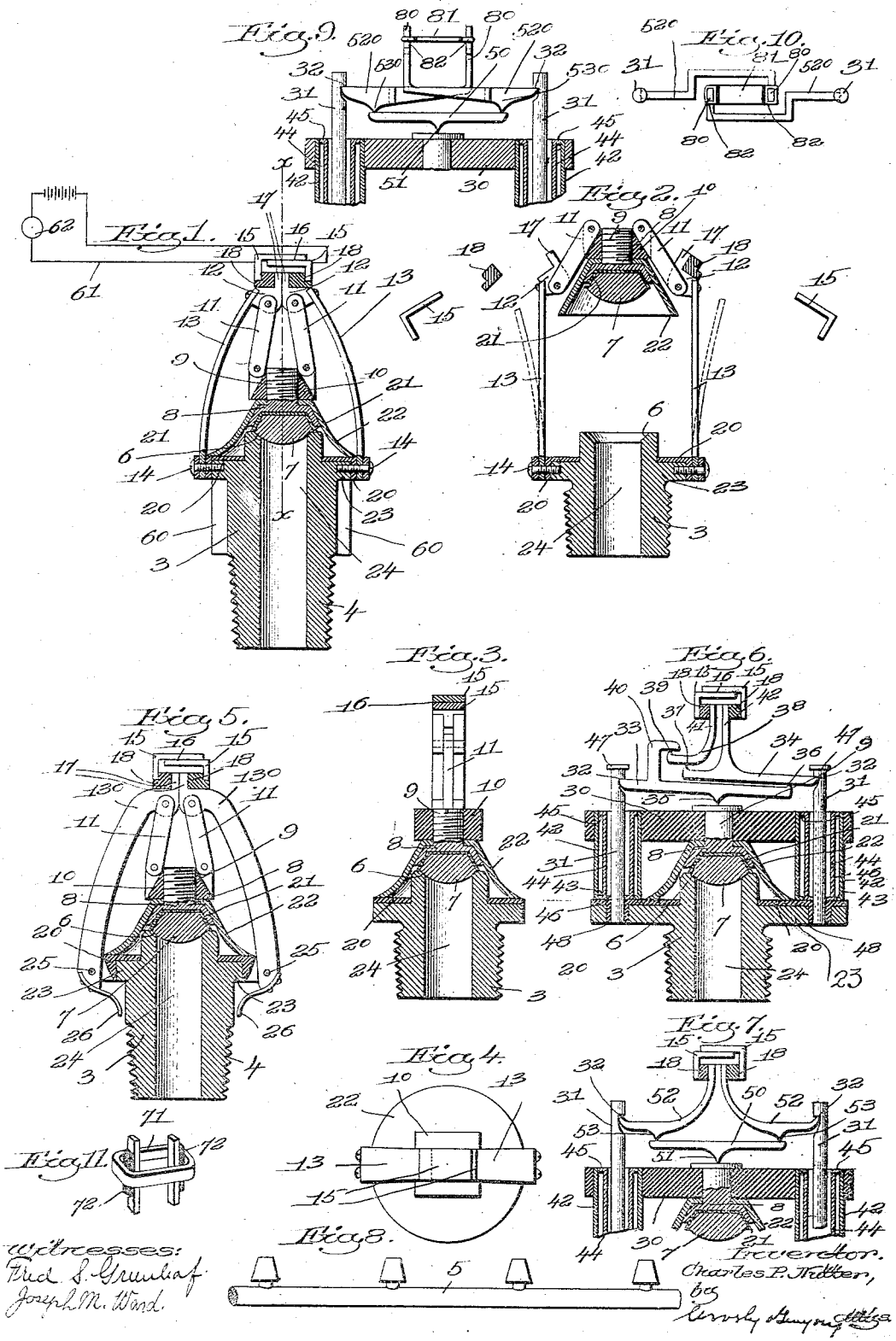
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AUTOMATIC SPRINKLER.

APPLICATION FILED MAR. 9, 1908.

1,137,016. Patented Apr. 27, 1915.



UNITED STATES PATENT OFFICE.

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AUTOMATIC SPRINKLER.

1,137,016. Specification of Letters Patent. Patented Apr. 27, 1915.

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To all whom it may concern:

Be it known that I, CHARLES P. NUTTER, citizen of the United States, residing at Malden, county of Middlesex, and State of Massachusetts, have invented an Improvement in Automatic Sprinklers, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to automatic sprinklers such as are now extensively used in connection with automatic fire-extinguishing systems, and one of the objects of the invention is to provide an automatic sprinkler which is especially adapted for use in connection with the sprinkler system described and illustrated in application Se. No. 318,814, filed May 26, 1906, by myself and John Chatman. The system described in said application is a combined heating and sprinkler system, this combination being effected by mounting sprinkler heads on the circulating pipes of a heating system or, in other words, arranging a system whereby a heating medium can be circulated through the pipes to which the automatic sprinklers are attached. In a construction of this character it is desirable that the sprinkler heads or at least the fusible joint or link of the sprinkler head should be insulated from the pipe to which such sprinkler heads are attached so that said fusible joints will not be affected by the temperature of the heating medium, for otherwise such fusible joint or connection might be melted by the temperature of the heating medium and the sprinkler head would open and become operative when there was no occasion for it to do so.

In the present invention this danger is avoided by so constructing the sprinkler head that the fusible connection or link which controls the operation of the sprinkler head is insulated from the body of the sprinkler and from the pipe so that the temperature of said connection or joint will not be affected by the temperature of the heating medium in the pipe.

Another novel feature of the present invention lies in the construction of the deflector. In most sprinkler heads the deflector is secured in a fixed position In the present invention the deflector is associated with the valve, and the valve is controlled by a suitable connection which in one position holds the valve to its seat and closes the outlet of the sprinkler head, and in another position holds the valve separated some distance from its seat. The deflector is made of resilient material and when the valve is held to its seat, said deflector is placed under tension so that when the fusible connection melts the resiliency of the deflector lifts the valve from its seat and opens the sprinkler head. The valve and the deflector move together into a position separated from the valve seat, in which position the deflector is properly situated to receive the stream of water issuing from the nozzle and convert said stream into a spray.

In the drawings wherein I have illustrated several embodiments of my invention for the purpose of disclosing the principle thereof, Figure 1 is a sectional view of a sprinkler head embodying the invention, said view showing the valve closed; Fig. 2 is a similar sectional view showing the valve open; Fig. 3 is a section on the line *x*—*x*, Fig. 1; Fig. 4 is a top plan view of Fig. 3; Fig. 5 is a view similar to Fig. 1 showing a modified form of the invention; Fig. 6 is a vertical sectional view showing still another modification of the invention; Fig. 7 is a view similar to Fig. 6 showing a modification of the invention; Fig. 8 illustrates a length of a pipe of a combined heating and sprinkling system having my improved sprinkler heads mounted thereon; Fig. 9 illustrates still another embodiment of my invention; Fig. 10 is a detail of the levers shown in Fig. 9; Fig. 11 shows a different form of link or fusible connection from that shown in the other figures.

As stated above, one of the features of the sprinkler head is a construction wherein the fusible connection is entirely insulated from the pipe to which the sprinkler head is secured so that any heat in the pipe will not be transmitted to said fusible connection through the parts of the sprinkler head.

Another feature of the sprinkler head relates to the construction and the manner of supporting the deflector.

Referring now to the embodiment of the invention shown in Figs. 1, 2 and 3, 3 is the body or valve seat member of the sprinkler head which is provided with the usual

screw-threaded portion, by means of which it may be screwed to a pipe 5 of the sprinkler system. Said valve seat member 3 is provided with the valve seat 6 on which is adapted to be seated a valve 7 as usual. These parts may be of any suitable or usual construction.

In the embodiment of the invention shown in Figs. 1, 2 and 3 the valve 7 is carried by a head 8 which is shown as having the screw-threaded stem 9. This stem has screw-threaded thereon a nut 10 to which is pivoted one end of two links 11, the other ends of said links being pivoted to blocks 12. The blocks 12 have secured thereto arms 13, and said arms are also secured to the valve seat body 3, as at 14. The arms 13 are preferably made of resilient metal so that when they are drawn together, as shown in Fig. 1, they will be under tension. Said arms are held in the position shown in Fig. 1 by means of a fusible connection or joint which in this embodiment of my invention comprises two L-shaped members 15 which are soldered together at 16 by means of some suitable soft solder. Said members 15 when thus soldered together form a clip which by embracing the projections 17 of the heads 12 serve to hold said heads together in the position shown in Fig. 1, and thus hold the valve firmly to its seat. As stated above, one of the objects of the invention is to provide a construction whereby the fusible connection is completely insulated from the valve seat member 3 or from the pipe to which said member is attached. This is accomplished herein by interposing heat insulating material 18 between the clip formed by the members 15 and the blocks 12, said insulating material acting to prevent any heat from being transmitted to the fusible link through the arms 13 or the links 11, as will be obvious. As a means of still further insulating the fusible link or connection I prefer to interpose a layer 20 of insulating material between the arms 13 and the valve seat member 3, and also to place a lever 21 of heat-insulating material between the valve 7 and the head 8. In this way a double insulation is afforded between the valve seat member 3 and the fusible link which will completely insulate said link or connection from any heat in the pipe 5.

In my improved sprinkler head the deflector is associated and moves with the valve. Said deflector is shown at 22 and it is shown as secured to the head 8 by being confined between the nut 10 and said head. This deflector is substantially cup-shaped and is preferably made of resilient material. Its size and construction are such that when the valve is seated, as shown in Fig. 1, the edge of the deflector rests firmly against the top of the flange 23 formed on the valve seat member 3, and is flared outwardly slightly and thus put under tension, as plainly seen in Fig. 1. The insulating material 20 will preferably be extended over the flange 23 so as to insulate the deflector 22 therefrom. With the parts thus constructed when the valve is seated, as shown in Fig. 1, the deflector 20 is under tension and the arms 13 are also under tension. The result is that as soon as the soft solder at 16 melts, the resiliency of the arms 13 tends to separate the upper ends thereof and the resiliency of the deflector 22 tends to cause the latter with the valve to spring away from the valve seat. The result of this combined operation is that the blocks 12 move away from each other to permit the valve and deflector to be carried into the position shown in Fig. 2. While the deflector is moving into this position the arms 13 are separated beyond their neutral position as shown in dotted lines Fig. 2, and the resiliency of said arms brings them back toward their neutral position, as shown in full lines Fig. 2. During this time, however, the force of the stream of water has carried the deflector and valve into the position shown in Fig. 2, in which position it is held by the arrangement of the links 11 and arms 13. When in this position the deflector is properly situated to receive the stream of water issuing from the port 24 in the valve-seat member 3 and to break said stream up into a spray. The closing of the valve, therefore, merely involves the reseating of the valve, and the applying and soldering together of the members 15.

In Fig. 5 I have shown an embodiment of the invention wherein rigid or non-yielding arms are substituted for the resilient arms 13 of Figs. 1 and 2. In said Fig. 5 the valve 7 is sustained by the head 8, as shown in Fig. 1, and said head has a screw-threaded stem 9 to which the nut 10 is screwed, said nut having pivoted thereto one end of each of the links 11, all as shown in Fig. 1. The upper end of said links, however, are pivoted to arms 130, which arms are provided with the projections 17. The lower ends of the arms 130 are pivoted at 25 to the flange 23 of the valve-seat member, and said arms have secured thereto resilient tails 26. The upper ends of the arms 130 are normally held together in the position shown in Fig. 5 by the clip formed by the two L-shaped members 15 which are soldered together at 16 by some suitable soft solder. This clip formed by the members 15 is insulated from the arms 130 by the blocks 18 of insulating material, all as above described with reference to Fig. 1. This embodiment also has the deflector 22 of resilient material which is carried by the head 8 and which is placed under tension when the valve is seated, as shown in the drawings. When the fusible solder at 16 melts the resiliency of the deflector 22 forces the latter away from the

valve seat, thus causing the arms 130 to separate sufficiently at their upper ends to permit the deflector and valve to pass through between them. This outward swinging movement of said arms 130 brings the resilient tails 26 against the valve seat member thus putting said tails under tension with the result that as soon as the deflector has moved up sufficiently to carry the links 11 beyond the horizontal position, the resiliency of the tails 26 forces the upper ends of the arms inwardly, thus serving to hold the deflector in its elevated position. In this embodiment of my invention the arms 130 and the deflector 22 are preferably insulated from the valve seat member 3 by suitable insulating material 20.

In Figs. 6 and 7 a different embodiment of the invention is illustrated wherein the compound lever arrangement is employed for maintaining the valve on its seat. In said embodiment the valve seat member 3 is provided with the valve seat 6 on which the valve 7 is seated, and said valve is sustained by a head 8 and has associated therewith the deflector 22, all as above described. The stem 9 of said head 8, however, is secured to a cross-head 30 which is telescoped over rods or pins 31 that are secured to the flange 23 of the valve seat member 3. Said rods or pins 31 are provided with notches 32 which are engaged by the ends of two levers 33 and 34. The lever 33 is provided with the fulcrum point 35, which is herein shown as engaging the end of the stem 9 and with another fulcrum point or knife edge 36 which rests against the lever 34. The lever 34 has at one end a knife edge 37 which rests against a supplemental lever 38, said latter lever having at one end a knife edge 39 that engages a projection 40 extending from the lever 33. The lever 34 and supplemental lever 38 are provided with upwardly-directed fingers 41 and 42 which are adapted to be embraced by the clip composed of the two members 15 connected together at 16 by soft solder or other fusible metal. So long as the clip embraces the fingers 41, 42, the valve will be held to its seat, but if said clip is released from said fingers there is nothing to hold the valve to its seat and the resiliency of the deflector 22 will throw the valve away from its seat.

Since the deflector is carried by the valve, it is necessary to provide some means for holding the deflector at the proper position to receive and convert into a spray the stream issuing from the sprinkler. In this embodiment this is accomplished by providing a telescopic connection between the head 30 and each pin 31. Said head is herein shown as having rigid therewith two sleeves 42, each provided with an interior shoulder 43. Situated within each sleeve 42 is another sleeve 44 provided at one end with an out turned flange or shoulder 45, and at the other end with an inturned flange or shoulder 46. The sleeves 44 telescope over the pins 31, and the latter are provided with heads 47 which are adapted to engage and coöperate with the shoulders 46. This telescopic construction serves to guide the head in its outward movement and also to limit the outward movement thereof.

In the embodiment shown in Fig. 6 the fusible connection at 16 is insulated from the fingers 41, 42, by insulating material 18 interposed between the members 15 and said fingers. I may if desired also insulate the pins 31 from the flanges 23, as at 48, and may provide a suitable layer of insulation 20 between said flange and the deflector, and another layer of insulation 21 between the valve 7 and the body 8. In this way perfect insulation is secured between the valve seat member and the fusible joint or connection.

In Fig. 7 I have shown a modification of the invention which is similar to that shown in Fig. 6 in every respect except as to the construction of the compound lever. In Fig. 7 a lever 50 is provided with a knife edge 51 which rests on the cross-head 30, and the end of the lever 50 rests against knife edges 53 formed on two levers 52. The outer ends of the levers 52 engage the notches or shoulders 32 formed in the pins 31, and the inner ends of the levers 52 are embraced by the clip formed by the two members 15 which are connected together at 16 by the soft solder or other fusible material. Said members 15 may also be insulated from the levers 52 by insulating material 18. The operation of the device shown in Fig. 7 is similar to that shown in Fig. 6. In the above embodiment of my invention the fusible connection is of a construction to embrace two projections and normally hold them from spreading from each other, such a connection being subjected to tension.

In Fig. 9 I have shown an arrangement wherein a fusible connection in the form of a thrust member is employed. The general construction of the device shown in said figure is similar to that shown in Figs. 6 and 7 in that it comprises the cross head 30 which telescopes over the pins or rods 31 extending from the valve-seat member. The cross head 30 is held in position by a lever 50 provided with a fulcrum edge 51 which engages the cross head. Said lever is acted upon by the two levers 520, each of which has a fulcrum edge 530 to engage an end of the lever 50. The outer end of each lever 520 engages the notch 32 in the rod 31, as described with reference to Fig. 7, and the inner end of each lever overlaps that of the other lever and is bent upwardly as at 80. A fusible link or connection 81 is placed between the upturned ends 80 of the two levers and thus normally holds them in the

position shown in Fig. 9. With this construction the upward pressure on the valve will tend to move the upturned ends of the lever 520 toward each other and this tendency is resisted by the fusible connection 81 which is in the form of a thrust member. In order that this thrust member may properly act on the upturned ends it is desirable that the levers 520 should be offset sufficiently, as shown in Fig. 10, so that the upturned ends may be in line with each other. The insulation between the fusible connection 81 and the levers 520 may be secured in any suitable way, as by providing blocks 82 of insulating material between the ends of the fusible connection 81 and said arms 80.

In Fig. 11 I have shown another form of clip or fusible connection which might be used in place of that shown in Figs. 1 to 7 inclusive. This fusible connection comprises a link 71 of fusible metal which is adapted to be set over the upper ends of the projections 17, as shown in the device Figs. 1 to 5, or over the upper ends of the projections of the levers 41, 42, as shown in Fig. 6, or over the upper ends of the levers 52, shown in Fig. 7. This link may be insulated from the levers or projections which it ties together by means of blocks 72 of insulating material. This link 71 may either be made entirely of fusible metal or may be made in one or more parts which are soldered together by fusible metal. If desired I may provide the valve seat member 3 with radial wings or flanges 60 which serve to increase the radiating surface of said member, and assist in radiating any heat which may be conducted to the member from the pipe 5.

The insulating material which I employ while primarily having the quality of insulating from heat will preferably be of such a material that it will be an electrical insulator also. When insulating material of this character is used, the fusible connection will not only be heat insulated from the other parts of the device, but will also be electrically insulated. This is of advantage because said connection may be made part of a signal circuit 61 which is normally closed when the connections are intact but which is broken when said connection melts. The signal circuit may have any suitable signal 62 therein which will be operated by the breaking of the circuit. In this way indication may be given when any one of the sprinkler heads is set in operation.

I have used the term "fusible connection" in the claims in a generic sense and while I have illustrated some selected types of fusible connections for the purpose of giving an understanding of the invention yet the invention is not limited to any particular type of fusible connection.

I have shown herein several forms of fusible connections but my invention is not limited to any one or all of them.

I have not attempted to show herein all embodiments of my invention, but have merely illustrated a few embodiments which are sufficient to disclose the principle of the invention.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, and means including a fusible connection to keep the valve seated, and means to heat insulate the fusible connection from both the valve and the valve seat member.

2. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, valve-retaining means to keep the valve seated, said means including an insulated fusible connection and means to insulate the valve-retaining means from the valve seat member.

3. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, means to keep the valve seated, said means including an insulated fusible connection and means to insulate said means from both the valve and the valve seat member.

4. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon and heat-diffusing means associated with the valve seat member to diffuse and radiate any heat communicated thereto from the sprinkler pipe to which it is attached.

5. In an automatic sprinkler, the combination with a valve seat member provided with heat-radiating flanges, of a valve seated thereon, and means to keep the valve seated.

6. In an automatic sprinkler, the combination with a valve seat member provided with heat-radiating flanges, of a valve seated thereon, and means heat-insulated from the valve seat member to keep the valve seated.

7. In an automatic sprinkler, the combination with a valve seat member provided with heat-radiating flanges, of a valve seated thereon, and means heat-insulated from both the valve and the valve seat member to keep the valve seated.

8. In an automatic sprinkler, the combination with a valve seat member, of a valve adapted to be seated thereon, means to hold the valve to its seat, and a resilient deflector secured to the valve and shaped to be placed under tension when the valve is seated.

9. In an automatic sprinkler, the combination with a valve seat member having a flange, of a valve adapted to be seated thereon, means including a fusible connection to hold the valve to its seat, and a deflector of

resilient material secured to the valve and having a shape such that it will engage the flange of the valve seat member and be placed under tension when the valve is seated.

10. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, valve-retaining means to keep the valve seated, a fusible connection to hold said retaining means in operative position, and means to insulate said valve-retaining means from both the valve seat member and the valve.

11. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, valve-retaining means to keep the valve seated, a fusible connection to hold said retaining means in operative position, means to insulate said valve-retaining means from both the valve seat member and the valve, and other means to insulate said fusible connection from the valve-retaining means.

12. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, valve-retaining means to keep the valve seated, means to insulate said valve-retaining means from the valve seat member, and other means to insulate said valve-retaining means from the valve.

13. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, means including a fusible connection to keep the valve seated, and two separate heat barriers arranged in series interposed between the valve seat member and the fusible connection.

14. In an automatic sprinkler, the combination with a valve seat member, of a valve seated thereon, valve-retaining means to keep the valve seated, a fusible connection to hold the retaining means in operative position, means to insulate the retaining means from the valve seat member, other means to insulate the retaining means from the valve, and still other means to insulate the fusible connection from the retaining means.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES P. NUTTER.

Witnesses:
LOUIS C. SMITH,
MARGARET A. DUNN.