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AUTOMATIC FIRE ALARM SYSTEM

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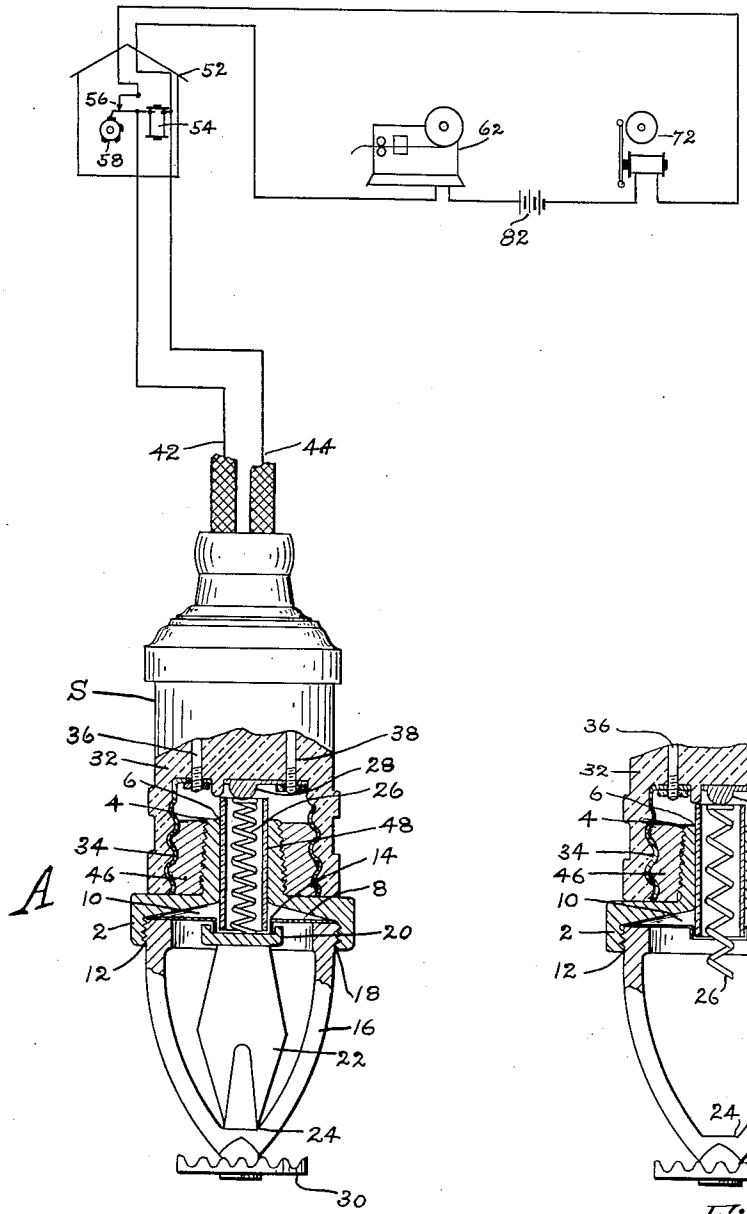


Fig. 1.

Fig. 2.

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AUTOMATIC FIRE ALARM SYSTEM

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19 Claims. (Cl. 200—142)

My invention relates to signaling systems, and more particularly to systems such as are commonly referred to as "automatic fire alarm systems."

It is well known that automatic fire alarm systems are unlikely to be subjected to frequent actuation as, in most instances fire does not occur in a premises protected by such a system for many months, and usually not for some years after the installation of the alarm system. Yet if such systems are to be relied upon in the event of fire, for the protection of human beings from death or injury, as well as for the protection of valuable property from destruction, they should be constantly and dependably responsive to the development of conditions such as are incidental to imminent fire peril.

Various forms of heat responsive equipment have been devised for utilization in automatic fire alarm systems; and, in many instances, laboratory tests of such equipment has indicated very desirable characteristics which seemed to assure dependability of action after long periods of non-use. Nevertheless, it has repeatedly been found that, notwithstanding such promising initial indications, various types of automatic fire alarm equipment have failed to function when needed, especially in instances where the systems were not continuously subject to so-called "central station supervision", and where a long time had elapsed between installation and occasion for operation.

The practical result of such experience has been to create a degree of distrust in automatic fire alarm systems such that the extent of their adoption has been far less than seemingly would have been inevitable had the results from the use of the systems heretofore installed been of a character calculated to develop a greater degree of confidence in the continuing dependability of such systems.

Contemporaneous with the occurrences which have impaired confidence in and increased use of automatic fire alarm systems, as just referred to, there has been an increasing use of so-called "automatic sprinkler systems" for fire control and extinguishment, and the so-called "sprinkler heads" employed in these systems have been developed and perfected to an extent such that a high degree of reliability has been attained, and the continuance for many years of dependability of such sprinkler heads, even where installed without central station supervision, has been so amply demonstrated that a most gratifying degree of confidence in their dependability has been developed in the minds of those having to do with the subject of fire protection, and especially, the insurance authorities.

It is therefore an important object of this invention to provide means whereby well known and commercially available forms of automatic sprinkler heads may be utilized as the fire detecting agencies of automatic fire alarm systems.

It is a further object to provide means whereby such sprinkler heads may be so utilized as to assure as great a degree of permanency in and of reliability as has been attained in the use of such heads in automatic sprinkler systems.

Other objects and aims of this invention, more or less specific than those just referred to, will be in part obvious and in part pointed out in the course of the following description and claims.

Referring to the drawing, in which an illustrative form of my invention is shown:

Figure 1 shows a fire alarm system embodying this invention, the signaling circuit being diagrammatically indicated and a conventional representation of an automatic sprinkler head being shown with normally conditioned associated circuit controlling mechanism and certain parts being broken away; and

Fig. 2 shows the circuit controlling mechanism of Fig. 1 in abnormal position.

As shown in Fig. 1, the automatic sprinkler head generally indicated by the letter A has a base member or casing 2 which has a threaded projection 4 at one side thereof. An opening 6 through the base 2 and its projection 4 provides the usual water channel.

A flexible disc or diaphragm 8 is mounted in a depression 10, having the threaded walls 12 and situated on the side of the base 2 opposite to that which carries the threaded projection 4. Said disc 8 has an opening 14 formed therein which substantially corresponds in size and is situated in alignment with the opening 6.

A frame 16 has a threaded portion 18 which engages the threaded portion 12 of the base 2, thus clamping the disc 8 in firm contact with said base.

The cap or cover 20 is normally maintained in firm engagement with the outer surface of the disc 8 and, when utilized in accordance with this invention, provides a contact member as will presently be more fully explained. The fusible part 22 is supported by the inner surface of the frame 16 at 24 and firmly presses the cover 20 against the disc 8, thereby somewhat flexing said disc so as to assure continuity of effective electrical connection between said cover and said

disc; said part 22 therefore constitutes means for normally retaining the cover 20 in a position where it seals the opening 14 through the disc 8 and for releasing said cover responsive to temperature increase.

The foregoing description of certain of the detailed structural characteristics of the automatic sprinkler head A is supplied for the purpose of more readily disclosing the manner in which utilization in accordance with this invention may be made of ordinary forms of automatic sprinkler heads; but neither the foregoing description of this particular type of sprinkler head, nor its illustration in the accompanying drawing, is intended to be construed as associating this invention exclusively with any particular make or type of automatic sprinkler head, as it will be readily understood by those skilled in this art that many other forms of automatic sprinkler heads may be substituted for that shown in the accompanying drawing and hereinbefore described, without departing from the spirit of this invention.

A conventional form of water distributor or deflector 30 is shown at the outer end of the frame 16, because water deflectors of some sort are usually carried by the various forms of automatic sprinkler heads as usually sold; but it will be apparent that the presence or absence of water deflectors such as that shown, or of any other type, will have no influence upon the suitability of such heads for use in connection with this invention.

In utilizing, in accordance with this invention, an automatic sprinkler head of any of the well known makes or types, such, for example, as the sprinkler head A of the accompanying drawing, means is provided for urging movement of the portion which normally seals the water outlet (as, the cap 20) away from its seat (as from the disc 8), which means may be embodied in the form of a spring, such as the spring 26, one end of which presses against the under or inner surface of the cap 20; the opposite end of which spring rests against the stationary contact 28. The pressure exerted against the cap 20 by said spring 26 preferably being on an order reasonably comparable with that which would be exerted against said cover were the sprinkler head utilized in an automatic sprinkler system where the fluid pressure against such cap was at least as great as would be recognized as minimum safe practice.

As illustrative of means for supporting a sprinkler head pursuant to this invention, I have shown what is ordinarily referred to as "a weatherproof socket" for incandescent electric lamps, and which I have generally designated by the reference letter S. This socket comprises a casing 32 having a cup-shaped opening in one end thereof in which is mounted an internally threaded shell 34 which is electrically connected with the stud 36, and therefore comprising one terminal of the socket. The stationary contact 28 is correspondingly connected to the stud 38 and forms the other terminal of the socket.

The studs 36 and 38 form continuations of the conductors of the wires 42 and 44, respectively, through which the attachment may be associated with an electric circuit such, for example, as that of an automatic fire alarm system.

A bushing 46 is secured in threaded relation to the shell 34 and is engaged by the threaded projection 4 of the base 2; and provides an electrical connection between said shell and said projection as well as means for facilitating the attachment of an automatic sprinkler head to the socket S.

An insulating sleeve 48 separates spring 26 from the projection 4.

From the foregoing it will be apparent that, under normal conditions, a current path is provided through this attachment and extends from the conductor 42, through the stud 36, shell 34, bushing 46, projection 4, base 2, disc 8, cap 20, spring 26, contact 28 and stud 38 to conductor 44.

Upon release of the cover 20 by the part 22, said cover is moved away from the disc 8, responsive to the spring 26, thus breaking the previously existing electrical connection which was maintained between the terminals 34 and 28 through the cap 20; said cap and the part 22 usually then falling clear of the frame 16 and thereby leaving the various remaining parts as shown in Fig. 2. In many instances, the spring 26 also drops away from the contact 28, and may correspondingly fall clear of the frame 16, but it is evident that the effectiveness of current path interruption between the terminals 34 and 28 is fully effective irrespective of such falling way of the spring 26.

The manner of association of an automatic sprinkler head with any desired signaling system is illustratively indicated in Fig. 1, in which there is diagrammatically indicated, by means of symbols of a more or less conventional character, an automatic fire alarm system comprising a signal formulating mechanism here indicated in a manner suggestive of a so-called "shunt type" auxiliarized master box 52, visual signaling means exemplified by the tape register 62, audible signaling means exemplified by the bell 72, and a current source exemplified by the battery 82.

The master box 52 is equipped with a starting or tripping magnet 54, upon effective energization of which the formulation of the intended code signal will be accomplished in a well known manner, as by the actuation of signaling contacts 56 responsive to rotation of a code wheel 58.

The wires 42 and 44 associated with the socket S are connected to the respective terminals of the magnet 54, so that, so long as the current path through the socket S and its associated sprinkler head A is maintained through the path hereinbefore more fully described, said magnet 54 will be short-circuited.

The operation of the signaling system shown in the drawing, and hereinbefore described, is as follows:

In the event that the part 22 is subjected to a temperature such as to cause it to release the cap 20, the spring 26 will move said cap away from the disc 8, thereby interrupting the current path which normally shunts or short-circuits the starting magnet 54, and said magnet will thereupon be energized by the current flow from the battery 82, and thus result in rotation of the code wheel 58, in accordance with the well known characteristics of shunt type auxiliarized master fire alarm boxes, thus effecting the formulation of the intended code signal, which will be visually and audibly indicated by the instruments 62 and 72, respectively.

It should be understood that the construction and operation of the fire alarm system and attachment, as indicated by the accompanying drawing hereinbefore more fully described, is supplied for purposes of illustration only, and that this invention is not limited to the details of construction and arrangement so shown and described,

other than insofar as such details are defined in the accompanying claims.

I claim:

1. In an automatic fire alarm signaling system: circuit terminals, an automatic sprinkler head having a threaded portion and having an orifice formed therein, a cover for said orifice constituting a current conducting member for controlling the circuit between said terminals and forming a part of a circuit between said terminals, means for retaining said cover in effective position and for releasing same responsive to temperature increase; supporting means engaged by the threaded portion of said sprinkler head, and means urging displacement of said cover and a change in the electrical relation of said terminals.

2. In an automatic fire alarm signaling system, circuit terminals, an automatic sprinkler head having a water channel formed therein, closing means for said channel constituting a current conducting member for controlling the circuit between said terminals and forming a part of the circuit between said terminals, structure for retaining said means in closing position and for releasing same responsive to temperature increase, in combination with means urging displacement of said closing means for changing the electrical relation of said terminals.

3. An attachment for an automatic fire alarm system for associating therewith an automatic sprinkler head having a channel formed therein and closing mechanism for said channel, which attachment comprises a casing, contact members mounted in said casing and insulated from each other, means for supporting such an automatic sprinkler head in conducting relationship with one of said contact members, an insulation lining for said channel, and a spiral spring engaging the other of said contact members and normally held in compression by said closing means to thereby provide an electrical connection between said other contact member and said closing means, which connection completes a current path extending from said first named one of said contacts, through said sprinkler head, said closing mechanism and said spring to said other contact.

4. An attachment for an automatic fire alarm system for associating therewith an automatic sprinkler head having a channel therein with walls of insulation and closing mechanism for said channel, which attachment comprises a casing, contact members mounted in said casing and insulated from each other, means for supporting such an automatic sprinkler head in conducting relationship with one of said contact members, and a spiral spring under compression between the other of said contact members and said closing means to thereby provide an electrical connection between said other contact member and said closing means, which connection completes a current path extending from said first named one of said contacts, through said sprinkler head, said closing mechanism and said spring to said other contact.

5. An attachment for an automatic fire alarm system comprising the combination of a movable contact member, a stationary contact member, a casing, circuit terminals mounted in said casing and insulated from each other, one of said terminals being connected to said stationary contact member, means for retaining said movable member in engagement with said stationary contact member and for releasing the same responsive to temperature increase, and a spiral spring under compression between and connected electrically with said movable contact member and the other of said terminals to thereby provide an electrical connection between said other terminal and said movable contact member, which connection completes a current path extending from said first named one of said terminals, through said stationary and movable contact members and said spring to said other terminal.

6. An attachment for an automatic fire alarm system for associating therewith an automatic sprinkler head having a threaded portion for attachment thereof to supporting means therefor and having a water channel formed therein, a cover for said water channel, means for retaining said cover in effective position and for releasing same responsive to temperature increase; which attachment comprises an electric lamp socket of usual commercial form one circuit terminal of which consists of an internally threaded shell and the other terminal of which is situated near the inner end of the cavity within said shell, a current conducting bushing secured within said shell and formed for attachment thereto of the threaded portion of an automatic sprinkler head, an insulating tube for enclosure within the water channel of such a head, and a resilient member within said tube for establishing an electrical connection between the second named one of said socket terminals and the water channel cover of such a head and for urging displacement of such cover.

7. An attachment for an automatic fire alarm system for associating therewith an automatic sprinkler head having a threaded portion for attachment thereof to supporting means therefor and having a water channel formed through said head and threaded portion, a cover for said water channel, means for retaining said cover in effective position and for releasing same responsive to temperature increase; which attachment comprises a circuit terminal for engaging the threaded portion of such an automatic sprinkler head, an insulating tube situated within said terminal for introduction into the water channel of such a head, a second circuit terminal, and a resilient member within said tube for establishing an electrical connection between said second terminal and the water channel cover of such a head and for urging displacement of such a cover.

8. An attachment for automatic fire alarm systems comprising a base having a threaded projection at one side thereof and having an opening formed therein and extending through said projection, supporting means engaged by said threaded projection, and circuit controlling mechanism comprising a cover for said opening situated at the other side of said base and urged for movement therefrom, said cover constituting a circuit controlling contact member, and means for normally retaining said cover and for releasing same responsive to temperature increase.

9. A fire alarm signal-initiating device comprising a supporting structure having a hole therein and having an associated circuit terminal, a second circuit terminal insulated from said supporting structure, an electricity conducting circuit controlling cap seated on and electrically engaged with said supporting structure in closing relation with said hole, thermo-responsive means associated with said supporting structure and normally holding said cap in the aforesaid relation, and spring means in said hole connected

electrically with said cap and second circuit terminal and insulated from said supporting structure for dislodging said cap from engagement with said supporting structure upon release by said thermo-responsive means.

10. The combination of an electrically conducting body, a free electricity conducting cap seated displaceably on said body, thermo-responsive means releasably holding said cap on said body, pressure means acting on said cap to dislodge it from said body when freed by the operation of said thermo-responsive means, and means for rendering said cap and said body separate contact members of a signal circuit whereby a condition of such circuit will be changed by dislodgment of said cap.

11. The combination of an electrically conducting body, a free electricity conducting cap seated displaceably on said body, thermo-responsive means releasably holding said cap on said body, pressure means acting on said cap to dislodge it from said body when freed by the operation of said thermo-responsive means, and means comprising a circuit terminal connected with said body and a second circuit terminal connected with said cap for rendering said cap and said body separate contact members of a signal circuit whereby a condition of such circuit will be changed by dislodgment of said cap.

12. In a fire alarm initiating device, the combination of a conventional incandescent lamp socket having a pair of relatively insulated electric terminals, a conventional sprinkler head having a member thermally releasable for displacement thereof, and means for associating said socket and said head and for thereby establishing a current path between said terminals which path includes and is subject to interruption by displacement of said member.

13. A fire alarm signal initiating device comprising a retaining casing, two circuit terminals carried by said casing in insulated relationship, a sprinkler head in said casing having a passage therethrough and electrically connected with one of said terminals, a free electricity-conducting circuit-controlling cap seated on said head over said passage and in electrical engagement with a portion of said head, means for applying a dislodging pressure on said cap and for rendering said cap and said portion separate contact members of a signal circuit whereby a condition of such circuit will be changed by dislodgment of said cap, said sprinkler head carrying thermo-responsive means normally engaged with said cap and opposing said dislodging pressure.

14. In a fire alarm initiating device, the combination of a conventional incandescent lamp socket having a pair of relatively insulated electric terminals, a conventional sprinkler head having a member thermally releasable for displacement thereof, and means for associating said socket and said head for thereby establishing a current path between said terminals which path includes said member, said means comprising a part for urging displacement of said member for effecting interruption of such path.

15. A fire alarm signal initiating device comprising a sprinkler head having a central passage therethrough, means providing said head with an outer screw-threaded circuit terminal electrically connected with said head and arranged to be screw-threaded into the outer terminal of a standard electric light socket, a center contact for said head cooperating with the center contact of the socket and comprising at least in part a spring located in said passage and insulated from said head, an electrically conducting cap normally seated on said head over said passage and bearing on said spring and electrically connecting said spring and head, and thermo-responsive means carried by said head releasably holding said cap in the aforesaid relation.

16. A fire responsive device comprising a supporting member, a flexible diaphragm on said member having an aperture therein, a cap normally seated on said diaphragm in closing relation with said aperture, thermo-destructible means normally bearing on said cap and holding it releasably in the aforesaid relation, pressure means acting on said cap to move it from the aforesaid relation, and a current path serially including said cap and said diaphragm for alteration by the movement of said cap away from the aforesaid relation.

17. A fire alarm signal initiating device comprising a supporting member, a flexible diaphragm on said member having an aperture therein, a cap normally seated on said diaphragm in closing relation with said aperture, thermo-destructible means normally bearing on said cap and holding it releasably in the aforesaid relation, pressure means acting on said cap to move it from the aforesaid relation, said cap and said diaphragm constituting separable conductors the circuit through which is interrupted by movement of said cap away from the aforesaid relation.

18. A fire alarm signal initiating device including a flexible diaphragm having an aperture therethrough, a cap seated on said diaphragm and removably closing said aperture, thermo-responsive means releasably holding said cap in the aforesaid relation against movement away from seating relation with said diaphragm, and current conducting means serially including said cap and said diaphragm for alteration by the movement of said cap.

19. A fire alarm signal initiating device including a flexible diaphragm having an aperture therethrough, a cap seated on said diaphragm and removably closing said aperture, thermo-responsive means releasably holding said cap in the aforesaid relation against movement away from seating relation with said diaphragm, and a current path serially including said cap and said diaphragm for alteration by the movement of said cap away from said diaphragm.

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