United States Patent

Ault

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[45] Feb. 1, 1972

[54] REINFORCED FUSIBLE ELEMENT

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[21] Appl. No.: 74,810

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 806,123, Mar. 11, 1969.

[52] U.S. Cl. 169/42, 29/183.5, 161/170, 222/54

[51] Int. Cl. A62c 37/30

[58] Field of Search 169/38, 39, 40, 42; 29/180, 29/191.4, 191.2, 183.5; 161/170; 122/504.3; 222/54

[56] References Cited

UNITED STATES PATENTS

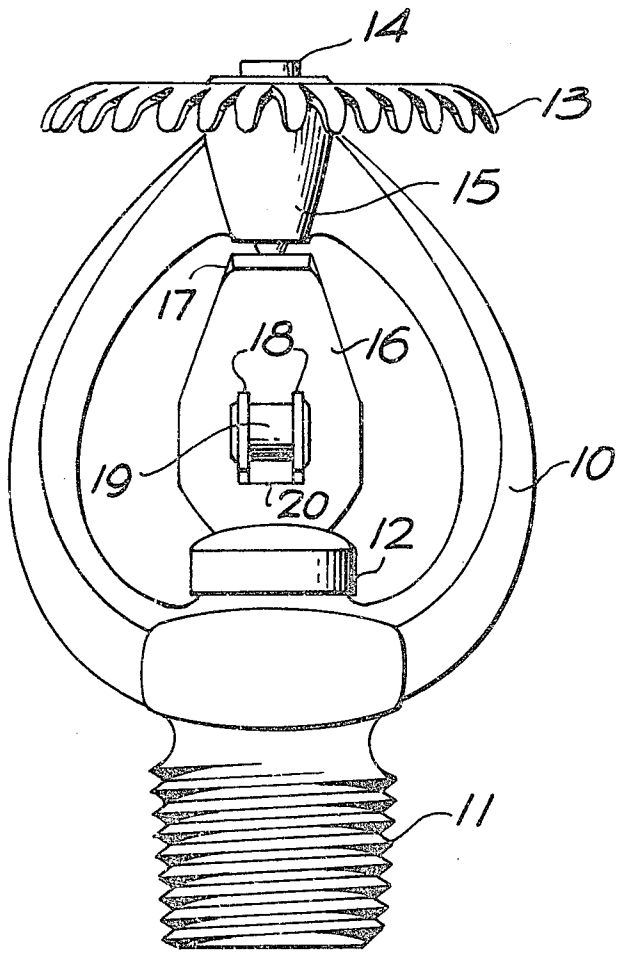
1,362,236	12/1920	Delaney	169/38
3,053,713	9/1962	Juras	29/180 R
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[57] ABSTRACT

A reinforced fusible element useful in fire extinguishing sprinklers, fusible links on fire doors and the like is disclosed wherein the fusible material usually solder of a lead alloy or the like is provided with a thin frangible covering for stabilizing its size and shape by acting to prevent cold flow of the alloy as a result of compressive or tension forces thereagainst. Specifically a fusible element may be provided with a thin plated metal coating restricting growth due to cold flow in any direction.

6 Claims, 5 Drawing Figures



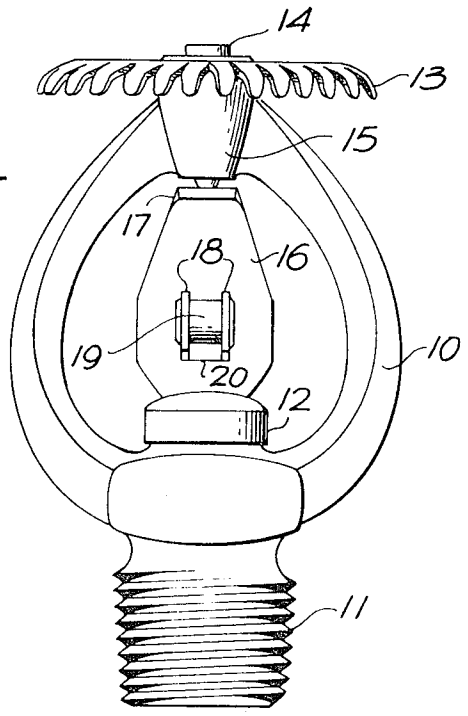


FIG. 1

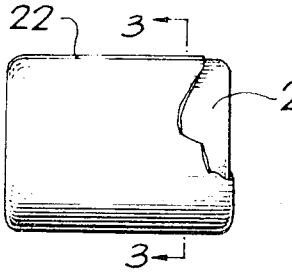


FIG. 2

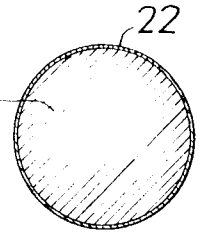


FIG. 3

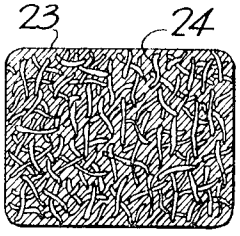


FIG. 4

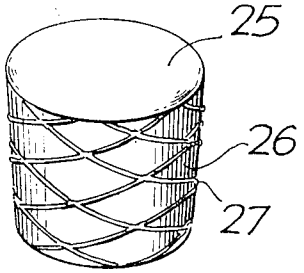


FIG. 5

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REINFORCED FUSIBLE ELEMENT

This is a continuation-in-part of application, Ser. No. 806,123 filed Mar. 11, 1969.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to fusible elements of the type normally employed to hold other devices in predetermined relation pending attainment of a predetermined temperature upon which the other devices are to be released by fusing, that is softening of the fusible element.

2. Description of the Prior Art

Prior fusible elements have generally consisted of appropriately shaped units of a desirable fusible alloy, the fusing or softening temperature of which may be readily predetermined. Such elements are generally in compression in a device using the same such as a fire extinguishing sprinkler head wherein the levers holding a cap on a discharge orifice are in turn held in desired position by the physical presence of the fusible element and so arranged that alteration in shape of the fusible element permits the levers to move to a position opening the cap on the discharge orifice. Some fusible elements have been positioned in retaining members as for example in U.S. Pat. Nos. 1,362,236; 2,004,833; and 2,502,754.

The present invention ensures the retention of the desired physical shape of the fusible element and precludes accidental operation due to cold flow of the fusible element or other alterations in its shape due to causes other than those responsive to temperature at a desired degree.

SUMMARY OF THE INVENTION

A fusible element comprises a pelletlike portion of a metallic alloy such as for example an alloy which will fuse at 165° F. and consists of 30.51 percent lead, 24.45 percent tin 41.22 percent bismuth and 3.82 percent cadmium.

Those skilled in the art will recognize that the percentages of the materials will vary depending upon the temperature at which the fusible element is to become operable.

The ability of fusible alloys such as the above example to withstand compression without cold flow of the alloy is limited and the present invention provides means for ensuring against such cold flow and thereby maintaining the physical shape of the fusible alloy as desired until the fusing temperature is reached. This is made possible by the use of a thin frangible covering restraining the radial growth of a fusible element and/or the addition of fibers of bondable material throughout the fusible element and/or the jacketing of the fusible element in a woven flexible nonstretchable sleeve.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a fire extinguishing sprinkler showing a fusible element holding the mechanical levers thereof fixed orifice closing position.

FIG. 2 is a greatly enlarged side elevation of a fusible element having a thin frangible covering thereabout, with parts broken away and parts in cross section.

FIG. 3 is an end view of the fusible element and covering of FIG. 2, with parts broken away and parts in cross section.

FIG. 4 is a cross section on a greatly enlarged scale of a fusible element incorporating suitable fibers disposed throughout and bonded to the alloy of the fusible element.

FIG. 5 is a perspective view on a greatly enlarged scale showing a fusible element having a loosely woven flexible but nonstretchable jacket thereabout.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 of the drawing a typical environmental use of a fusible element may be seen to comprise a fire extinguishing sprinkler which device includes a frame **10** a threaded base **11** defining a passageway normally closed by a cap **12**. A deflector **13** is affixed to the frame **10** in oppositely disposed relation to the cap **12** as will be understood by those skilled in the art.

A compression pin **14** positioned centrally through the upper portion **15** of the frame **10** engages a plurality of levers **16**, **17** and **18** respectively with the levers **18** being held in spaced-apart relation by a fusible element **19**.

The exterior configuration of the oppositely disposed spaced-apart levers **18** is such that they cannot move through an opening **20** in the lever **16** until the fusible element **19** fuses so as to change shape and permit the levers **18** to move toward one another sufficiently that their configurations will clear the opening **20** whereupon the levers **16**, **17** and **18** fall free and permit the cap **12** to open the discharge orifice in the sprinkler.

In the prior art constructions the fusible element **19** is simply formed of a metal alloy that would fuse at a desired predetermined temperature. For example, these are conventionally 165°, 212°, 286° and 360° F. In practical experience it has been found that when compression is constantly maintained on a fusible element it tends to alter its shape by reason of cold flow of material and sometimes to the point where accidental operation of the device controlled thereby results.

In order to utilize an inexpensive easily assembled mechanical lever arrangement in a fire extinguishing sprinkler such as that shown in FIG. 1 of the drawings, it is necessary to place the fusible element under some degree of compression. By utilizing the invention disclosed herein the modified fusible element becomes capable of withstanding the compressive forces applied thereto without altering its shape and yet be fully responsive in operation to a fusing temperature.

In FIG. 2 of the drawings a fusible element **21** of solid cylindrical shape is shown in side elevation with thin frangible covering **22** positioned thereabout. The main body of fusible element **21** is formed of a fusible alloy such as that hereinbefore described and the thin frangible covering **22** may be formed of an electroplated metal such as chrome, nickel, brass or the like which is of a thickness for example 0.0003 inch, the thickness of the covering **22** being only sufficient to restrain any tendency of the body of the fusible element **21** to enlarge radially, and thin enough to be unable to resist collapse of the assembly of the element **21** and covering **22**.

In FIG. 3 of the drawings an end view of the fusible element **21** may be seen and it will be observed that the covering **22** extends completely thereabout. It will be seen that the covering **22** is of a very fragile nature, sufficient only to hold the fusible body **21** in place and inhibit creep and/or cold flow, and that in itself will support no load in compression and will collapse on fusing of the element **21**. The covering may be formed of a suitable synthetic resin such as polystyrene arranged to incorporate the desirable characteristics hereinabove set forth.

In FIG. 4 of the drawings a fusible element **23** is illustrated which is a solid cylindrical shape of fusible alloy as hereinbefore described and incorporating a plurality of random length fibers **24** distributed throughout. The fibers may be natural fibers, synthetic resin fibers, metallic fibers such as fine metal wire or metal shavings such as steel wool and the like and bondable to the fusible alloy so as to become an integral part thereof. The reinforcing action of the many fibers within the body of the fusible element **22** reinforces the same and prevents its growth longitudinally or radially except at fusing temperatures of the alloy.

FIG. 5 of the drawings a perspective view of a fusible element **25** may be seen and it is enclosed on its outer circular surface with a loosely woven jacket **26** of diagonally positioned woven fibers **27** so as to form a flexible but nonstretchable jacket thereabout. A preferred embodiment of the form of the invention illustrated in FIG. 5 would comprise a loosely woven wire braid such as for example that used in hydraulic hose constructions and bondable to the surface of the fusible element so as to prevent relative movement therebetween while being capable of collapse upon fusing of said element.

It will thus be seen that a fusible element has been disclosed in several forms which is arranged to prevent changes in its physical shape at temperatures less than the fusing tempera-

ture of the alloy of which the fusible element is formed. The thin frangible covering of FIGS. 2 and 3, the fibers of FIG. 4 and the woven jacket of FIG. 5 all prevent undesirable change of shape of the fusible element and thereby meet the principal object of the invention.

Although but three embodiments of the present invention have been illustrated and described it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention.

I claim:

1. A fusible element comprising a shaped section of a fusible alloy having a thin covering means, said means consisting of a covering material of a thickness to restrain creep and cold flow of said alloy at temperatures less than the fusing temperature of said alloy and being collapsible upon fusing of said alloy.

2. The fusible element set forth in claim 1 and wherein the covering means restraining cold flow of the alloy comprises a coating of nonstretchable material positioned thereabout.

3. The fusible element set forth in claim 1 and wherein the covering means restraining cold flow of the alloy of the fusible element comprises an electroplated metallic coating.

4. The fusible element set forth in claim 1 and wherein the means restraining the cold flow of the alloy of the fusible element comprises a nonstretchable woven jacket enclosing said fusible element, and capable of collapse upon fusing of said element.

5. The fusible element set forth in claim 1 and wherein a plurality of fibers are distributed throughout said fusible alloy and bonded thereto.

6. The fusible element set forth in claim 1 and wherein the covering means restraining cold flow of the alloy of the fusible element comprises a synthetic resin coating.

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