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G. E. HIBBARD.

SPRINKLER HEAD FOR AUTOMATIC FIRE EXTINGUISHERS.

APPLICATION FILED MAR. 3, 1902.

NO MODEL.

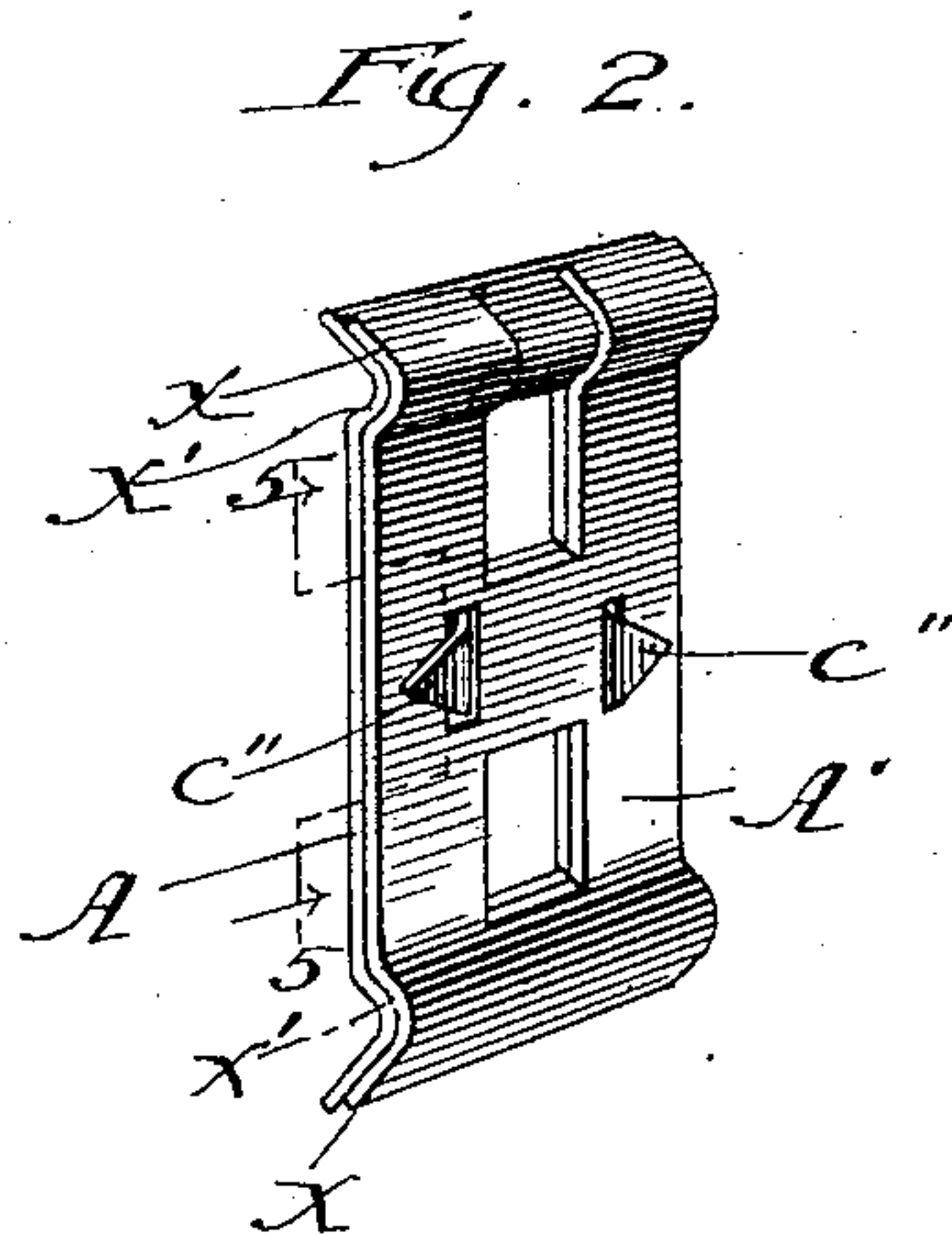
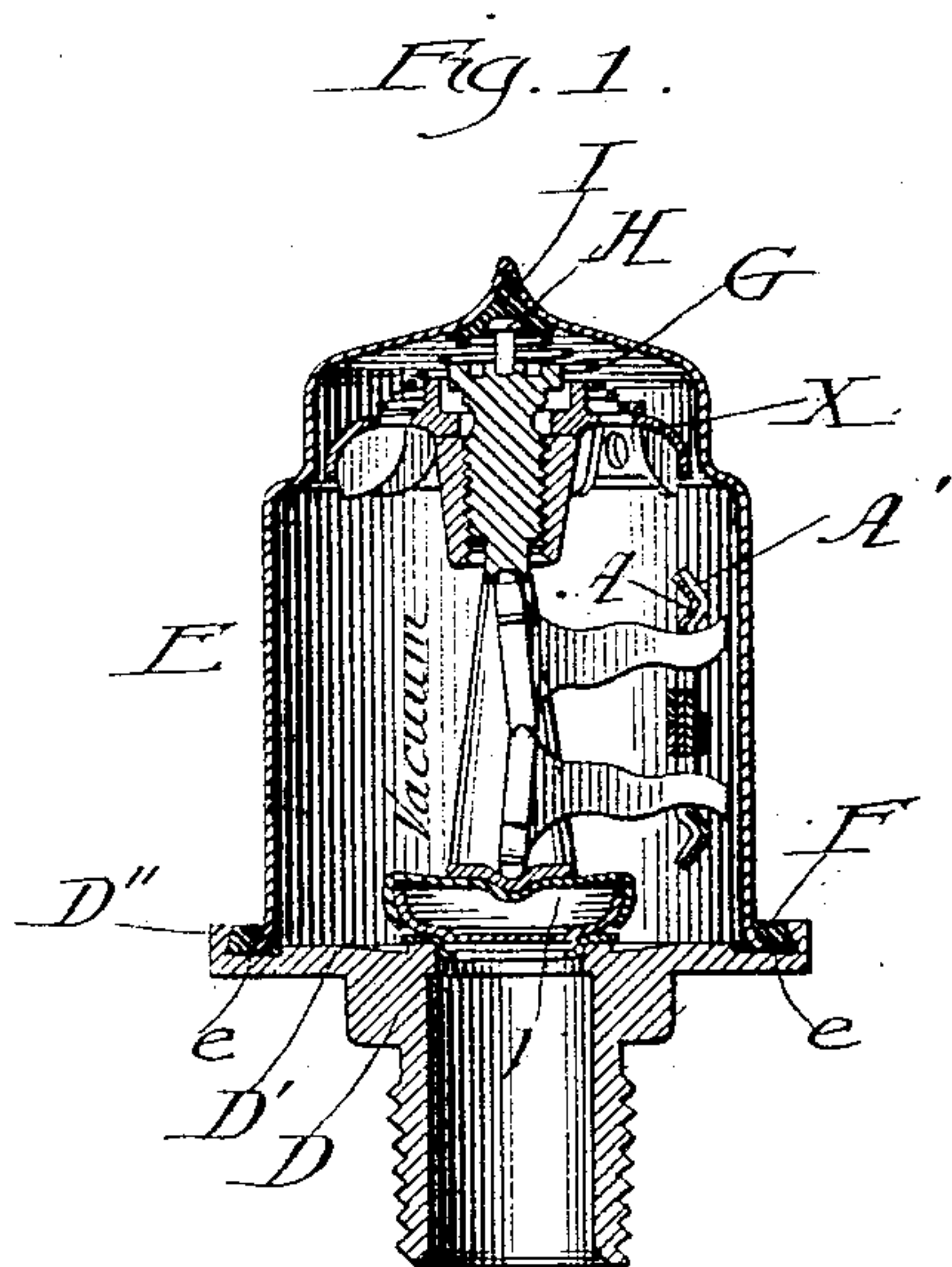


Fig. 3.

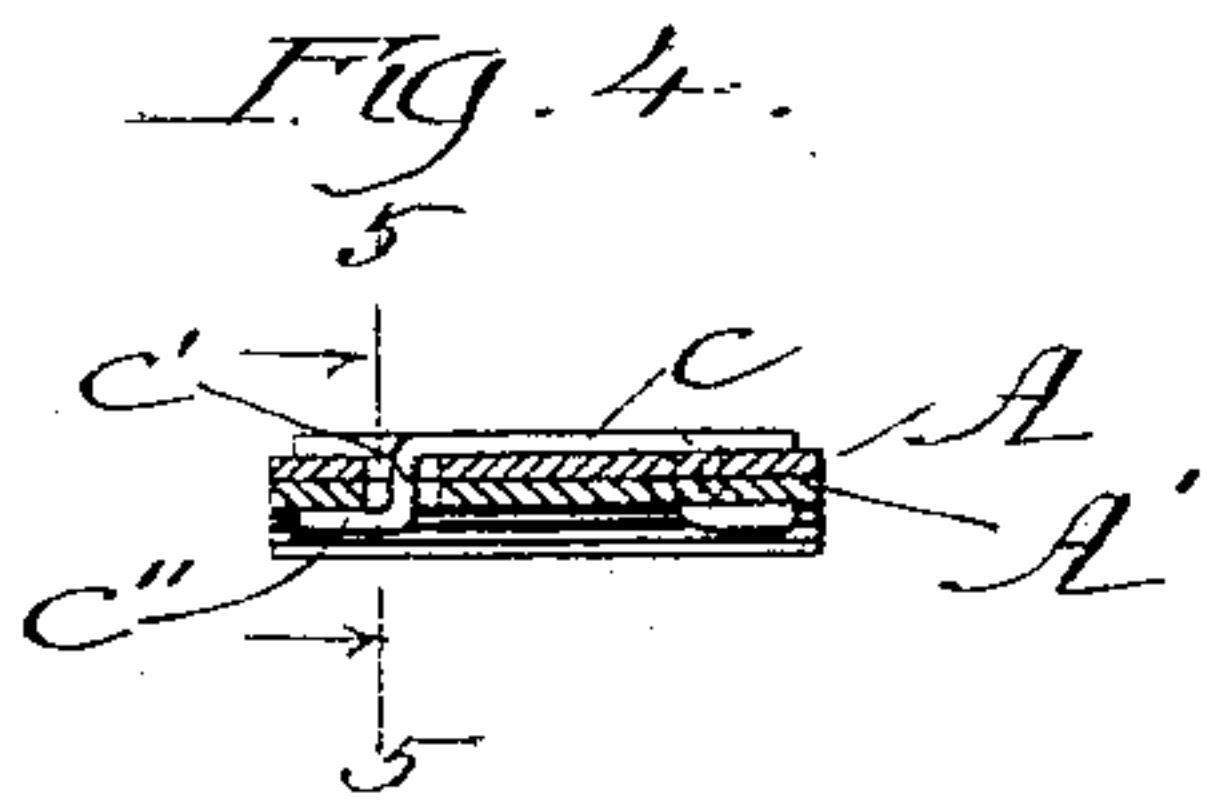
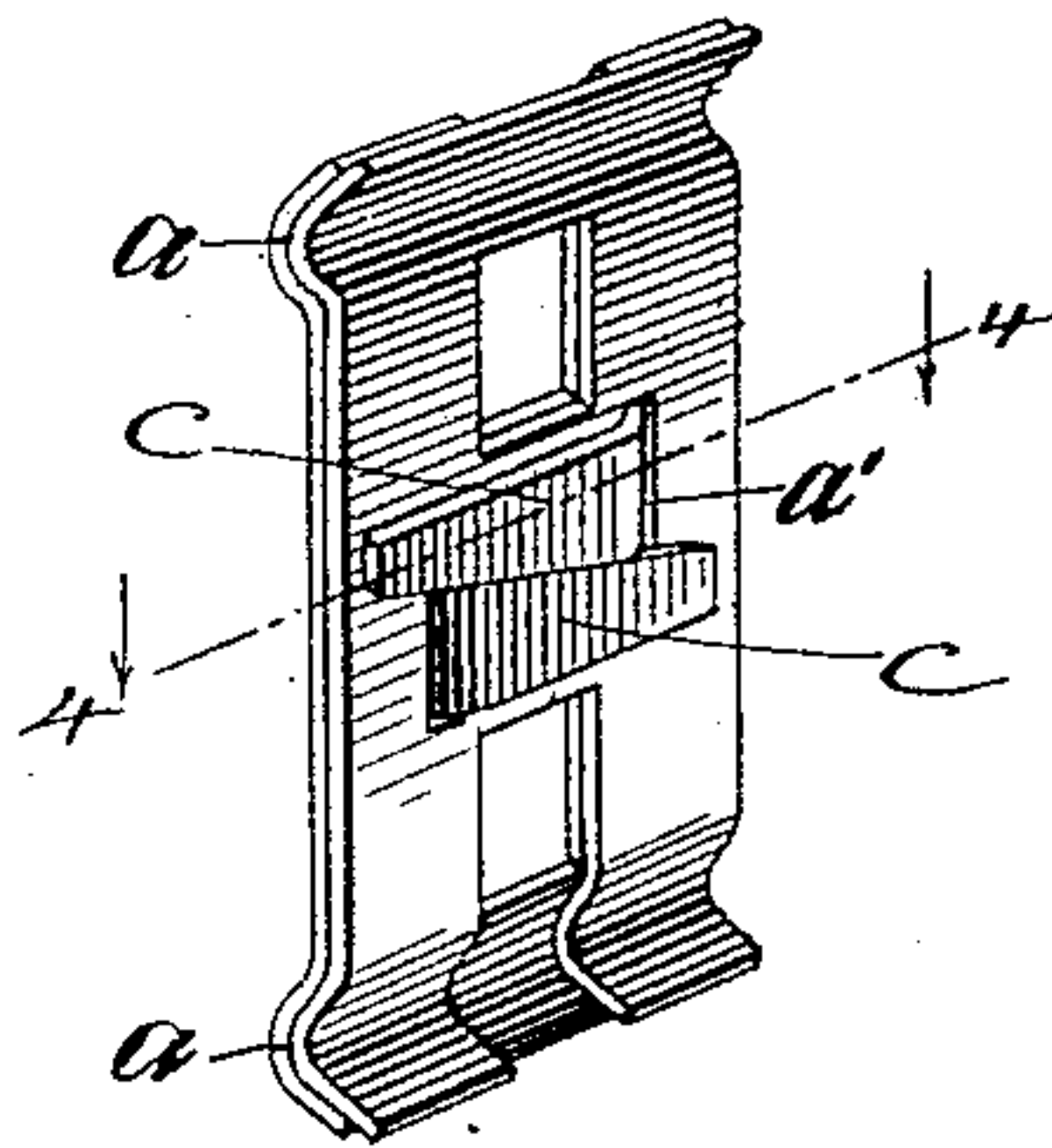


Fig. 5.

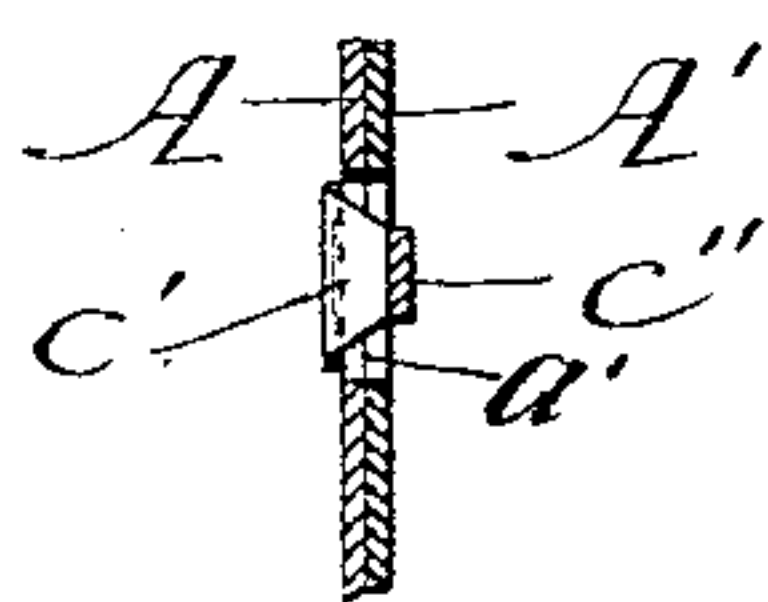


Fig. 6.

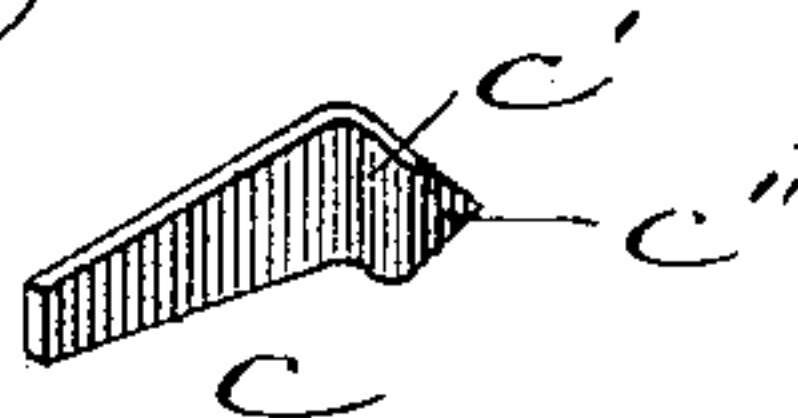
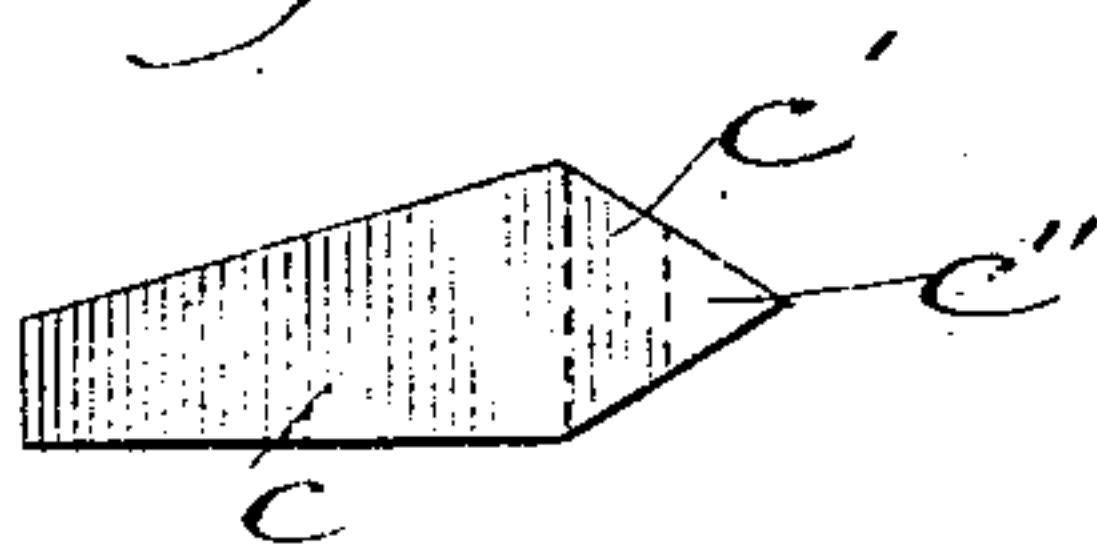


Fig. 7.



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# UNITED STATES PATENT OFFICE.

GEORGE E. HIBBARD, OF CHICAGO, ILLINOIS.

## SPRINKLER-HEAD FOR AUTOMATIC FIRE-EXTINGUISHERS.

SPECIFICATION forming part of Letters Patent No. 750,768, dated January 26, 1904.

Application filed March 3, 1902. Serial No. 96,482. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. HIBBARD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sprinkler-Heads for Automatic Fire-Extinguishers, of which the following is a specification.

In sprinkler-heads for fire-extinguishers of the class at present extensively used there is an element which may be in the nature of a link and adapted to resist tensile strains or in the nature of a strut and adapted to resist compressive strains. This element is usually made up of two or more parts united by means of solder fusible at a predetermined temperature, so that when subjected to that temperature the parts going to make up the element will be freed and allowed to separate one from another.

The present invention relates in part to an element of this class, and this part of the invention may be embodied either in a link or in a strut, the term "element" as herein used being intended to comprehend both. The object of this part of the invention is to provide for use in sprinkler-heads an improved element of this class.

The importance of keeping the vital parts of sprinkler-heads free from corrosion or impurities that the atmosphere may hold in suspension is fully appreciated in the art. Where sprinklers are installed in factories in which certain chemicals are handled, or in which corrosive gases are generated, or in which large quantities of solid foreign substances are carried through the atmosphere, it is necessary to systematically inspect the sprinklers at short intervals and to remove and replace with others those that appear to be unfit for use. In order to overcome this, it has been proposed to protect the vital parts of the sprinkler-head by means of a cap, and the present invention relates in part to a cap for this purpose, in part to the means for holding the cap in place, and in part to means for positively and with certainty removing the cap before the firing temperature of the sprinkler is reached in order to fully and completely ex-

pose the vital parts of the sprinkler to the surrounding atmosphere.

To these ends the invention consists in the features of novelty that are hereinafter described, with reference to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a sectional elevation of a sprinkler-head embodying the invention. Figs. 2 and 3 are perspective views of a link, viewed from opposite sides, respectively, embodying some features of the invention. Fig. 4 is a transverse section thereof. Fig. 5 is a longitudinal section of a portion thereof. Figs. 6 and 7 are views from different positions of a part hereinafter called a "key."

The link has two parts, A and A', of similar construction. Each of them is provided, preferably, near its ends with one or more hollow ribs or corrugations  $\alpha$ , the corrugations of the two being so formed that when the two parts are placed together one upon the other the corrugations of one will occupy and fit snugly the corrugations of the other. With the parts thus fitted together they will be incapable of any endwise movement relatively to each other without a corresponding lateral movement away from each other, so that in order to resist their relative endwise movement it is simply necessary to restrain them against relative lateral movement. This is done partly by soldering together their meeting faces and partly by means of a key which crosses the general plane of the parts A A' and is soldered to their outer faces.

I do not in this application claim, broadly, what I have thus far described, all of which is shown and described in my pending application, filed May 20, 1901, Serial No. 61,048.

In both instances the complementary corrugations of the two parts A and A' provide at  $\alpha$  and  $\alpha'$  engaging surfaces that are oblique to the general line or direction of strain which is put upon the element when in use. The surfaces  $\alpha$  are active when the element is used as a link and the surfaces  $\alpha'$  are active when it is used as a strut. In my former application a key for assisting in holding the parts against relative lateral movement away from



each other is shown; but in that instance the key is disposed lengthwise of the element, so that it has a sort of pivotal action about an axis which is transverse to the element. I would have it understood, therefore, that the object of this part of my invention is to provide a key of novel construction having a novel relation to the other parts of the element, to the end that the slots through said other parts may be disposed longitudinally instead of transversely. The advantage of the longitudinal arrangement is that the slots may be of the length necessary to take a key of any desired width without either dangerously lessening the capacity of the element to resist endwise strains or objectionably increasing the total width of the element. To this end I use a key having a flat portion *c*, which is soldered against the outer face of the part A, a portion *c'*, which extends through registering openings *a'* through both of the parts A and A', and a portion *c''*, that is soldered against the outer face of the part A'. The portion *c'* occupying the openings is loose therein, so that there is considerable clearance. In addition to this the sides of the portion *c'* taper in opposite directions, as shown more clearly in Fig. 5, so that there is not only clearance between its sides and the parts A A', but in addition to this its sloping surfaces will act as cams and assist in its dislodgment should it happen (although this is not at all likely) that the parts A and A' come in contact with the portion *c'* with a tendency to pinch it and lock the parts A A' against further endwise movement relatively to each other. With the same end in view the portion *c''* of the key is tapered, the entire key being made of a blank bent at right angles upon the dotted lines, once in one direction and once in the opposite direction.

It will be observed that the slots are disposed longitudinally with respect to the element and that their width is slight, while their length is considerable. The advantage of this, as above intimated, is that they may be made of sufficient length to accommodate a key of any necessary width without objectionably weakening the element, so far as its resistance to endwise strains is concerned. I prefer for the sake of greater security to use two of these keys, and in that event they may be disposed as shown in the drawings. For the purpose of bringing the openings *a'* for the two keys as close as possible to the transverse middle line of the element the portions *c* of the keys are cut diagonally on one side, as shown more clearly in Fig. 6.

The nozzle D is surmounted by an annular base D', having a marginal annular flange D''. A cap E, preferably spun out of sheet metal, rests upon the base D' and has a marginal flange *e*, which projects outward toward the flange D'', the latter being preferably undercut on its inner surface, so as to provide an

overhanging lip. In order to form an air-tight joint at this point, a body F of wax or some other substance fusible at a low temperature is run into the space between the flange D'' and the side of the cap E, so that the flange *e* is more or less completely embedded therein. It is the intention that for sealing the cap in place a material shall be used which will fuse and release the cap at a temperature considerably lower than that required to fuse solder used to hold together the parts of the link or other element by which the valve V is held in place. If this were not so, the presence of the cap E in a temperature that should cause the sprinkler to fire would protect the vital parts of the sprinkler, and thus make it less sensitive. I prefer, therefore, to use for ordinary purposes wax or paraffin for sealing the joint between the cap E and the annular base D' and to use solder such as is now customarily used for making the fusible joint of the valve-holding device.

For insuring the complete and instant removal of the cap E as soon as the seal F is weakened by heat I interpose between the cap and some part of the sprinkler-head—say the distributor X—a coiled spring G, which exerts a constant pressure upon the under side of the cap, tending to dislodge it.

As a further means for holding the cap in place against the pressure of the spring G a partial vacuum is formed within it. This is done by heating the cap to a temperature of, say, 200° Fahrenheit, more or less, and then forming the seal between it and the base D'. The invention is not limited to either the manner of producing the vacuum within the cap or to the manner or means for forming the air-tight joint between the cap and the base of the sprinkler. In actual practice the vacuum has been formed and the air-tight joint has been made by heating the cap, then putting it in place upon the base D', upon which latter a suitable quantity of wax or paraffin has been placed just within the marginal flange, then pouring melted paraffin or wax into the annular space between the cap and the marginal flange of the base and holding the cap firmly upon the base until the wax or paraffin hardens. In this way the temperature of the air within the cap when first put in place may be very much higher than that required to fuse the solder in the fusible joint of the valve-holding device; but all parts of the sprinkler being at a low temperature when the cap is first put in place the heat of the air within the cap will be quickly and uniformly taken up before the joint of the valve-holding device has time to fuse.

In many places where sprinkler-heads are used—for instance, boiler-rooms—the temperature is higher than that found under more ordinary conditions, and for these places sprinklers having a higher fire test are used.



In situations of this sort wax or paraffin would not be effective as a means for sealing and holding the cap in place, but solder fusible at a low temperature may be used for the purpose. In such cases I prefer to provide the top of the sprinkler with a headed stud H or other device that will serve as an anchor and that may be attached to the top of the cap E by means of a body of solder, as shown at I. In order to do this, it is simply necessary to place a small quantity of solder in the cap, hold the latter in an inverted position, insert the sprinkler properly therein, and apply to the apex of the cap sufficient heat to melt the solder and cause it to take hold of the anchor.

The spring G for kicking off the cap is an important element, since without it there would be nothing tending to dislodge the cap until air or water is discharged from the nozzle. This would be open to the objection already pointed out and also to the further objection that cold water coming in direct contact with wax or solder at F or I would freeze it, and might thereby again secure the cap and prevent its displacement, thus making the sprinkler useless.

I am aware that it has already been proposed to inclose the vital parts of a sprinkler-head within a cap made in one or more pieces and held in place by means of wax or other material fusible at a temperature below that at which the soldered joint of the valve-holding device is fusible, and I do not claim such, broadly, as my invention. In every instance, however, of the proposed use of such a device gravity alone has been relied upon for dislodging the cap. I believe that I am the first to hold the cap in place by means of material fusible at a low temperature and to provide a spring for kicking it off as soon as the fusible holding material softens. I believe also that I am the first to use a partial vacuum to aid in holding the cap in place. A partial vacuum is peculiarly adapted for this purpose, because under normal atmospheric conditions it will retain its full holding efficiency, while under a temperature approximating the firing-point of the sprinkler the rarefied air within the cap will expand, and thereby lessen or entirely destroy its holding effect. The combined use of a partial vacuum for holding the cap in place and a spring for kicking it off is also peculiarly adapted for the purpose. The vacuum may be so high that under normal conditions the atmospheric pressure upon the cap will exceed the pressure of the spring, while in the presence of a gradually-increasing temperature the holding effect of the vacuum will correspondingly decrease, and may be thus reduced to such an extent that the pressure of the spring will entirely overcome it.

Having thus described my invention, what I

claim as new therein, and desire to secure by Letters Patent, is—

1. An element for sprinkler-heads comprising two parts having oblique engaging surfaces adapted to resist their relative endwise movement, and a key crossing the general plane of the said parts and soldered to them upon opposite sides of said plane, said key being disposed transversely to the direction or line of strain to which the element is subjected, while in use, substantially as described.

2. An element for sprinkler-heads comprising two parts having oblique engaging surfaces adapted to resist their relative endwise movement, said parts having through them registering openings, and a key having a portion passing through said openings and having portions engaging the outer faces of said parts, the latter portions being disposed transversely with relation to the line of strain to which the element is subjected when in use, substantially as described.

3. An element for sprinkler-heads comprising two parts having oblique engaging surfaces adapted to resist their relative endwise movement, said parts having through them registering openings, and a key having a portion passing through said openings and portions engaging the outer faces of said parts, the sides of that portion of the key which passes through said openings being sloped or inclined in opposite directions toward both ends of the element, substantially as described.

4. An element for sprinkler-heads comprising two parts having oblique engaging surfaces adapted to resist their relative endwise movement, each of said parts having openings through it and the openings of the two parts registering, and a pair of keys having portions extending through said registering openings and portions engaging the outer faces of the two parts, these latter portions being arranged transversely, substantially as described.

5. An element for sprinkler-heads comprising two overlapping parts, means for resisting their relative endwise movement, said parts having through them registering openings disposed longitudinally, and a key having a portion passing through said openings and having portions engaging the outer faces of said parts, the latter portions being disposed transversely with relation to the line of strain to which the element is subjected when in use, substantially as described.

6. The combination with a sprinkler-head having a valve-holding device with a fusible joint, of a cap inclosing the valve-holding device, an anchor located within the cap and soldered to the top thereof, and a spring engaging the cap and normally exerting its pressure thereon so as to dislodge it when the joint for holding the cap weakens, substantially as described.

7. The combination with a sprinkler-head



having a valve-holding device with a fusible joint, of a cap inclosing the valve-holding device, an anchor located within the cap and soldered to the top thereof, and a spring surrounding said anchor and bearing in one direction against the frame of the sprinkler and in the other direction against the cap, substantially as described.

8. The combination with a sprinkler-head, having a valve-holding device with a fusible joint, of an air-tight cap inclosing the valve-holding device, and containing a partial vacuum, and a fusible joint for holding the cap in place, substantially as described.

9. The combination with a sprinkler-head having a valve-holding device with a fusible joint, of an air-tight cap inclosing the valve-holding device and containing a partial vacuum, means for forming an air-tight joint between said cap and the sprinkler-head, and a spring engaging the cap and exerting a constant pressure thereon, tending to dislodge it, substantially as described.

10. The combination with a sprinkler-head having a valve-holding device with a fusible joint, of an air-tight cap inclosing the valve-holding device and containing a partial vacuum, means for forming an air-tight joint be-

tween said cap and the sprinkler-head, an anchor fixed to the sprinkler-head and soldered to the top of the cap, and a spring arranged between the top of the sprinkler-head and the cap, substantially as described.

11. The combination with a sprinkler-head having a valve-holding device with a fusible joint, of a cap inclosing the valve-holding device, a joint, made of solder fusible at a low temperature, located within the upper part of the cap for holding it in place, and a spring bearing in one direction against the sprinkler-head and in the other direction against the cap for dislodging it when the fusible joint of the valve-holding device gives away, substantially as described.

12. In a sprinkler-head, the combination of a sealed cover having a partial vacuum formed within it, anchoring devices adapted to attach the said cover to the sprinkler-head, the said anchoring devices including a fusible joint, and a spring arranged to throw the said cover off when said joint is fused.

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