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SPRINKLER

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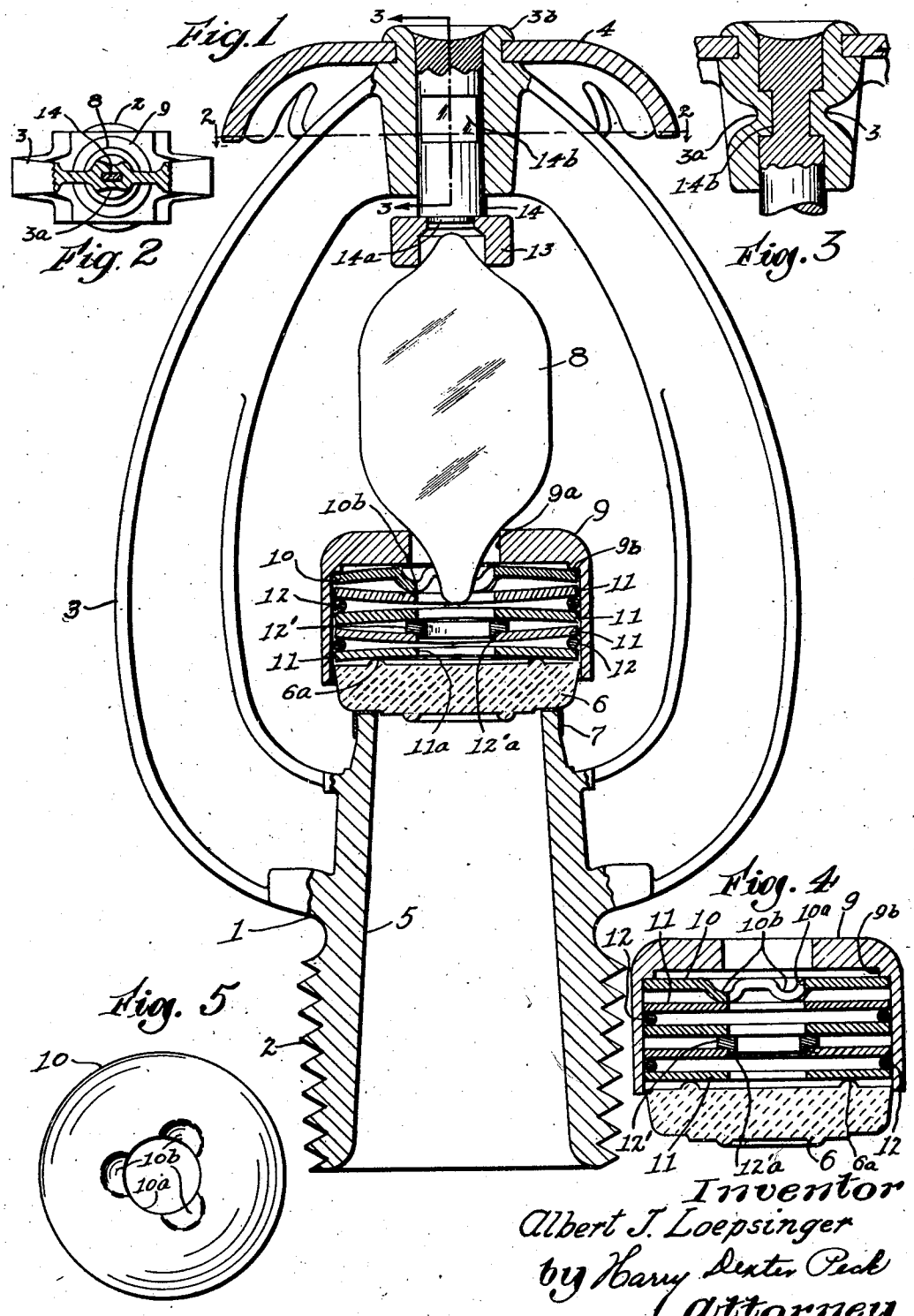

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SPRINKLER

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This invention relates to improvements in sprinklers. More especially it has to do with a sprinkler of the type which at normal temperatures remains closed and at a predetermined higher temperature opens automatically for the discharge and distribution of a fire extinguishing medium. The invention is herein disclosed in its application to a sprinkler employing a charged frangible bulb as the heat responsive element but the scope of the invention is not limited to this particular form of element.

It is among the objects of the invention to provide a sprinkler which is simple to make, easy to assemble and which will have definite characteristics. Among the objects is to provide a resilient strut whereby the maximum load imposed upon it can be definitely predetermined. Other features reside in an improved waterway and a novel lock for holding the strut in valve closing position. It is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawing:

Figure 1 is an elevation, with portions in medial section, of a sprinkler embodying the present improvements;

Figure 2 is a plan on reduced scale taken as on line 2—2 of Figure 1;

Figure 3 is an elevation in section as on line 3—3 of Figure 1;

Figure 4 is an elevation in medial section through the valve and the resilient means of the strut; and

Figure 5 is a bottom plan of one type of spring discs.

Referring more particularly to the drawing, the sprinkler body or frame 1 has a nozzle 2 exteriorly threaded for engagement with a supply line carrying fluid under pressure, and a yoke 3 of channel cross section except at the upper portion which is of a T cross section to minimize interference with the water distribution. Mounted on the yoke at the top is a deflector 4.

The waterway 5 of the sprinkler is deemed a distinct improvement over those of the ring nozzle and the diaphragm types of sprinklers. This improved waterway is tapered from its inlet end to the discharge orifice, the latter being smaller in area than the customary openings of sprinklers heretofore used, because of which the total pressure imposed on the valve of the sprinkler by the held-back fluid is appreciably reduced. It has also been established by numerous tests that there is less danger of clogging the tapered waterway than the usual types. While it is recognized that the opening is smaller and therefore would not pass as large an object as might be forced through the openings in a diaphragm or a ring nozzle, there is no liklihood of any such an object being present in a sprinkler system. Sawdust, wood shavings and chips, cinders, sand, gravel, small stones, cotton waste, packing material, matches, and bits of melted lead, cord, etc. have been fed into a supply line and readily discharged through the tapered waterway.

There is also a minor but nevertheless appreciable advantage of the tapered waterway which is due to the increase in velocity of flow of the issuing jet. The gradual reduction in cross section of the nozzle stream and its final discharge through the smaller opening gives it added speed and when it strikes the deflector 4 the turbulence is greater and the distribution more uniform than has heretofore been experienced.

Prior to discharge the fluid in the nozzle is held back by a valve 6 which seats on a gold-plated metal gasket 7 provided on the valve seat. As herein shown this valve is a glass button but a metal valve has been and can be used as well. This valve is held to its seat by a strut comprising, in this showing, a frangible bulb 8 containing a charge which expands upon rise in temperature and at a predetermined degree completely shatters the bulb. The strut also comprises a novel resilient means which enables a predetermined and fixed maximum load to be placed on the valve.

This resilient means comprises a flanged cap 9 having a center hole 9*a* whose edge forms the lower seat for the bulb, and a series of spring discs, also provided with center holes, and ring spacers, all housed within the cap. Referring particularly to Figure 4, there is an annular shoulder 9*b* on the inner face of the cap against which is placed a spring disc 10. This disc represents one form which has near its center hole 10*a* several depending projections 10*b*. Against these is placed a flat disc 11 with center hole 11*a* and next to the latter is a ring spacer 12 which lies at the outer edge of the disc close by the flange of cap 9. Then another disc 11 is positioned next to the large ring spacer followed by a smaller ring spacer 12′ which has a stub stem or sleeve portion 12′*a* that fits into the center hole 11*a* of the next flat disc 11. In the particular form herein disclosed, there is provided another large ring spacer 12 and still another flat disc 11, the latter being in contact with the glass button 6, but where a metal

valve is used, it has been found satisfactory to omit the last mentioned disc and to place the valve in edge contact with the lowermost ring spacer shown. The central openings of the discs provide ample clearance for the reduced stem of the bulb and also increase the desired resiliency of the discs.

With the resilient means assembled as shown in Figure 4, the button is placed on the valve seat gasket 7, the bulb on the cap and a seat washer 13 on the upper end of the bulb. This washer has a suitable recess to receive the upper end of the bulb and a top opening formed to receive the short reduced end 14*a* of a compression pin 14. The latter extends through a bore in the top of the yoke and has one or more recessed portions 14*b*. With the parts arranged as described, pressure is applied on the top of the pin to force it downward through the yoke and this force is transmitted by the bulb and cap to the several spring discs.

The load is applied by the cap through its internal shoulder 9*b* to the edge of the first spring discs 10 and is then transmitted by the latter through its depending projections 10*b* to the central portion of the next disk 11. This in turn passes the load on through the large ring spacer 12 to the outer edge of the second disc 11. The latter applies the load to the smaller ring spacer 12' which passes it along to the central portion of the next disc 11 whose outer edge rests on the succeeding large ring spacer 12. The latter, as before stated may rest directly on a metal valve if one is employed but as shown here the load is finally applied to one more disc 11 and thence to the glass button 6 along a raised annular ridge 6*a* on its upper surface which is substantially opposite the inner edge of the valve seat. As the pressure is increased the several discs assume the disposition seen in Figure 1 being bent or cupped and acting as a series of resilient levers each of which either receives the load at its outer extremity and passes it along at its middle portion or receives the load centrally and passes it along through its edge.

When the desired load has been imposed upon the resilient strut pressure is applied to the side walls 3*a* of the yoke to force the material thereof into the recessed portions 14*b* of the pin, (here shown as notches, but which might take the form of a groove around the pin) thus locking the pin and yoke together. The upper end of the pin can now be cut off, the deflector applied and the upstanding section 3*b* of the yoke spun over to clamp the deflector in place.

Thus there is imposed upon the valve a fixed, or at least limited, maximum load, which is of course greater in degree than any anticipated pressure to be applied to the valve by the fluid pressure in the nozzle. If, by any chance, the fluid pressure should exert a force greater than that initially impressed upon the spring discs the latter further yield and permit leaking of the valve without additional strain on the sprinkler. Likewise if the frame is hit accidentally, or even if it should stretch, and the distance between the top of the yoke and the valve is slightly increased, the spring discs compensate for such change and continue to hold the valve tightly on its seat.

When the sprinkler is subjected to a rise of temperature great enough to effect shattering of the bulb, the spring discs snap back to their initial flat shape and thus tend to drive the cap and valve apart. This is of advantage in cases wherein the course of time the sprinkler has become externally "loaded" with dust or other foreign matter. This latter danger is, however, materially lessened with the sprinkler of this invention because the surfaces upon which this loading may fall and accumulate are reduced to a minimum. Moreover the only movable surfaces upon which the loading can be deposited are the surfaces of the bulb and the cap and since the former is completely shattered by the expansion of its charge, and since the cap is violently displaced by the snap action of the housed discs, no concern need be had regarding this "loading" danger.

The one-piece frame, the simplicity of the machine operations required to form the waterway, valve seat, the compression pin and its washer, the ability to make the cap and spring discs from sheet stock and the ease of assembling, all combine to reduce the initial cost of the sprinkler. And the provision of a resilient strut which enables the maximum load on the frangible bulb to be definitely limited avoids any undue strain on the bulb and insures a tight valve up to the limit of the load.

I claim:

1. An automatic sprinkler having a valve and means for holding the valve seated comprising a thermally responsive element; resilient discs interposed between said element and the valve; and a housing surrounding said discs, having a flange extending below the portion of largest diameter of the valve and of diameter as large as the largest diameter of said valve.

2. An automatic sprinkler having a valve and means for holding the valve seated comprising resilient discs superposed upon the top of the valve; a housing for said discs having a flange extending below the portion of largest diameter of the valve; and a thermally responsive member mounted between said housing and the frame of the sprinkler.

3. An automatic sprinkler having a body with a passageway therethrough; a frame extending from the body; a valve closing said passageway; and a resilient strut interposed between the frame and the valve comprising a thermally responsive element, a housing constituting a seat for said element having a flange extending below the portion of largest diameter of the valve, and resilient means within said housing between it and the top of said valve.

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