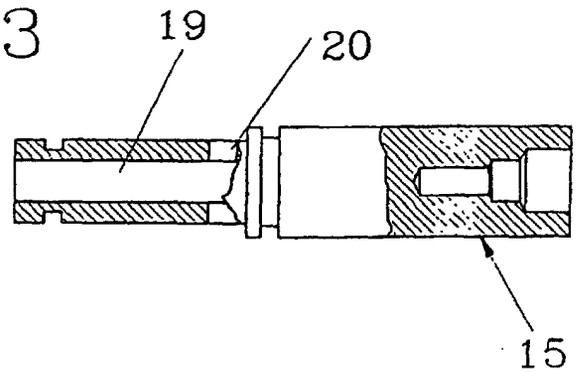


FIG.4

