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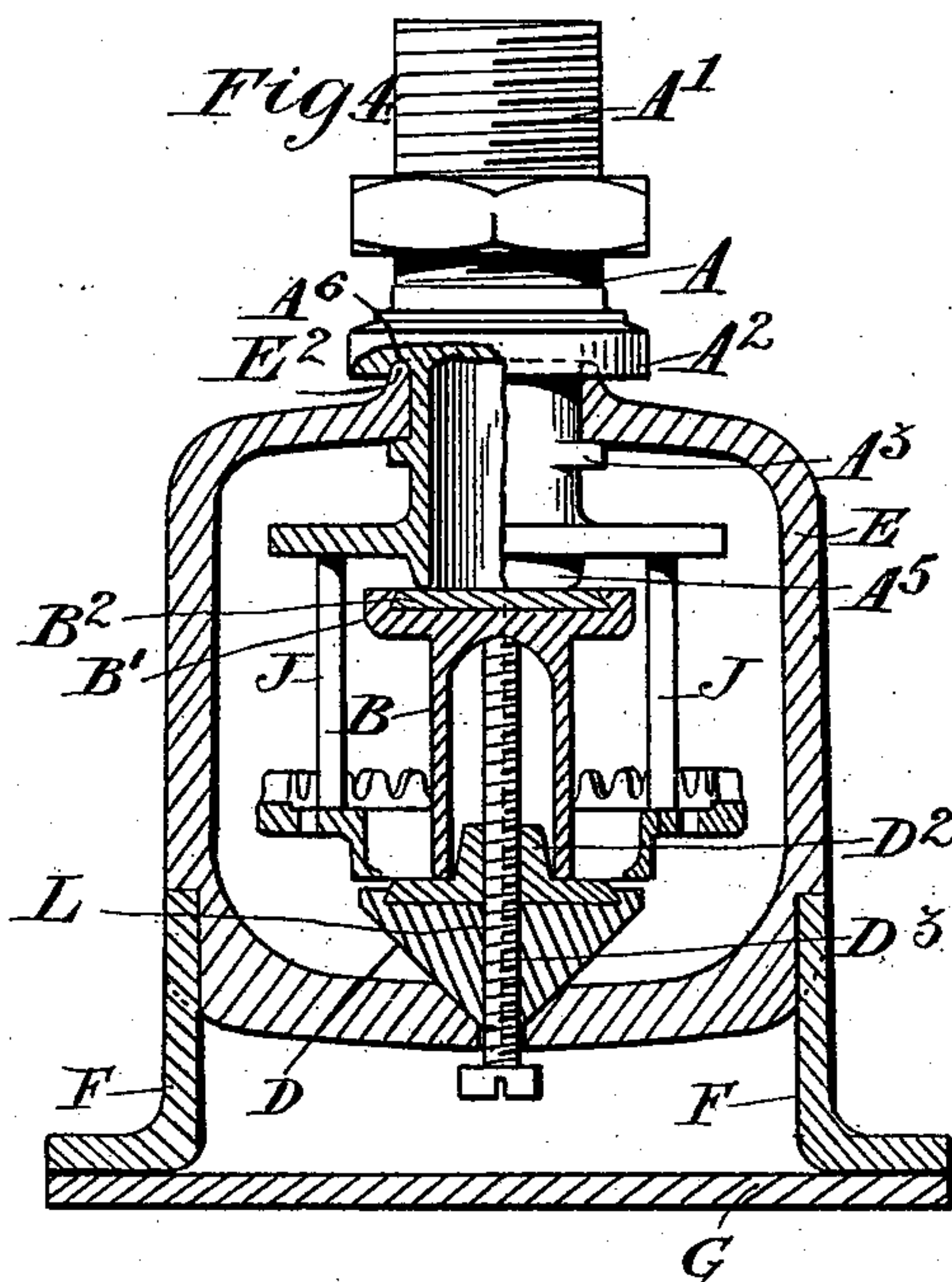
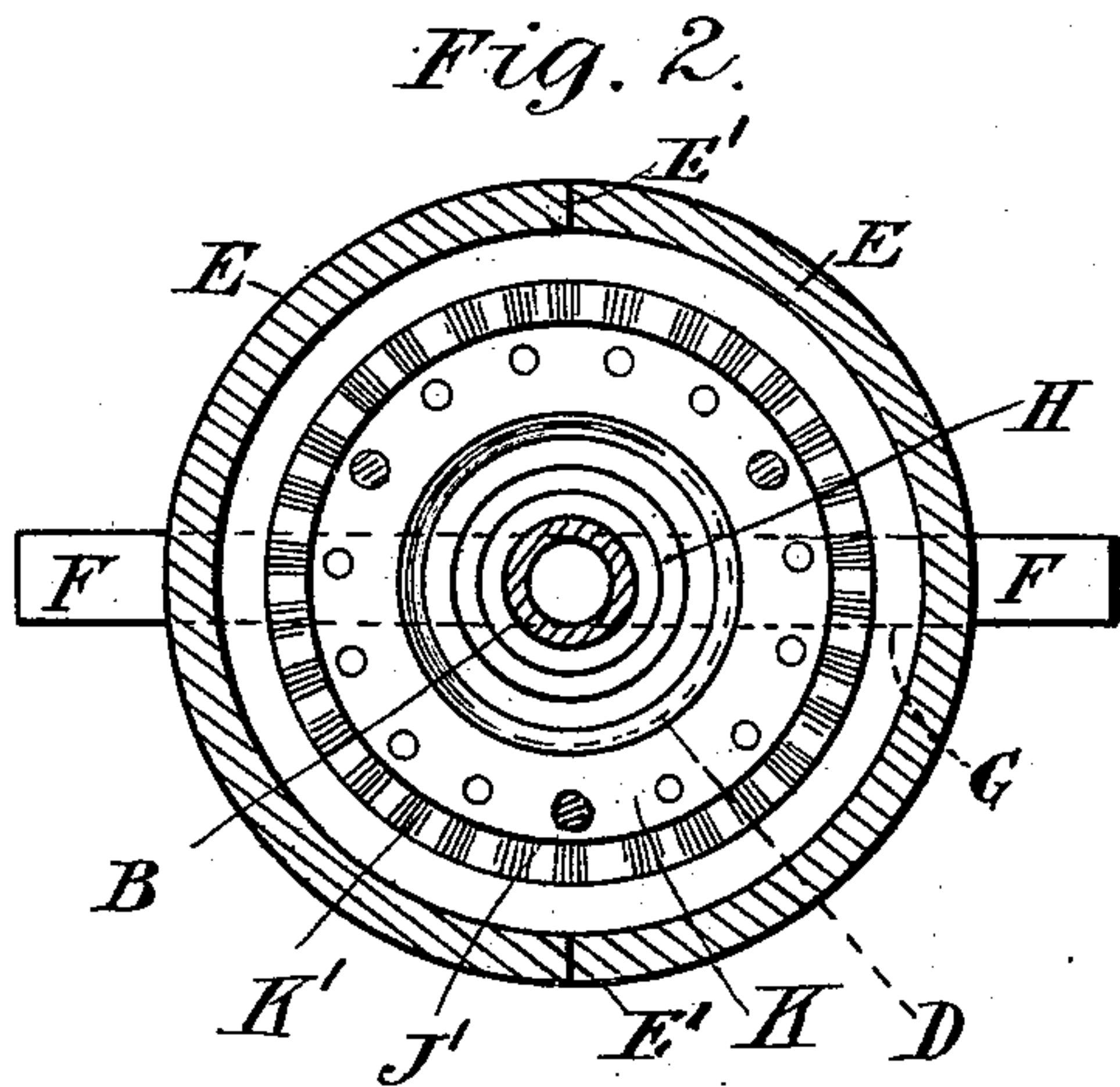
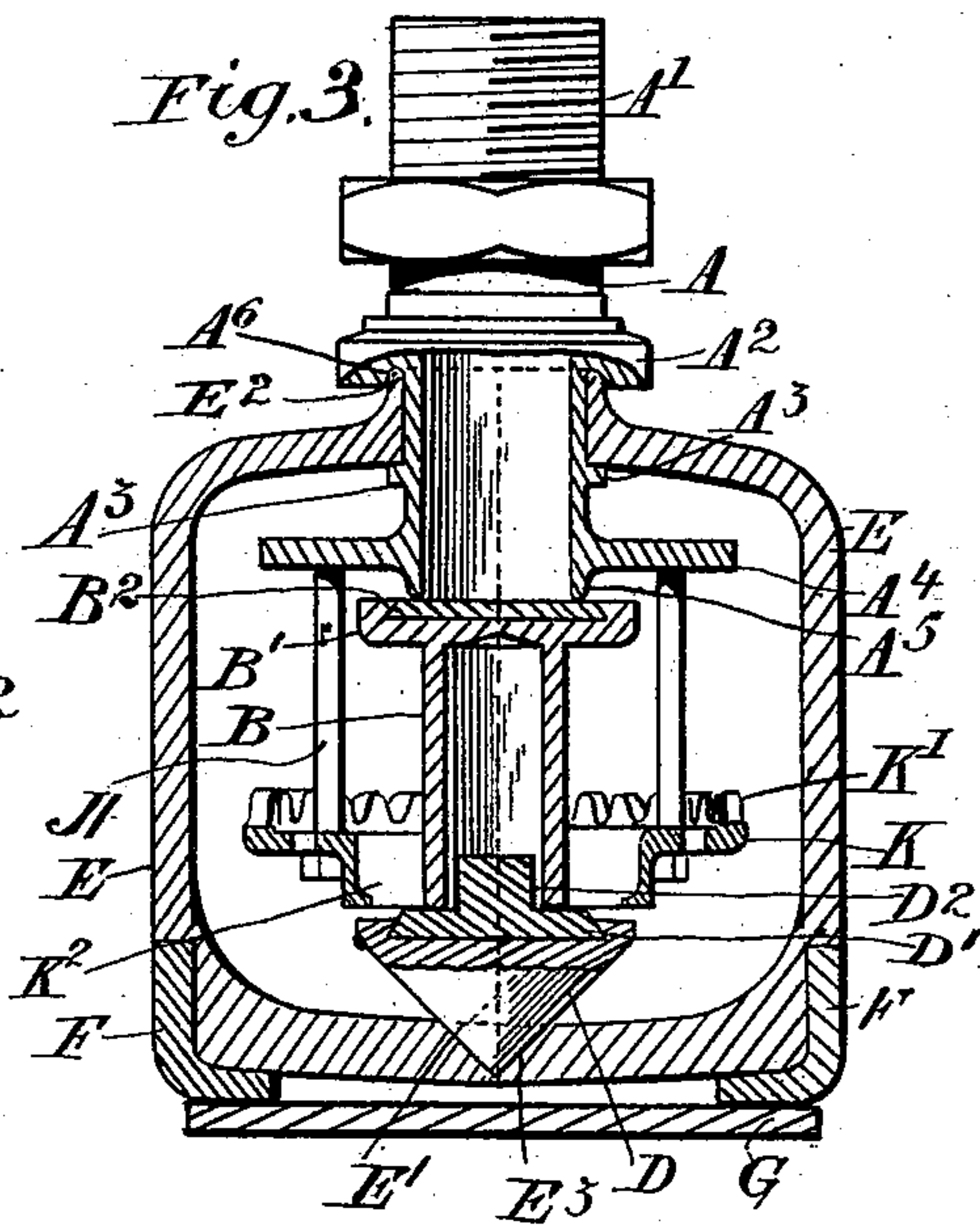
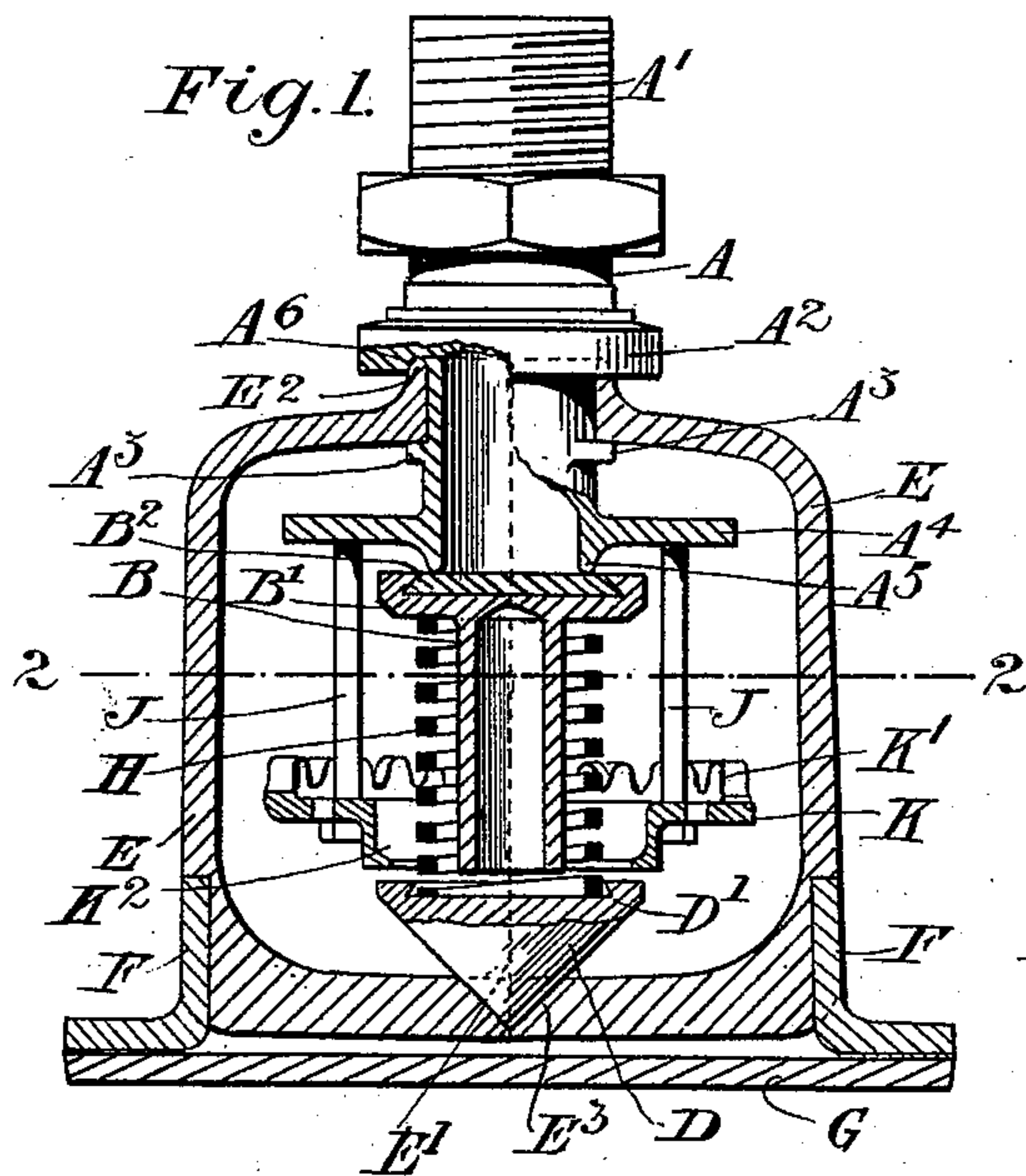
Patented Dec. 6, 1898.

F. W. GREW.  
FIRE SPRINKLER.

(Application filed Dec. 29, 1897.)

(No Model.)

2 Sheets—Sheet 1.



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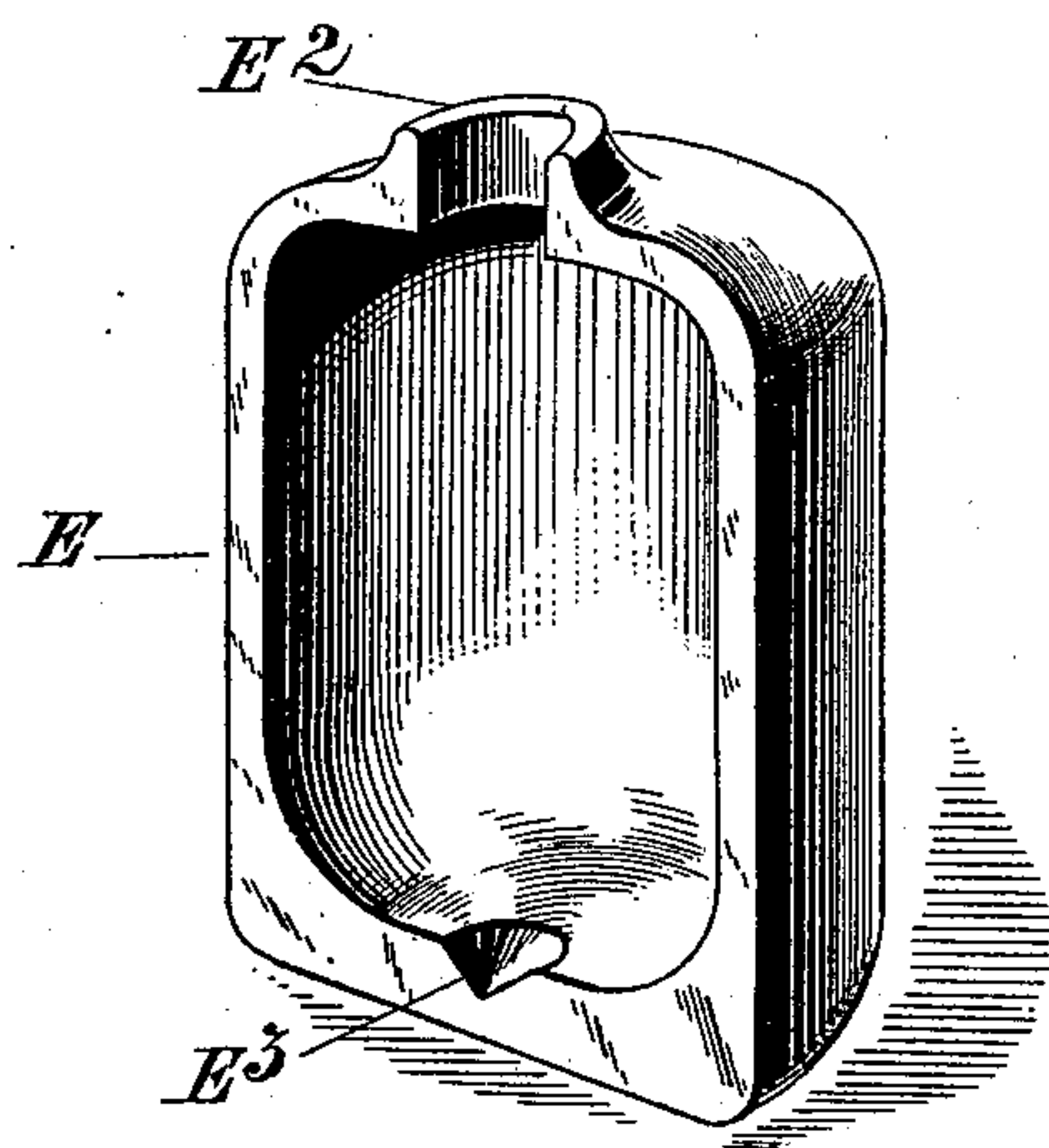
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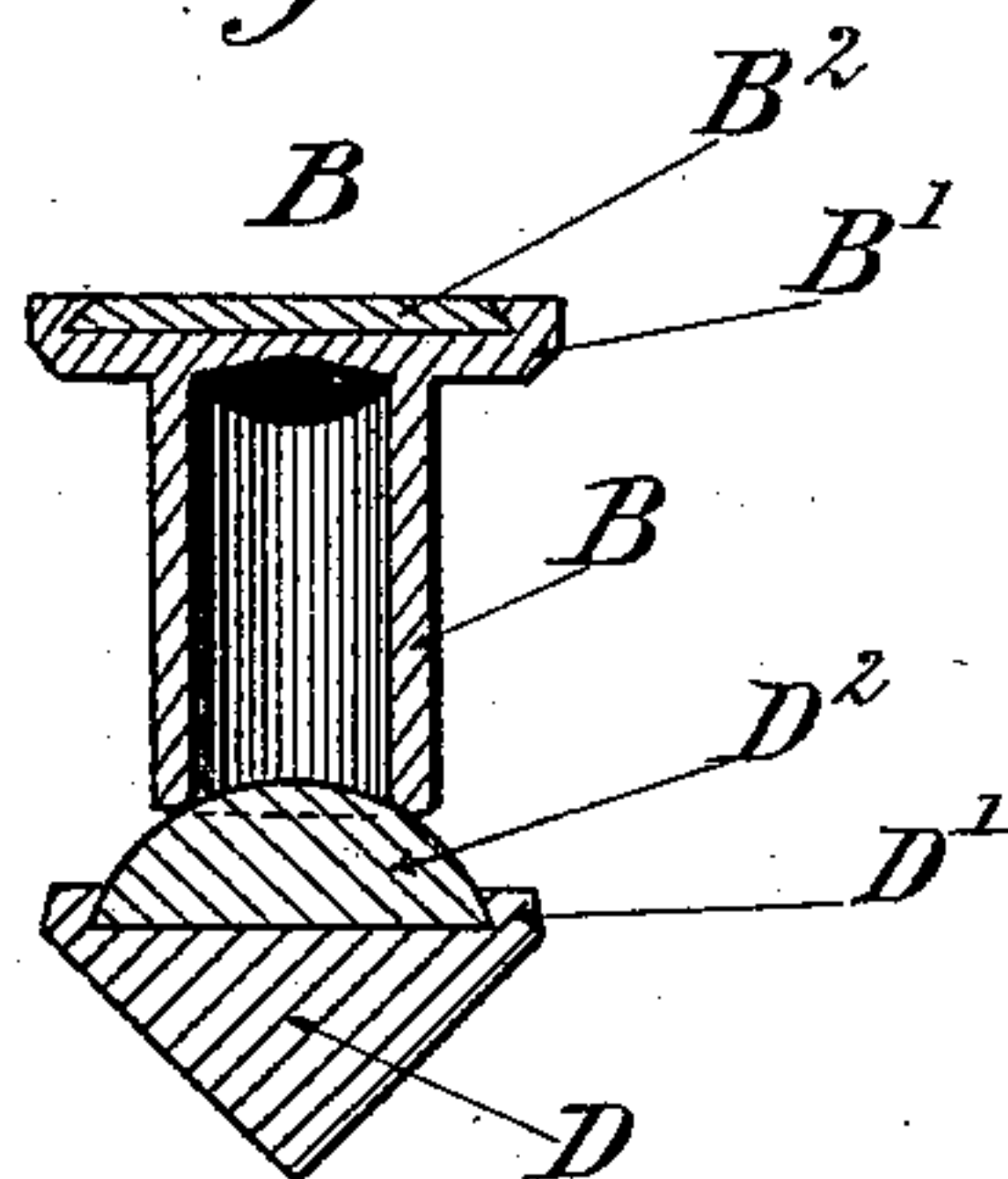
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*Fig. 5.*



*Fig. 6.*



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# UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM GREW, OF LONDON, ENGLAND.

## FIRE-SPRINKLER.

SPECIFICATION forming part of Letters Patent No. 615,270, dated December 6, 1898.

Application filed December 29, 1897. Serial No. 664,255. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK WILLIAM GREW, a subject of the Queen of England, residing at London, England, have invented certain new and useful Improvements in or Relating to Fire-Sprinklers, of which the following is a specification.

This invention relates to automatic fire-sprinklers employed for the protection from fire of an area below or adjacent to them and caused to act by the raising of the temperature to a predetermined point.

Fire-sprinklers as hitherto usually constructed possess certain disadvantages. In some of them there are working parts or projections in the waterway which impede the delivery of liquid, and the working parts are exposed to atmospheric influence or to the danger of becoming clogged with dirt and dust or corroded.

According to the present invention a sprinkler is constructed with a clear waterway, at the end of which is a valve, preferably having a facing of non-corrosive metal or other material. This valve is normally retained in position to close the end of the waterway by preferably a spring bearing at one end upon the valve and at the opposite end upon the interior of the casing, which may be of a material which is a non-conductor of heat—such, for instance, as wood-pulp—or may be coated with such a material. This casing incloses the valve and the operative parts of the sprinkler and is conveniently made in two or more parts engaged or interlocked with a stationary portion of the same and so formed and combined with the spring or other device by which the valve is held against its seat that the action of the spring or of the water-pressure on the valve, acting through such opening or other connection, tends always to separate them and cause them to fly off the sprinkler, and in so doing to permit the valve to open and the water to be delivered from the sprinkler, which may have the usual deflector or other spreading device.

The parts of the casing are engaged with each other by fusible or other locking devices adapted to operate automatically by variation of their temperature, such as a bar secured at its opposite ends to the casing by solder joints which soften or fuse at a predeter-

mined temperature or otherwise operate upon the attainment of a certain temperature to release the parts of the case and allow the latter to separate, the valve to open, and the sprinkler to come into operation.

Conveniently the spreader may be so constructed and held in position as to constitute a guide for the valve.

The casing may be divided in the plane of the axis of the sprinkler and the valve may be upheld by a spring provided with a coned or wedge-shaped head, the reaction set up by the spring between the head and the cone tending to open out the parts of the casing which are held together by the thermal locking device.

The combination of a non-conducting casing and of a bar locking device is advantageous; but the invention is not limited to this particular construction.

In the accompanying drawings, Figure 1 is a sectional elevation of one construction of sprinkler according to this invention. Fig. 2 is a sectional plan on the line 2 2 of Fig. 1. Figs. 3 and 4 are each sectional elevations of alternative constructions of sprinkler, also according to this invention. Fig. 5 is a perspective view of one-half of a cover for a sprinkler according to this invention. Fig. 6 shows a modification of the construction of valve illustrated in Fig. 3.

Like letters indicate like parts throughout the drawings.

A is the nozzle or stem of the sprinkler, screwed, as at A', so that it may engage with a suitable fitting in the water-pipe or other fluid-containing vessel and having its lower edge rounded, as at A<sup>5</sup>. The nozzle A is provided with two flanges A<sup>2</sup> A<sup>4</sup> and two tongues or projections A<sup>3</sup>, for purposes hereinafter described.

With reference first to Fig. 1, B is a tube of metal or other suitable material having a flanged end B', which is countersunk upon its upper surface, as at B<sup>2</sup>. This countersunk recess B<sup>2</sup> is filled with some non-corrodible material, metallic or otherwise. The bottom end of the tube B extends down nearly into contact with the base of an inverted cone D, which is recessed, as at D'. A spiral spring H is provided, the upper end of which presses against the under side of the flange B', its



lower end bearing in the recess  $D'$  in the base of the conical piece  $D$ .

$E$  is a casing or cover made, preferably, of woodite or other material which is a bad conductor of heat. It is conveniently made in two halves, separable in a vertical plane, in which is the axis of the sprinkler. As illustrated, the division is shown by the dotted line  $E'$ . The top of the cover  $E$  is in the form of a neck  $E^2$ , the upper end of which fits into a groove  $A^6$  in the flange  $A^2$ . The cover is supported upon the before-mentioned tongues  $A^3$ . In the center of the bottom of the cover  $E$  a countersunk conical recess  $E^3$ , Fig. 5, is formed, which receives the point or apex of the conical piece  $D$ . At the opposite ends of a diameter upon the lower portion of the casing  $E$  two recesses are formed, into each of which an angle-piece  $F$ , preferably of metal, fits. In Figs. 1 and 4 these angle-pieces are shown extending outward from the base of the cover; but, if preferred, they may, as illustrated in Fig. 3, extend inward toward the center of the sprinkler. The latter construction would be adopted in places where the sprinkler would be liable to be knocked about. The former construction would be preferred for places where the liability of this kind of damage did not exist.

A bar of metal or other suitable material  $G$  extends across the bottom of the cover  $E$  and is fastened to the casing by suitable material, such as soft solder, which will fuse when the temperature is raised to the requisite amount.

The various parts of the sprinkler are so proportioned that when the cover  $E$  is placed in position the lower end of the tube  $B$  is just clear of the top of the conical piece  $D$ , the spring  $H$  being then compressed, so that it exerts a considerable pressure upon the cone  $D$ . This insures that the valve-face  $B^2$  is always in close contact with the end  $A^5$  of the nozzle  $A$ .

Dependent from the flange  $A^4$  by three pins  $J$  or equivalent is a deflector or spreader  $K$ , comprising an annular ring with teeth  $K'$  projecting vertically from its outer edge and having a flanged recess  $K^2$ .

When the sprinkler is fixed ready for use, the pressure of water upon the valve-face  $B^2$  is transmitted to the conical piece  $D$ . It will therefore under the joint action of this fluid-pressure and the effort exerted by the spring  $H$  act as a wedge in its seating  $E^3$  and tend to force the parts of the cover  $E$  apart. This tendency is counterbalanced by the bar  $G$  as long as the soft-solder joints between it and the angle-pieces  $F$  hold. As soon as either or both of these joints give way through the increase of their temperature the parts of the cover are separated and, being forced apart by the conical wedge  $D$ , slip off the tongues  $A^3$  and fall away. The wedge  $D$  and spring  $H$  also drop away, as they are no longer supported by the cover. The valve  $B$  is then free to fall, which it immediately does, until the flange  $B'$  is caught by the

flanged recess  $K^2$  in the deflector  $K$ . There is now a clear way for the water through the nozzle  $A$ , and consequently it descends with great force upon the top of the flange  $B'$ , which is now level with the base of the teeth  $K'$  of the deflector  $K$ , and splashes up, being spread by these teeth, and is distributed in every direction.

It will be seen that this construction of sprinkler is applicable to either the "wet" or "dry" pipe system, as it does not necessarily depend for its operation upon the pressure of fluid in the pipe  $A$ , the spring  $H$  tending to throw the cover off whatever position the sprinkler may occupy on the pipe.

The foregoing description of the construction of the improved sprinkler will also apply to the constructions illustrated in Figs. 3 and 4, with the exception of certain modifications in the valves, which are as follows:

In the construction illustrated in Fig. 3 the spring  $H$  is dispensed with, the bottom of the tube  $B$  resting upon the upper face of the conical piece  $D$ . The recess  $D'$  is in this case preferably filled with a non-corrodible material, a portion of which extends for a short distance up into the interior of the tube  $B$ , as at  $D^2$ , or the face of the non-corrodible material may be formed into an approximately spherical shape, as shown in Fig. 6. In this construction the tube  $B$  acts as a strut connecting the flange  $B'$  with the conical piece  $D$ .

If it be desired that there should be provision for positive adjustment for length between the conical recess  $E^3$  in the cover  $E$  and the bottom end  $A^5$  of the nozzle  $A$  without employing a spring, it can be obtained, as in the further example illustrated in Fig. 4, by means of a screw  $L$ , which passes through a hole in the cover  $E$  and screws into a hole  $D^3$ , tapped to receive it in the conical plug  $D$ . There is clearance around the screw  $L$  where it passes through the cover  $E$ ; but such clearance is so slight that dust, dirt, &c., are excluded from the interior of the sprinkler. The point of the screw  $L$  bears against the upper end of the interior of the tube  $B$ , so that by screwing it in or out the distance between the valve-face  $B^2$  and the conical piece  $D$  is altered. In this construction the vertical parts of the angle-pieces  $F$  are preferably made longer, so that there may be space provided between the bottom of the casing  $E$  and the bar  $G$  for the head of the screw  $L$ .

Although the cover  $E$  is preferably made of some material which is a bad conductor of heat, it is obvious that, if desired, it may be made of metal, each half-cover, with its angle-piece, being in one piece.

The advantages of sprinklers made according to this invention are chiefly as follows: There is no part which is at all likely to get out of order, and there is no mechanism between the conical wedge  $D$  and the cover  $E$ . The valve is acted upon positively by the pres-



sure of the water, and the valve-face B<sup>2</sup> is large and of non-corrodible material. The cover E does not inclose or shield any device depending for its action upon the temperature. The only device of this nature is the bar G, which is outside the cover E.

I claim—

1. In an automatic sprinkler, the combination with the nozzle having a groove and shoulders beneath the groove, the two-part separable casing having a neck adapted to engage said groove and rest upon the shoulders, a fusible connection between the parts of said casing, the valve for closing the nozzle, and the support interposed between the valve and casing and adapted to be released by the separation of the casing substantially as described.

2. In an automatic sprinkler, the combination with the nozzle, of the separable casing inclosing the same and fusibly held together, a wedge within the casing engaging a correspondingly-shaped recess on the line of separation, a valve for the nozzle, and a supporting connection between the wedge and valve, substantially as described.

3. In an automatic sprinkler, the combination with the nozzle, of the separable casing inclosing said nozzle, the bar extending transversely of the casing beneath the same, the fusible connecting-pieces connecting the ends of said bar with the sections, the wedge engaging a corresponding recess between the sections of the casing, a valve, and a supporting connection between the wedge and valve, substantially as described.

4. In combination, the nozzle, the fusibly-connected separable casing inclosing the same, the wedge engaging a corresponding recess between the sections of the casing, the tube supported above the wedge, and the valve-plate carried at the upper end of said

tube and closing the mouth of the nozzle, substantially as described.

5. In combination, the nozzle having a groove and shoulders beneath said groove, the two-part separable casing having a neck adapted to engage said groove and rest upon the shoulders, the bar beneath the separable casing, and the angle-pieces carried by the sections and having a fusible connection with the bar, the valve, and the support between the valve and casing, substantially as described.

6. In combination, the nozzle, the separable casing fusibly connected and inclosing said nozzle, the wedge engaging a corresponding seat between the sections of the casing, the spreader supported from the nozzle and having an open center, the valve adapted to close said nozzle, and also adapted to drop to close the open center of the spreader, and the support between the valve and wedge extending through said open center and tending to normally hold the valve against the nozzle, substantially as described.

7. In an automatic sprinkler, the combination with the nozzle, of the separable casing inclosing said nozzle, the bar extending transversely of the casing beneath the same, the fusible connecting-pieces connecting the ends of said bar with the sections, a wedge engaging a corresponding recess between the sections of the casing, a valve, and a supporting connection comprising an adjusting-screw between the wedge and valve, substantially as described.

In witness whereof I hereto set my hand in the presence of the two subscribing witnesses.

FREDERICK WILLIAM GREW.

Witnesses:

HARRY B. BRIDGES,  
A. P. HOOD.