April 23, 1935. R. Z. HOPKINS 1,998,721

FIRE EXTINGUISHER

Filed April 25, 1932

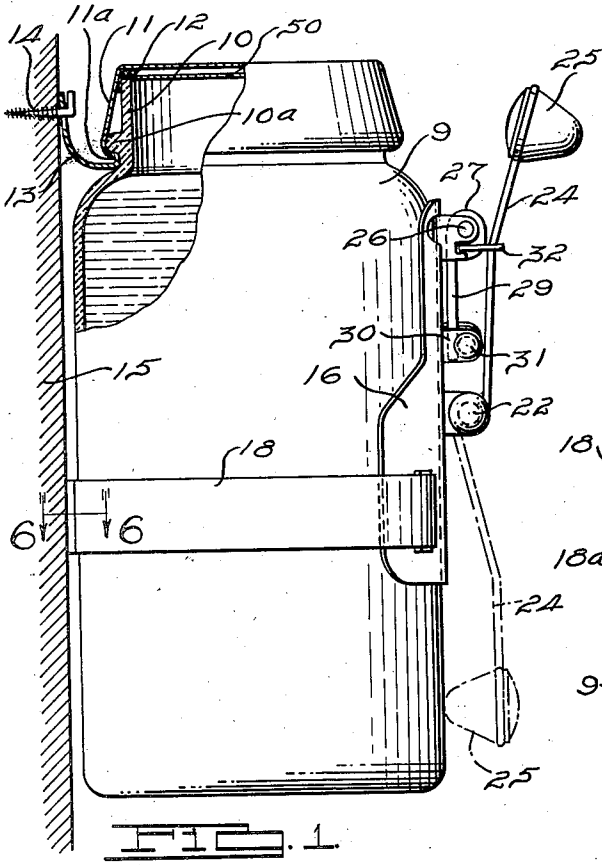


FIG. 1.

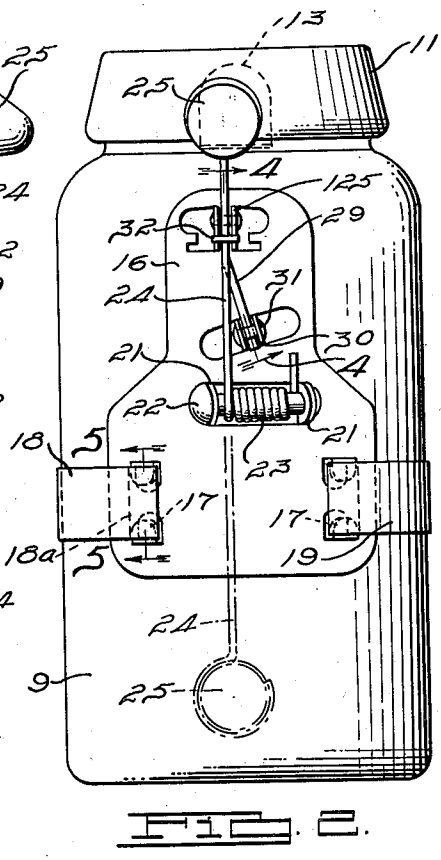


FIG. 2.

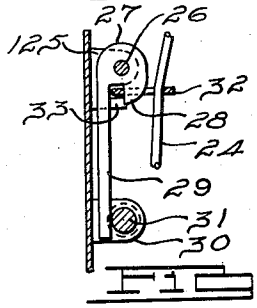


FIG. 4.

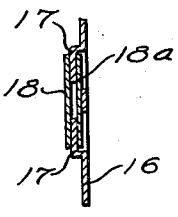


FIG. 5.

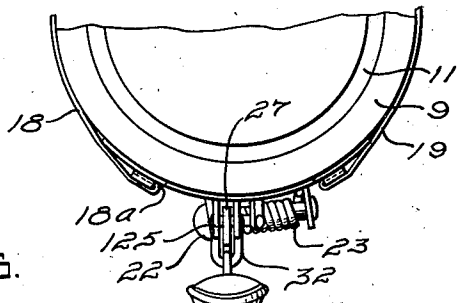


FIG. 3.

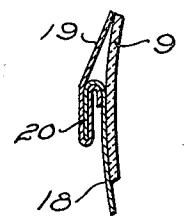


FIG. 6.

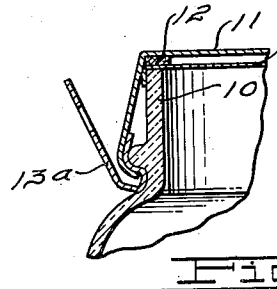


FIG. 7.

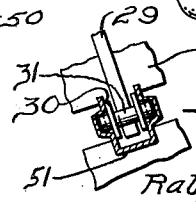


FIG. 8.

INVENTOR
Ralph Z. Hopkins.
BY
Dike, Calver & Gray
ATTORNEYS.

Patented Apr. 23, 1935 1,998,721

UNITED STATES PATENT OFFICE

1,998,721

FIRE EXTINGUISHER

Ralph Z. Hopkins, Detroit, Mich.

Application April 25, 1932, Serial No. 607,328

6 Claims. (Cl. 169—26)

This invention relates to fire extinguishers and particularly, although not exclusively, to that general type employing a frangible container or receptacle, such as glass, adapted to contain a quantity of fire extinguishing fluid, and also utilizing a hammer device controlled by a fusible substance adapted to fuse or melt at a predetermined temperature for releasing the hammer device under spring pressure so that the hammer will break the container and release the fire extinguishing fluid.

An object of the present invention is to provide a fire extinguisher of the foregoing character in which a fire extinguishing fluid may be used which is of a character adapted to react rapidly upon exposure to the atmosphere and produce a gas or vapor blanket effective to extinguish the fire. In accordance with one aspect of the invention wherein it is desired to utilize a fire extinguishing material of this character and prevent any danger of tampering with the device or of decomposition of the fluid, the invention contemplates the provision of means for permanently sealing the container.

A further object of the invention is to provide a fire extinguisher in which the hammer device is held in retracted position under spring pressure by means of a fusible element and in which the force of the spring is transmitted in reduced ratio to the fusible means thereby preventing any danger of the release of the fusible means at a temperature lower than that at which the device is set to operate.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawing forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In said drawing Fig. 1 is a side elevation, partly broken away, illustrating a fire extinguisher embodying the invention.

Fig. 2 is a further elevation thereof.

Fig. 3 is a fragmentary top plan view.

Fig. 4 is a detail section taken through lines 4—4 of Fig. 2.

Fig. 5 is a detail section taken through lines 5—5 of Fig. 2.

Fig. 6 is a detail section taken through lines 6—6 of Fig. 1.

Fig. 7 is a fragmentary section illustrating a modified method of supporting the container.

Fig. 8 is a detail view illustrating a modified means for clamping the fusible element against removal.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawing, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation, and it is not intended to limit the invention claimed herein beyond the requirement of the prior art.

In one form of the invention as illustrated in the drawing, the fire extinguisher comprises a container 9 which is preferably in the form of a glass jar provided with a filling neck 10. The receptacle preferably contains a fluid, such for example as carbon tetrachloride, which upon exposure to the atmosphere will react and produce a gas heavier than air. Other suitable extinguishing fluid may be employed as desired. The neck 10 of the container is preferably provided with a horizontal rib 10*a* and in the present instance is closed by means of a metal cap 11. This cap is first stamped into cup shape to embrace the neck of the jar, a gasket 12 being interposed between the cap and the upper edge of the neck, and is then mechanically rolled around and beneath the rib or flange 10*a* producing a tight and permanently sealed joint. Where it is desired to suspend the device from the wall, the cap 11 may be provided with an integrally projecting hanger member 13 extending from the rolled edge of the cap and provided with an aperture by means of which the device may be attached to the wall 15 through the medium of a screw or a hook 14.

The operating mechanism is carried in the present instance by means of a suitable metal supporting plate 16 preferably shaped to the curvature of the jar. This plate is provided with pairs of projecting tongues 17 struck up from the metal thereof, and the plate may be clamped to the jar by means of flexible metal straps 18 and 19. The inner end of each strap is bent to provide a hook portion 18*a* adapted to interlock with the tongues 17, and the ends of the straps, as shown in Fig. 6, are permanently joined under tension by folding the ends together as shown at 20.

The supporting plate 16 is also provided with integrally projecting lugs 21 struck out from the metal thereof, these lugs carrying a transverse riveted pin 22 on which is mounted a coiled spring 23. In the illustrated embodiment of the in-

vention the wire of the spring has an integrally extending portion 24 to the end of which is attached a hammer 25.

According to the invention a reducing or differential mechanism is interposed between the spring and fusible element and in the present example is in the form of a fulcrumed lever connected to the hammer wire 24 and to the fusible element at different distances from the fulcrum. The supporting plate 16 is provided with struck out lugs or tongues 125 carrying a transverse riveted pin 26 on which is pivoted a lever 27. The head of this lever has an arm 28 terminating in a notch adapted to connect to the hammer wire and also has an arm 29 for connection to the fusible element. The arm 29 is adapted to lodge between lugs or tongues 30 struck out from the metal of the plate 16. These lugs have alined apertures through which is inserted a pin 31 of suitable metal alloy capable of melting at the predetermined temperature, such for example 165° F. The ends of the fusible pin 31 may be riveted over, as shown in Figs. 1 and 2, so as to permanently lock the fusible element in place against unauthorized removal, and when the fusible pin is in place the lower end of the lever arm 29 is held thereby against outward swinging movement, as shown in Fig. 4. The connection between the hammer arm 24 and the short arm 23 of the lever is in the present instance accomplished by means of a metal eyelet 32 which embraces the wire 24 and lodges in the notch behind the arm 28. Preferably the eyelet link 32 is locked against unauthorized detachment, and this may be accomplished by means of notches in the lugs 125 which form projections 33 underlapping the link 32 as shown in Fig. 4. As illustrated in Fig. 2 the supporting lugs 30 for the fusible element are preferably positioned at an angle and the lever arm 29 extends at a corresponding angle so as to lie out of the path of the hammer arm 24.

It will be understood that when the temperature rises to the predetermined degree the fusible element 31 will fuse or melt, releasing the arm 29 whereupon the tension of the spring arm 24 will swing the lever about its pivot 26, releasing the link 32, whereupon the hammer will be actuated by the spring 23 to break the jar. The position of the hammer at this time is illustrated in dotted lines in Figs. 1 and 2.

Heretofore it has been the conventional practice to connect the hammer or its operating spring directly to the fusible element, or in such manner that the force exerted by the spring on the hammer is transmitted in direct ratio to the fusible element. Hence, in previous devices there has been a pressure or force exerted on the fusible element corresponding to the force of the spring. These fusible elements are usually made of suitable metal alloy capable of melting at any predetermined temperature. Where, however, the force of the hammer arm is applied directly to the fuse, I have found that there is a tendency for the fuse to weaken or fatigue at a lower temperature than that at which it is set to melt. For example, a fuse set at 165° might weaken under hammer pressure of five or ten pounds at a temperature of from 25° to 40° below the set temperature, resulting in releasing the hammer and thus breaking the jar. This might frequently occur, for example, where the temperature in an attic reaches a high point in summer time, causing the release of the hammer device without the presence of any fire. I have found that the pressure which the fusible pin will stand when cold often has little relation to the tendency of the fusible pin to fatigue under pressure at temperatures above 100° F., and although the fusible element may be theoretically produced so as not to fatigue, this is very difficult in commercial production. I have found that a fusible element designed to melt at 165° F. might be produced capable of withstanding as much as several hundred pounds shearing pressure when cold but which would give at temperatures around 135° F. under continued pressure of only ten pounds.

These disadvantages have been overcome in the present invention by interposing a differential or ratio changing means between the fusible element and the spring. One form of leverage is illustrated in the present embodiment, although it is understood that various differential means may be employed as alternative arrangements within the spirit of this invention. I have illustrated a simple form of leverage in which the fulcrum of the lever 27 is at 26 and the force of the spring is applied at 28 relatively near the fulcrum. This force, which might for example be five pounds, is transmitted at a disproportionately less ratio to the pin 31 by the long arm of the lever 29, so that the force on the pin 31 might only be one half pound. Only a fraction of the spring pressure is thus exerted against the pin 31 tending to shear it and hence this element will not weaken or fatigue and will not fail except at the set temperature.

Owing to the tendency of the chemical, such as carbon tetrachloride within the glass jar to decompose rapidly upon exposure to atmosphere, I have provided an improved means for sealing the jar not only to make it air tight but also proof against unauthorized opening. I preferably first place over the open neck 10 a sheet of cellulose material 50, such as "cellophane," or other like cellulose derivative. This material is permanently held in place by interposing an adhesive substance, such as a glue not soluble in the fluid, between the sheet and edge of the jar neck. The gasket 12 is preferably of some compressible material, such as cork, and the cap 11 is first applied under considerable vertical pressure so that the gasket 12 forms a cushion effective to compensate for irregularities in the upper edge of the jar and hence adapted to press the cellulose sheet into uniform contact with the glass at all points. An air tight bond is thus produced. The pressure on the cap is maintained during the operation of rolling its edge around the flange 10*a*. As a result of this method a closure is produced which cannot readily be tampered with and which will prevent any danger of decomposition of the fluid.

The construction illustrated in Fig. 7 is substantially the same as in the previous embodiment with the exception that a separately formed angle member 13*a* is provided, this member being clamped in position against the flange or bead 10*a* by means of the side flange 11 of the cap when the latter is rolled beneath the flange or bead of the jar.

In the modified construction illustrated in Fig. 8 the fusible pin 31 is locked in position by means of a metal clamp 51. This clamp is stamped to provide opposed pockets within which the ends of the pin 31 are anchored and is pressed into position to embrace the tongues 30 and permanently hold the fusible element against unauthorized removal.

I claim:

1. A fire extinguisher comprising a frangible container, a hammer device, means for supporting said device in position to engage the container, a spring acting on the hammer device and adapted to be deflected when said hammer device is retracted, a lever comprising a pair of arms extending in the same direction and fulcrumed intermediate the ends of said arms, said arms being of different lengths, a connection between said hammer device and the shorter arm of said lever, and an independently supported fusible element positioned for engagement by the longer arm of said lever for holding the same in position to maintain the hammer device in retracted position, said connection being releasable upon fusing of said element to permit actuation of the hammer device.

2. A fire extinguisher comprising a frangible container, a supporting plate mounted on said container, a hammer carried by said plate to engage and fracture the frangible container when released, a spring acting on the hammer and adapted to be deflected when the hammer is retracted, means carried by said plate for independently supporting a fusible member, a rockable lever fulcrumed on said plate and having a relatively long arm engaging said fusible member for transmitting thereto a minor portion of the spring force ineffective to release the fusible member at temperatures materially less than the melting temperature thereof, and means for releasably connecting said hammer device to said lever at a point substantially nearer said fulcrum than the point of engagement of said arm and fusible member, said means being effective upon destruction of said fusible member to release the hammer device and permit actuation thereof.

3. A fire extinguisher comprising a frangible container, a spring actuated hammer device, means for supporting said device in position to engage the container, a fusible element, a fulcrumed lever acting on said device and said element, the arms of said lever being so constructed and arranged as to transmit a diminished force on said element, means for independently supporting said fusible element, said lever acting to transmit from the spring a force on said fusible element ineffective to release the latter at temperatures materially less than the melting point thereof, a link detachably connecting said device and lever in such manner that upon destruction of said element the connection is released thereby permitting actuation of the hammer device, and means for locking said link to the lever when the latter is in operative engagement with the fusible element.

4. A fire extinguisher comprising a frangible jar adapted to contain a fire extinguishing fluid, a spring actuated hammer device mounted adjacent thereto and adapted to fracture said frangible jar upon the release thereof, a fusible element, means for supporting said element in fixed position, and means for locking the hammer device in retracted position against release except upon fusing said element, said means including a fulcrumed lever engaging said device and said lever at different distances from said fulcrum to transmit a decreased force from the hammer device to said fusible element.

5. A fire extinguisher comprising a frangible jar adapted to contain a fire extinguishing fluid, a hammer device having spring actuated means adapted to actuate said hammer device upon the release thereof to strike and fracture said frangible jar, a fusible element, means for supporting said element in fixed position, and means for locking the hammer device against release except upon fusing of said fusible element, said means including a fulcrumed lever having connections with the hammer device and fusible element at different distances from its fulcrum to transmit a decreased force from the hammer device to said element.

6. A fire extinguisher comprising a permanently sealed air tight frangible container containing fluid adapted to react on exposure to the atmosphere, a supporting plate clamped to the container and having a hammer pivotally mounted thereon, a spring for actuating the hammer to break the container, and means for holding the hammer retracted, separate means including a fusible element for locking said hammer in the retracted position and operable to maintain the said hammer in retracted position except upon fusing of the fusible element.

RALPH Z. HOPKINS.

CERTIFICATE OF CORRECTION.

Patent No. 1,998,721. April 23, 1935.

RALPH Z. HOPKINS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 20, claim 4, for "lever" read element; and lines 20 and 34, claims 4 and 5, respectively, after "fulcrum" insert the words in such a manner as; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of July, A. D. 1935.

Leslie Frazer
Acting Commissioner of Patents.

(Seal)