No. 720,013. PATENTED FEB. 10, 1903.

W. ESTY.

AUTOMATIC STATIONARY FIRE EXTINGUISHER.

APPLICATION FILED FEB. 15, 1902.

MODEL.

2 SHEETS—SHEET 1.

Fig. I.

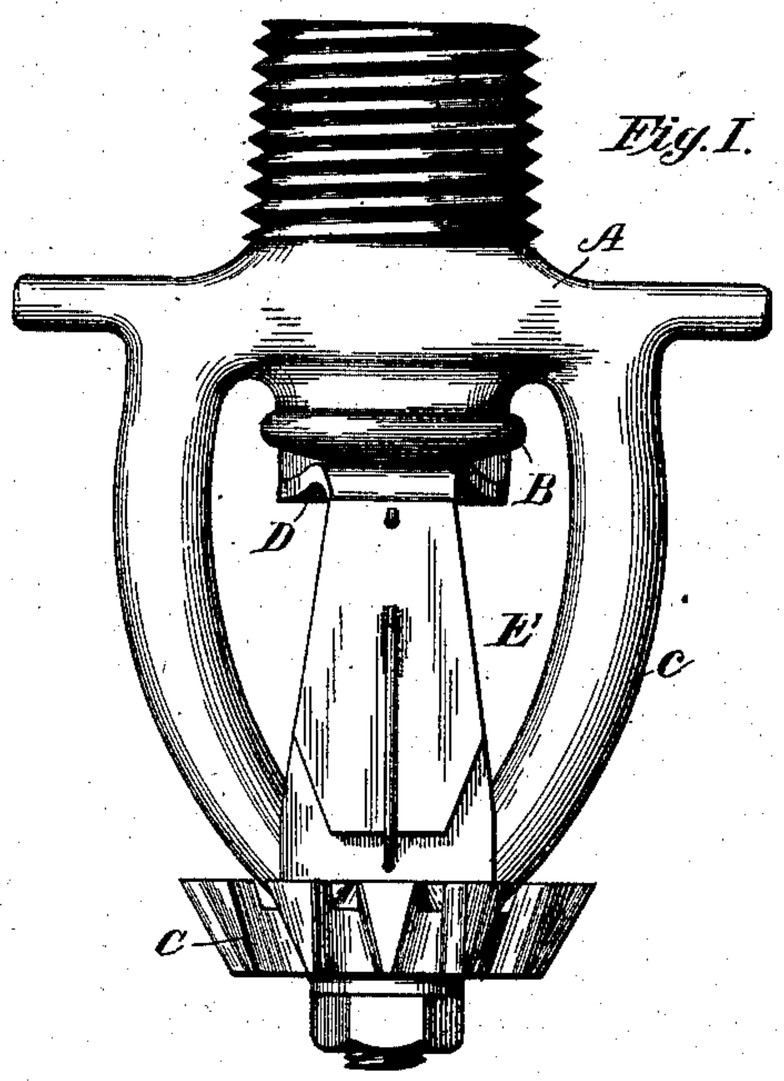


Fig. II.

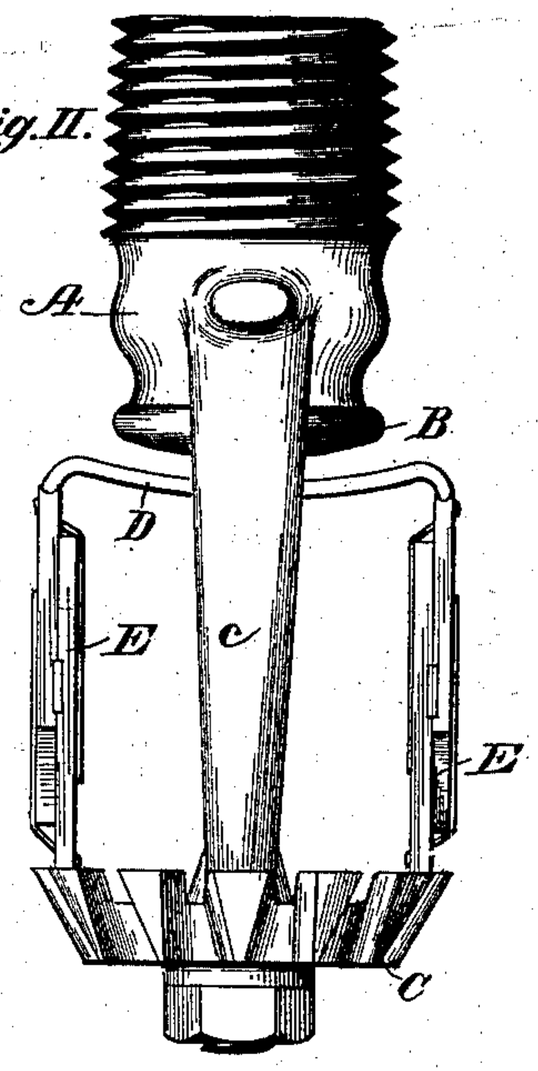


Fig. III.

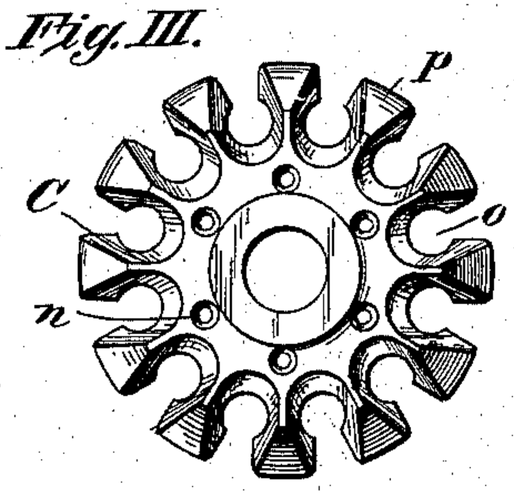


Fig. IV.

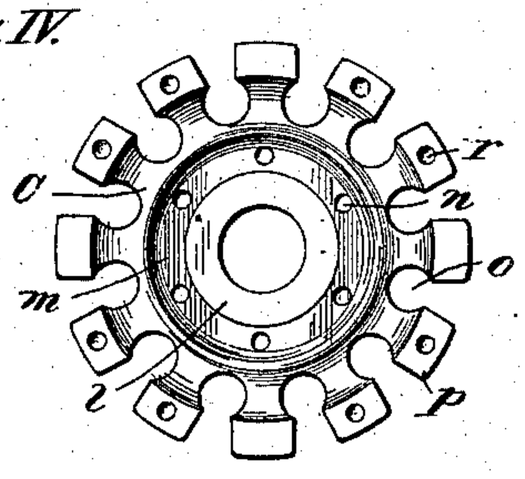


Fig. V.

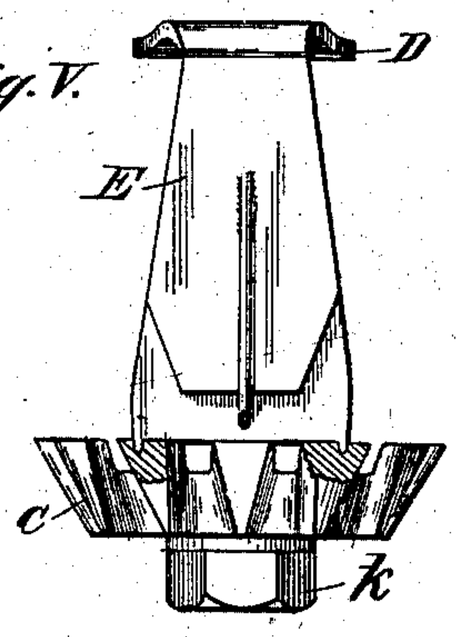
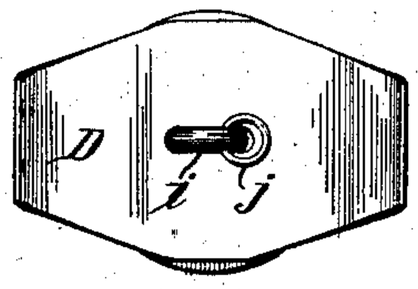


Fig. VI.



Witnesses

H. S. Austin

John Mansfield.

Inventor

William Esty

By Wilfred A. Browne

his Attorney

No. 720,013. PATENTED FEB. 10, 1903.

W. ESTY.

AUTOMATIC STATIONARY FIRE EXTINGUISHER.

APPLICATION FILED FEB. 15, 1902.

MODEL.

2 SHEETS—SHEET 2.

Fig. VII.

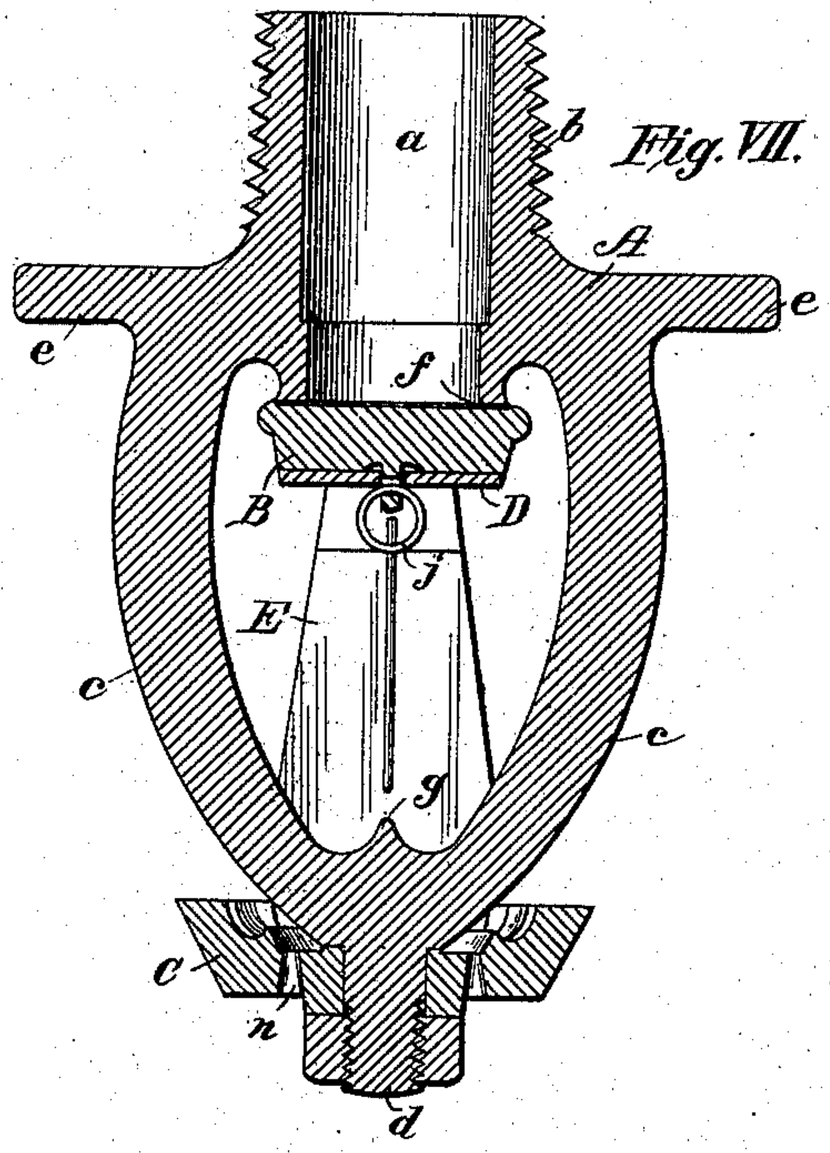
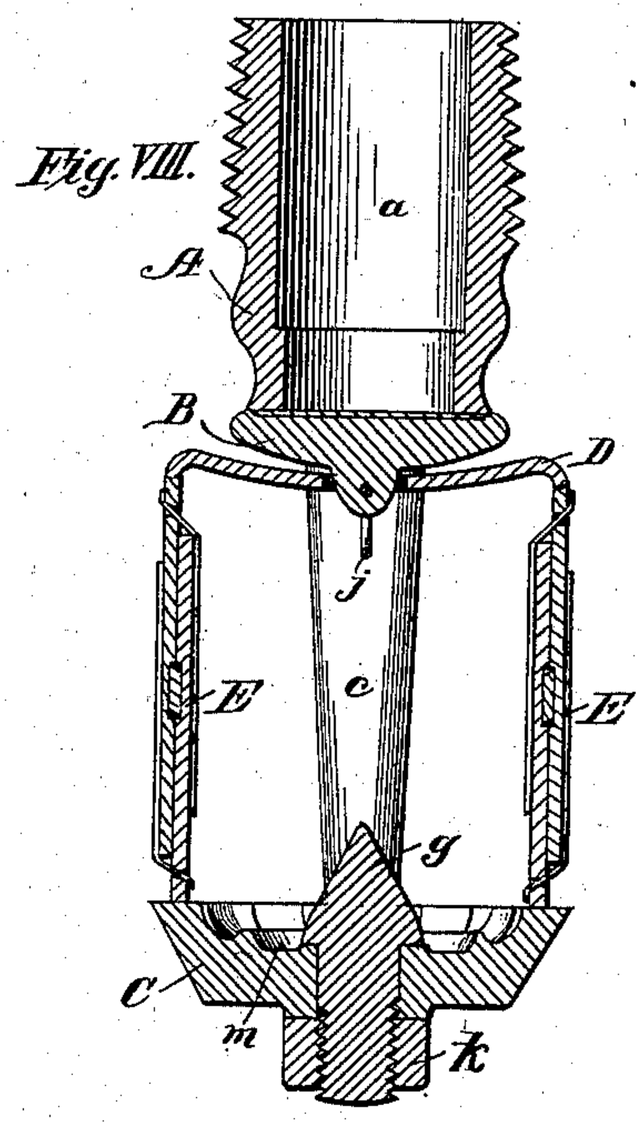


Fig. VIII.



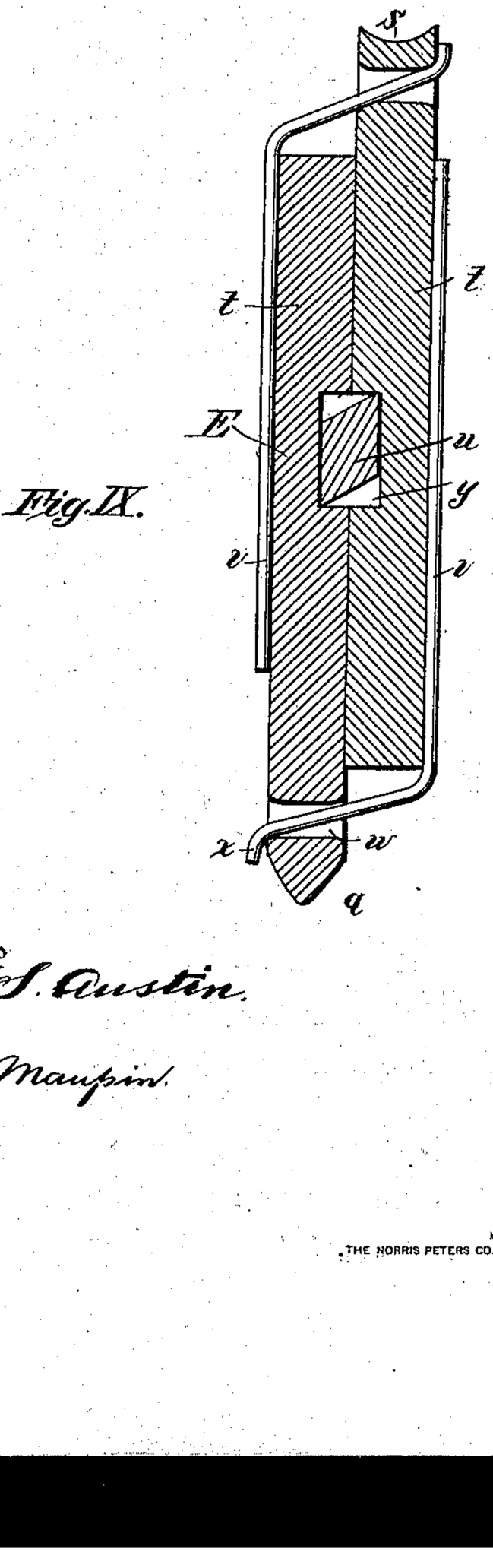
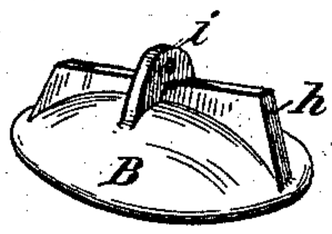


Fig. IX.

Fig. X.



Witnesses
H. S. Austin.
John Maupin.

Inventor
William Esty
by William A. Browne
his Attorney

UNITED STATES PATENT OFFICE.

WILLIAM ESTY, OF LACONIA, NEW HAMPSHIRE.

AUTOMATIC STATIONARY FIRE-EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 720,013, dated February 10, 1903.

Application filed February 15, 1902. Serial No. 94,199. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM ESTY, residing at Laconia, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in Automatic Stationary Fire-Extinguishers, of which the following is a specification.

The present invention consists in improvements upon that class of automatic stationary fire-extinguishers which are employed in factories and other buildings for the purpose of automatically flooding the same with water in case of the outbreak of a fire. In such fire-extinguishers automatic sprinklers are employed connected with the water-supply, which are provided with valves kept closed by suitable fastening devices which are maintained in place by means of a suitable fusible alloy the melting-point of which is low. In case of the outbreak of a fire the rise of temperature incident thereto causes the fusible alloy to melt, whereupon the fastening device gives way, the valves of the sprinklers are opened, and the apartment in which the fire occurs is flooded with water.

The present invention relates to improvements in this type of automatic sprinklers, and has for its object the improvement of the same in various respects.

The improvements are illustrated in the accompanying drawings, in which—

Figure 1 is a front view of one of the improved sprinklers. Fig. 2 is a side view of the same. Fig. 3 is a bottom view of the distributer, which when the sprinkler is discharging water causes the same to be deflected in a shower of spray. Fig. 4 is a top view of the distributer. Fig. 5 is a side view of the distributer and one of the struts, showing the connection between the same. Fig. 6 is an under side view of the spring against which the struts bear at their upper ends, showing the manner in which said spring is connected to the valve of the sprinkler. Figs. 7 and 8 are vertical central sections of the sprinkler, taken at right angles to each other. Fig. 9 is a central vertical section, on an enlarged scale, of one of the struts. Fig. 10 is a perspective view of the valve, showing the under side thereof.

The improved sprinkler is composed of a frame A, a separable valve B, a distributer C, a spring D, connected with the valve, and a separable strut (or struts) E, interposed between the said spring and distributer. The frame A is adapted to be suspended from and secured to an appropriate water-supply, as by screwing thereto, and is equipped at its upper end with a water-passage *a*, which is closed by the valve B. The valve is maintained closed by the struts E. This condition continues until a rise in temperature due to the breaking out of a fire causes the parts of which the struts are composed to give way on account of the fusing of the solder or alloy which holds them together, whereupon the valve being no longer supported drops down and it, the attached spring, and the struts become detached and separated from the frame, falling entirely away, since they are separable from and independent of the frame, thus opening an outlet for the water through the passage *a*. The water in passing out from said outlet encounters the upper face of the distributer C and is thereby efficiently distributed throughout the apartment over the area which the particular sprinkler is designed to protect. Generally speaking, this mode of operation is common to sprinklers of this character.

The present improvements relate to the frame, the valve or cap, with its connected spring, the struts, and the distributer.

The frame A comprises the threaded boss *b*, by means of which it is secured to and suspended from the water-supply, the separated arched arms *c*, which merge together immediately below and in line with the water-passage, and from the place where they thus meet there depends a downwardly-extending screw-threaded stem *d*, by means of which the distributer C is centrally supported. The frame has at its upper portion outwardly-projecting lugs *e*, extending outwardly beyond the arms *c*, and hence beyond the outside limits of the frame, the purpose of which is to coöperate with a spanner-wrench, so as to facilitate the screwing of the sprinkler into place. Owing to this construction the sprinkler can be put into place without the wrench coming in contact with any of the operative parts of the sprinkler, thus avoiding any damage to the same. In the case of ordinary sprinklers ordinary pipe-wrenches are usu-

ally employed for screwing the same into place, and it frequently happens that in so doing the wrench comes against the cap or valve, displacing it laterally and causing the sprinkler to leak. By employing the outwardly-projecting lugs *e* a spanner-wrench can be employed which straddles the frame and does not come in contact with any of the operating parts. It will be noted that the bore or water-passage of the frame is contracted at its outlet, where the seat *f* for the cap or valve is located, thus giving a nozzle effect to the sprinkler when in use, the nozzle and bore being in line with each other. Where the two side arms *c* of the frame meet they are provided with an upwardly-projecting conical separator *g*, which is directly in line with the axis of the water-passage or bore *a*. When the sprinkler is in operation, the descending stream of water strikes this separator and is diverted thereby toward the distributer C, thus facilitating the proper distribution of the water. All parts of the frame thus referred to are cast in a single piece of metal, thus economizing the construction and making the sprinkler strong and reliable. It will further be noted that the two side arms *c* afford ample space for the downward movement and discharge of the valve-struts and spring when the sprinkler operates and do not interfere with the location and operation of the struts.

The valve or cap B seats against the valve-seat *f* of the frame and is held against said seat by the struts. When, however, a fire breaks out, it is important that the valve or cap should open with certainty. The normal condition of sprinklers of this type is that of inaction; but they should be prompt, certain, and reliable when called upon to act. After such a sprinkler has been installed it may be many years before there is any occasion for its operation; but when the call does come it must act with certainty. Now it very frequently happens with this class of apparatus that in course of time the valve becomes stuck to its seat, so that when a fire breaks out and the supporting strut or struts give way the valve does not open, and the loss occurs which the sprinkler should have prevented. An important feature of the present invention is to with certainty tear the valve away from its seat in case a fire breaks out. To this end the struts do not bear directly upon the cap or valve, but indirectly support the same through the intervening spring D. As shown, this spring is an elastic plate which is loosely connected to the under side of the valve B. As best shown in Fig. 10, the valve has on its under side a rib *h* and an eye *i*. This eye extends through a slit in the middle of the spring D, as best shown in Figs. 6, 7, and 8, and the valve and spring are secured together by a loose ring *j*, which passes through said eye on the under side of the spring. The spring seats against the rib *h* of the valve. As shown, there are two struts E, which bear against the outer ends, respectively, of the spring, thus holding the valve in place. Two struts are preferably employed, as shown, so as to distribute the strain, this being desirable since the ultimate strength of the struts depends upon the solder which secures the members of which each is composed together, and this solder in order to be sufficiently fusible cannot withstand a very great strain. As the struts may have to hold a pressure of three hundred pounds to the square inch, it is desirable to divide the load between two struts. On account of the favorable leverage in the construction shown, under such conditions each strut in the illustrated construction would have to withstand a strain of about thirty pounds in case the diameter of the nozzle is one-half inch. The employment of the two struts is, however, merely a preferred construction and is of importance, but is not essential to the invention in its broader aspects. A single strut could be employed, though less favorably, and to that extent would embody one principle of the invention, and it is obvious that a larger number of struts might be employed. It is apparent that the strain to which the struts are subjected is borne by the spring D, and as a consequence the spring is constantly under strain. In case a fire breaks out and the struts give way as the result, the spring is almost instantaneously relieved of the strain which has it under tension, and consequently springs downwardly. This reaction of the spring operates upon the valve through the connecting-ring *j*, thus giving a quick downward jerk upon the valve, thus tearing it away from the valve-seat in case it should have become stuck thereto. Owing to this construction and arrangement, the valve operates reliably even after the lapse of a great length of time. In this connection the double-strut arrangement shown is important. It rarely happens on the occurrence of a fire that both struts are heated alike, so that ordinarily one disintegrates in advance of the other. Consequently under such ordinary conditions the intact strut acts as a fulcrum for the spring, thus causing the spring and attached valve to tilt on the valve-seat as the spring jumps away, which materially facilitates tearing the valve from the seat. In such a case the kick of the spring throws the valve and spring in the direction of the intact strut, while the parts of the disintegrated strut fly in the opposite direction.

The struts E are interposed between the spring B and the distributer C, and it will facilitate the understanding of the struts to first consider the distributer. The distributer, generally speaking, is disposed horizontally and centrally with reference to the nozzle, so as to receive the stream of water and to divert the same laterally, at the same time permitting a sufficient amount of the water to pass directly beneath the sprinkler. The distributer has a central aperture by means of which it is slipped over the stem *d* of the

frame and is held in place thereon by means of the nut *k*. Surrounding this central opening the distributer has a ground-seat *l*, (see Fig. 4,) which seats squarely against a corresponding shoulder of the frame, as shown in Figs. 7 and 8. In assembling the parts of the sprinkler the distributer is slipped over the stem *d*, the valve in its spring is put in place, and the struts are then interposed between the spring and the distributer. The nut *k* is then screwed onto the stem, thus forcing the distributer C upwardly and putting the spring D under strain. It is important, however, that the struts should not be overstrained, since, as above pointed out, they have only limited strength. In the present construction the relation between the parts is such that when the distributer is forced upwardly until its seat *l* comes squarely against the shoulder of the frame the struts and spring are under the proper strain, and the said shoulder positively prevents overstraining. As the distributer is especially constructed to secure the proper and thorough distribution of the water, and particularly to insure the distribution of water directly beneath the sprinkler, the distributer has on its upper or water-receiving side a channel or cup *m*, surrounding its seat *l*, (see Figs. 4, 7, and 8,) which channel receives some of the water, and a portion of the water entering this channel passes directly downward through apertures *n*, (see Figs. 4 and 7,) which thus admit a direct downward discharge of a portion of the water. Extending outwardly from the rim of this channel are a plurality of separated upwardly and outwardly extending distributing projections *p*, having open-mouthed spaces *o* between them. On reference to Figs. 1, 2, and 5 it will be noted that each of these spaces *o* is wider at its bottom than at its top—that is to say, it is wider at the water-discharging than at the water-receiving side of the distributer—so that a portion of the water which passes downwardly through said spaces is free to spread laterally at an angle of about forty-five degrees. By reference to the various figures of the drawings it will be seen that each of these spaces diverges from its top in every direction as it extends downwardly. The projections *p* at the same time cause the water striking them to be thrown outwardly, the water being split thereby into fine drops and distributed in every direction. This form of distributer, in connection with the spreader *g* of the frame, insures a thorough and uniform distribution of the water over the entire space which the sprinkler is designed to protect. The construction of the distributer is such that the distribution of water is thoroughly effected without giving any rotary movement to the distributer.

Each strut E is provided at its bottom with two pointed feet *q*, which enter, respectively, recesses *r* in the upper faces of two of the outward projections *p* of the distributer. As shown, the arrangement is such in this respect that each strut straddles across one of the projections *p* which is not provided with such a holding-notch. Each strut at its upper end has a groove *s*, (see Fig. 9,) which embraces one of the outer edges of the spring D, which is suitably bent over to receive the said groove, as shown in Fig. 8. Consequently each strut is held both at top and bottom against accidental lateral displacement. Each strut is composed of two parallel members *t t*, an intermediate separator *u*, and two binding-wires *v* and is best illustrated in Fig. 9, which is purposely on a much enlarged scale. As shown, the two members *t* seat flatly against each other and are suitably recessed on adjacent faces to receive the separator *u*. The binding-wires *v* secure the two members *t* together. As shown, each binding-wire lies vertically along the outer face of its corresponding member and is bent at one end, so as to pass around the end of its own member and to extend through an aperture *w* of the other member, being hooked at its extreme end *x*, so as to hold onto the opposing member. The solder or fusible alloy, which holds the parts of the strut together, is placed along each binding-wire, uniting the same to the face of its own member *t*, as indicated in Figs. 1 and 5. The fusible alloy can also be placed between the meeting faces of the two members and is so placed by preference. It is desirable to use as little of the solder as is sufficient to maintain the parts of the strut together and to enable it to withstand the strain to which it is subjected. The separator *u*, which is interposed between the meeting faces of the two separate members, being located in the recess *y* is diamond-shaped, as shown, its points resting against diagonally opposite corners of the recess *y*. There is illustrated a single diamond-shaped separator in the recess *y* of each strut; but it is obvious that a plurality of such separators might be employed. When the solder melts, owing to the occurrence of a fire, the two members of which each strut is composed are thrown apart by the combined action of the spring D and the diamond-shaped separator *u*. It is important when this action takes place it shall take place practically instantaneously, so as to give no opportunity for the solder to freeze after being once melted, and thus to hold the parts of the struts together. The tendency of the spring D is to slip one of the members facewise on the other—that is to say, vertically downward—but as soon as this downward movement begins the diamond-shaped separator is rocked, thus forcing the two members *t* apart from each other, and thereby preventing any freezing of the solder, which might interfere with the operation. At the same time this parting action of the separator causes the outer members of each strut to be thrown outwardly. It will be noted that both struts and the valve, with its spring, are not connected permanently to the

frame, but are separable therefrom and independent thereof, and consequently when the struts give way and the valve opens the struts and valve and spring are free to be thrown outwardly away from the frame, either by their own action or by the subsequent discharge of the water, so that when the sprinkler is at work sprinkling water the only portions of the apparatus which are present are the frame and the distributer, together with the nut which holds the distributer in place.

The sprinkler has been described on the assumption that it is suspended from the water-supply; but it is obvious that it could be placed on top of a water-pipe with the valve down and the distributer up.

I claim as my invention—

1. An automatic sprinkler having, in combination, a frame, a valve-seat, a separable valve, a spring so joined thereto that when the spring moves away from the valve-seat the valve moves with it, and a separable strut which operates upon said valve through said spring to hold the valve in place, whereby, when the strut gives way, the action of the spring tends to open the valve, and the strut, spring and valve thereupon become detached and separated from the frame.

2. An automatic sprinkler having, in combination, a frame, a separable valve, a spring operatively connected therewith, and two separable struts which act upon opposite ends of said spring to maintain the spring under tension and hold the valve in place, whereby, when said struts give way, the spring reacts and jerks the valve from its seat, and the valve with the spring and both struts becomes detached and separated from the frame.

3. An automatic sprinkler having, in combination, a frame, a separable valve, and two separable struts supporting the valve on opposite sides, each of said struts comprising a plurality of members connected by a fusible alloy, so that an increase of temperature causes said struts to disintegrate and to release the valve, and, thereupon, the valve and both struts become detached and separated from the frame.

4. An automatic sprinkler having, in combination, a frame, a valve-seat, a separable valve, a spring operatively connected with said valve, so that when the valve moves away from the valve-seat the valve moves with it, a distributer carried by the frame, and a separable strut interposed between the distributer and the spring whereby said spring is maintained under tension, and when the strut gives way it, together with the valve and spring, becomes detached and separated from the frame.

5. An automatic sprinkler having, in combination, a frame, a valve-seat, a separable valve, a spring operatively connected with the valve, so that when the spring moves away from the valve-seat the valve moves with it, a distributer movable on the frame toward said valve, a separable strut interposed between said distributer and spring and means for limiting the movement of said distributer toward said valve, whereby the spring is put under tension and overstraining of the strut is prevented.

6. An automatic sprinkler having, in combination, a frame, a separable valve, a spring operatively connected with said valve and extending in opposite directions from the center of said valve, a distributer attached to said frame and movable to and from the valve, two separable struts interposed between the said distributer and opposite ends of said spring, each of said struts comprising a plurality of members connected together by fusible alloy, and means for limiting the adjustment of the distributer toward the valve, whereby the spring is put under tension, and the overstraining of the struts is prevented.

7. An automatic sprinkler having, in combination, a frame, a separable valve, a spring operatively connected with said valve and extending in opposite directions from the center thereof, a distributer connected to said frame, and two separable struts interposed between said distributer and said spring at opposite ends of said spring, each of said struts being composed of a plurality of members united by fusible alloy.

8. An automatic sprinkler having, in combination, a frame, a valve-seat, a separable valve, a spring operatively connected with the valve so that when the spring moves from the valve-seat the valve moves with it, a separable strut, and a support carried by said frame for said strut, said strut being interposed between said support and said spring, and means for preventing lateral displacement of the strut at both ends.

9. An automatic sprinkler having, in combination, a frame, a separable valve, a spring operatively connected with the valve, a separable strut and a support on said frame for said strut, said strut being interposed between said support and spring, and being composed of two members, one bearing on the spring and the other on the support, said members lying face to face and united by solder and having interposed between them a separator which forces them apart when the solder melts and said spring tends to slide one strut member along the other.

10. An automatic sprinkler having a distributer provided with outwardly-extending and separated projections with open-mouthed spaces between them, said spaces flaring from the water-receiving to the water-discharging faces of said distributer.

11. An automatic sprinkler having, in combination, a valve, a spring operatively connected therewith, and two struts which act upon opposite ends of said spring to maintain the spring under tension and hold the valve in place, whereby, when said struts give way, the spring reacts and jerks the valve from its seat.

12. An automatic sprinkler having a strut composed of the strut members *t*, having the

apertures w and the recess y, the separator u located in said recess y, and the binding-wires v, each located along the outer face of one of said members t and soldered thereto and having a hooked tapered end x extending through the aperture w of the other strut member.

13. An automatic sprinkler having, in combination, a frame, a valve-seat, a separable valve, a spring operatively connected with said valve so that when the spring moves away from the valve-seat the valve moves with it, a support carried by said frame, and a separable strut the parts of which are united by fusible alloy, said strut being interposed between said support and said spring so as to put said spring under tension and to keep the valve closed, whereby, when the strut gives way on a rise of temperature, the action of the spring tends to open the valve, and the strut, spring and valve thereupon become detached and separated from the frame.

14. An automatic sprinkler having, in combination, a frame, a valve-seat, a valve separable from the frame, a spring so joined to the valve that when the spring moves away from the valve-seat the valve moves with it, and fusible means which operates to hold the valve in place and to maintain the spring under tension, the valve being unattached to the frame when the fusible means has been disintegrated by heat.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM ESTY.

Witnesses:
GEO. W. SHERWELL,
LESTER A. DEARTH.