June 5, 1934. D. MAPES 1,961,371

SMALL LIQUID FIRE EXTINGUISHER

Filed May 26, 1931

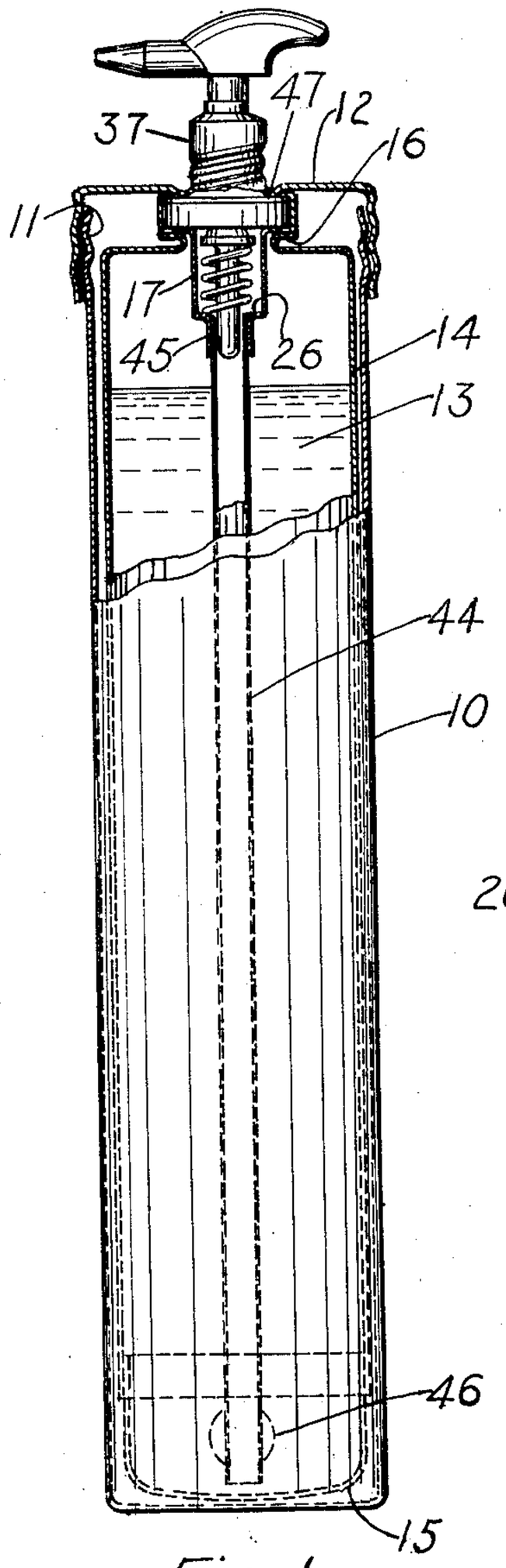

Fig. 1.

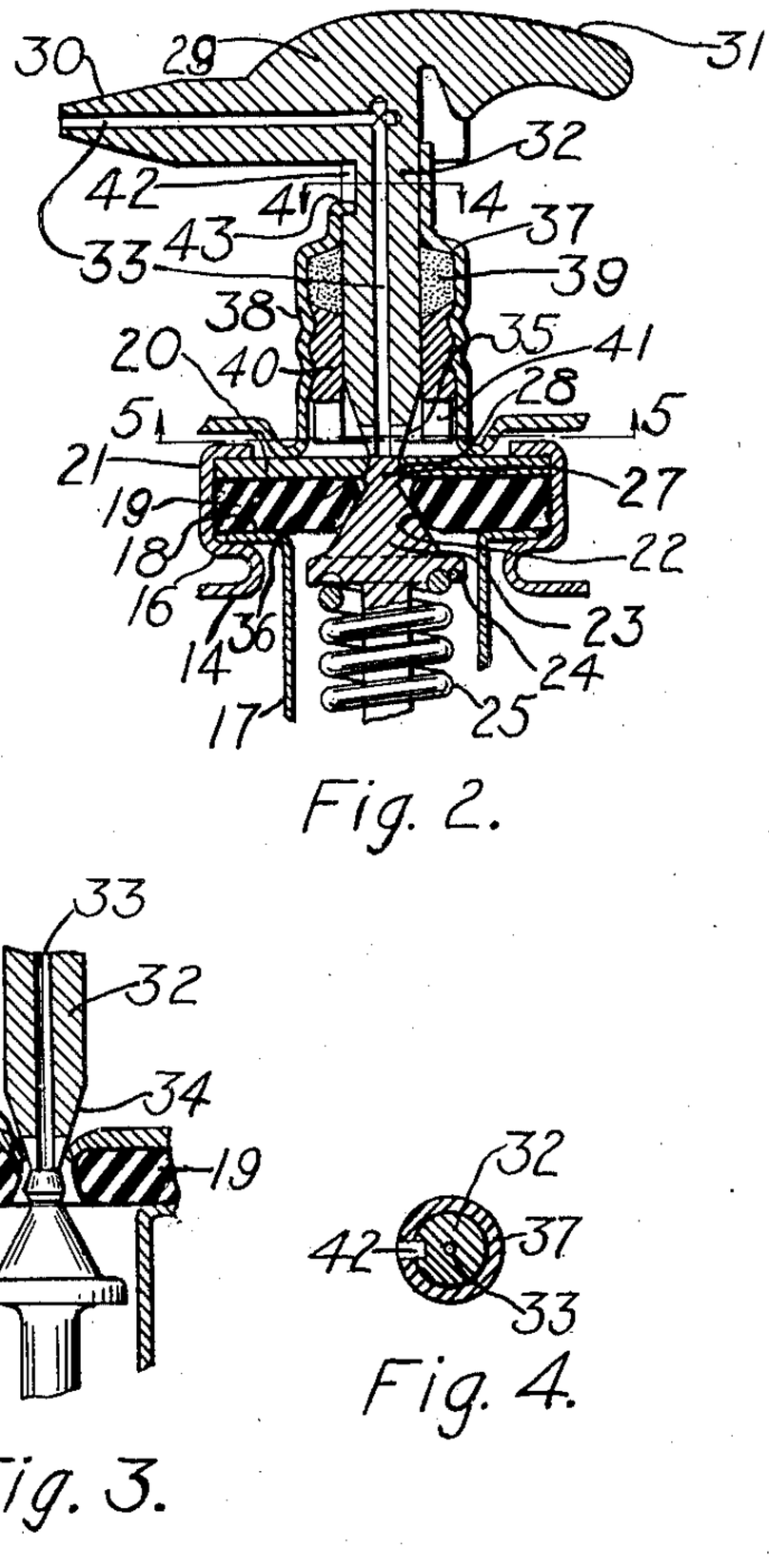

Fig. 2.

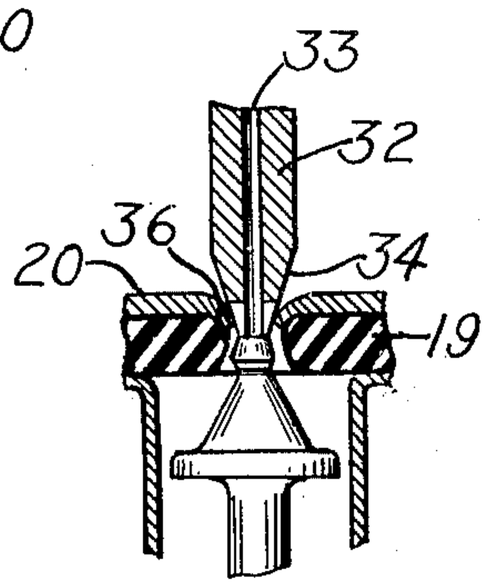

Fig. 3.

Fig. 4.

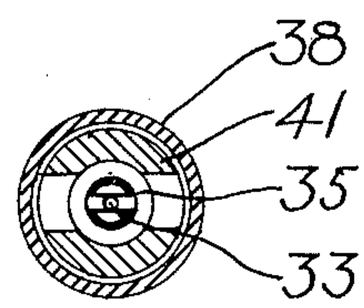

Fig. 5.

INVENTOR
Daniel Mapes
BY Darby & Darby
HIS ATTORNEYS

Patented June 5, 1934 1,961,371

UNITED STATES PATENT OFFICE

1,961,371

SMALL LIQUID FIRE EXTINGUISHER

Daniel Mapes, Upper Montclair, N. J., assignor to Walter Kidde & Company, Inc., New York, N. Y., a corporation of New York

Application May 26, 1931, Serial No. 540,016

9 Claims. (Cl. 299—95)

The present invention relates to small hand extinguishers employing a vaporizable liquid fire extinguishing medium such, for example, as methyl bromide or carbon tetrachloride.

In small hand extinguishers of the type referred to, and with specific reference to those employing methyl bromide as the extinguishing medium, which medium develops sufficient vapor pressure at ordinary temperatures to expell the liquid portion thereof with considerable rapidity when released from its container, difficulty has been encountered with the extinguishers in cold weather on account of the low vapor pressure of the liquid at low temperatures. It is, of course, well known that the vapor pressure of a vaporizable fluid varies directly in accordance with the temperature of the liquid.

Such extinguishers also have the disadvantage that an extinguisher, when used, must be returned to a dealer or distributor for refilling. This would not be a serious disadvantage to users of the extinguishers in large quantities, but it is a considerable handicap to the small user employing but a single extinguisher,

It is accordingly an object of the present invention to provide means of expelling the extinguishing liquid at any temperature likely to be encountered, so that the benefits of vaporizable liquid fire extinguishing mediums having low vapor pressures at low temperatures may be always procurable.

It is a further object of the present invention to provide an easily replaceable cartridge for the fire extinguisher, containing the proper charge of the extinguishing liquid and propelling means, so that the small user in particular may easily procure or stock the necessary refills.

It is a further object of the present invention to provide an extinguisher of the above character, the discharge of which can be pointed in any direction without having the propelling charge escape from the extinguisher before the fire extinguishing medium.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawing, wherein:

Figure 1 is a view in front elevation, with the upper portion of the view shown partly in section, showing a complete extinguisher in accordance with the present invention.

Figure 2 is a view in section of the upper portion of Figure 1, showing the important details on an enlarged scale, the parts being shown in non-operated position.

Figure 3 is a view in section of the operated position of the fire extinguishing release means shown in Figure 2.

Figure 4 is a view in section, taken on line 4—4 of Figure 2, and looking in the direction of the arrows.

Figure 5 is a view in section, taken on line 5—5 of Figure 2, and looking in the direction of the arrows.

Referring to the above drawing, the extinguisher will be found to consist of an outer shell 10 having rolled threads 11 by which it is secured to a cap 12 having rolled threads cooperating with the threads 11. Within the outer shell 10 and supported between the bottom thereof and the top of the cap 12 is the replaceable cartridge 13, which is in accordance with the present invention. The cartridge 13 is shown consisting of a main cylindrical body portion 14 and a bottom cap 15 secured thereto so as to be tight against leakage. The upper portion of the body 14 is formed with a seat 16 for a stepped sleeve 17, which is provided with a flange 18 bearing on the seat. A sealing washer 19, which may be non-metallic, and a washer 20 of readily deformable metal, such as lead, complete the group of parts which is clamped securely between the seat 16 and the turned-over portion 21 of the body 14.

The sealing washer 19 is provided with an aperture forming a conical seat 22. This seat is engaged by a conical plug 23 having a flange 24. A spring 25 seated between the flange 24 and the surface 26 of the sleeve 17 maintains the plug seated tightly on the conical seat 22. The conical plug 23 is provided with an enlarged head 27 having an externally tapered surface 28 engaging a correspondingly tapered opening in the lead washer 20.

When the cartridge has been charged with the proper amounts of the extinguishing liquid and the propelling charge, the head 27 is soldered tightly to the lead washer, thus effectively sealing the fluids within the cartridge.

The element 29 will be found to be a combined fluid release means, operating handle and discharge nozzle. The discharge nozzle is shown at 30 and the operating handle at 31. The release means is shown with a bore 33 which extends entirely through the element 29 from the vicinity of the head 27 to the discharge nozzle 30. The lower end of the release means 32 is externally tapered at 34 down to a diameter approximating that of the end of the head 27. The lower end of the release means is slotted at 35, as is more clearly shown in Figure 5.

When the release means 32 is moved downward by the application of force to the operating handle 31, it first breaks the seal between the head 27 and the lead washer 20 and then forces the plug 23, with the head 27, downward against the force of the spring 25. At the same time the tapered surface 34 of the release means seats tightly in the lead washer 20, forcing a portion of the lead washer around the radius 36 of the sealing washer 19. In this manner communication is effected from the interior of the cartridge 13 to the nozzle 30 past the conical seat 22, and through the slot 35 and the passage 33. At the same time the seating of the tapered surface 34 of the release means effectively seals the cartridge from the outer shell 10, so that all of the released fluid is directed to the discharge nozzle.

Of course, the discharge of the extinguishing medium can be stopped by withdrawing the release means 32, whereby the plug 23 will seat against the conical seat 22 under the influence of the spring 25.

It will be noted that the cap 12 is provided with an upwardly extending sleeve 37 having rolled threads 38. Packing 39 is secured between the sleeve 37 and the release means 32 by means of a packing nut 40 having rolled threads cooperating with the threads 38. The lower end of the packing nut 40 is provided with a slot 41 for a tightening tool, as is more clearly shown in Figure 5.

The outer surface of the release means 32 is recessed as shown at 42, and as is more clearly shown in Figure 4, for the reception of a turned-over portion 43 of the sleeve 37. This turned-over portion of the sleeve serves as a limit for the inward and outward motion of the release means, and prevents undesirable or unnecessary rotation.

In order to attain the desired object of having an extinguisher, the discharge of which may be pointed in any direction without having the propelling means escape from the cartridge before the fire extinguishing liquid, the cartridge is provided with a flexible dip tube 44, secured leakage tight at 45 to the sleeve 17 and having at its lower end a weight 46 to assist the flexible dip tube in always seeking the lowermost point of the cartridge. Furthermore, the discharge nozzle 30 is pointed in a direction at right angles to the longitudinal axis of the cartridge. With this combination of a flexible dip tube or its equivalent, and a discharge nozzle at substantially right angles to the axis of the cartridge, it is possible to point the discharge in practically any conceivable direction and still have the dip tube siphon off the liquid portion of the fluid contents.

In order to insure that the fire extinguishing medium be propelled from the cartridge under any temperature conditions, there is charged into the cartridge a fluid medium which retains sufficient pressure at low temperatures. This medium is preferably of a fire extinguishing nature itself and accordingly might be carbonic acid gas, nitrogen, or other suitable medium.

It will of course be appreciated that when the extinguisher has been operated, it is only necessary to unscrew the outer shell 10 from the cap 12 and remove the cartridge 13 and replace it with a new cartridge which can be or has already been procured. When the parts are re-assembled, the apparatus is again ready for use. In this connection it should be noted that an additional seal is provided at 47 between the washer 20 and the cap 12 for insuring delivery of the contents of the cartridge to the discharge passage 33 only. The cap should, therefore, be coupled tightly to the shell to effect good sealing.

Therefore, it will be seen that I have provided a very effective hand extinguisher which is at the same time compact, which can be employed effectively at any temperature, which is operable when pointed at a fire in any direction, and which, above all, is easily refillable.

In fact, I believe the use of a replaceable cartridge for small fire extinguishers of the type herein described to be broadly new, without regard to the specific nature of the fire extinguishing medium, whether it be a liquid or a gas stored under pressure.

While the present invention has been described with specific reference to the accompanying drawing, it is not to be limited, save as defined in the appended claims.

I claim as my invention:

1. As an article of manufacture, a replaceable self-contained cartridge for fire extinguishers, comprising an elongated cartridge proper having an opening at one end formed with a shoulder, a stepped sleeve fitting within said opening and having an out-turned flange engaging said shoulder and having a shoulder formed by the portion connecting the steps of the sleeve, an apertured disc secured in contact with said flange and across said opening, means within the cartridge engaging the aperture in the disc, a spring seated between the last named means and the second shoulder to urge the last named means to engage the aperture, and a dip tube secured to the sleeve, below the second named shoulder.

2. In a fire extinguisher of the type described, the combination of an outer shell, a cartridge containing a fire extinguishing medium under pressure located within the shell, a cap forming part of and coupled to the shell, means on the cartridge adjacent the cap for normally retaining the medium within the container, the last named means comprising an apertured disc secured across an opening in the end of the cartridge, a valve within the cartridge cooperating with the aperture, a second apertured disc secured across the opening, an extension on the valve extending adjacent the aperture in the second disc and means to effect a seal between said second disc and said extension; operating means on the cap for engaging the aforesaid extension to break the aforesaid seal and unseat the valve, and a passage through the operating means for discharging the released medium.

3. In a fire extinguisher of the type described, the combination of an outer shell, a cartridge containing a fire extinguishing medium under pressure located within the shell, a cap forming part of and coupled to the shell, means on the cartridge adjacent the cap for normally retaining the medium within the container, the last named means comprising an apertured disc secured across an opening in the end of the cartridge, a valve within the cartridge cooperating with the aperture, a second apertured disc of readily deformable metal secured across the opening, an enlargement in the aperture of the first disc on the side thereof adjacent the second disc, an extension on the valve extending adjacent the aperture in the second disc and means to effect a seal between said second disc and said extension; operating means on the cap for engaging the aforesaid extension to break the aforesaid seal and unseat the valve, said operating means being formed to enlarge the aperture in the readily de-

formable disc and to seal itself within the enlarged aperture, and a passage through the operating means for discharging the released medium.

4. In a fire extinguisher of the type described, the combination of an outer shell, a cartridge containing a fire extinguishing medium under pressure located within the shell, a cap forming part of and coupled to the shell, means on the cartridge adjacent the cap for normally retaining the medium within the container, the last named means comprising an apertured disc of readily deformable material secured across an opening in the end of the cartridge, a valve within the cartridge cooperating with the aperture and adapted to be unseated through the aperture by means exterior to the cartridge, operating means on the cap for unseating the valve, said operating means being formed to enlarge the aperture in the readily deformable disc and to seal itself within the enlarged aperture, and a passage through the operating means for discharging the released medium.

5. As an article of manufacture, a replaceable self-contained cartridge for fire extinguishers, comprising an elongated cartridge proper having an opening at one end, an apertured disc secured across said opening, a valve within the cartridge cooperating with the aperture for controlling the discharge of the contents of the cartridge, a second apertured disc of deformable metal secured across the opening, a metallic extension on the valve extending into the aperture in the second disc, means to force the valve extension into sealing engagement with the deformable metal disc and means to effect an integral metallic seal between said extension and said disc of deformable metal to hermetically seal the contents of the cartridge.

6. As an article of manufacture, a replaceable self-contained cartridge for fire extinguishers, comprising an elongated cartridge proper having an opening at one end, an apertured disc arranged across said opening, a valve within the cartridge cooperating with the aperture for controlling the discharge of the contents of the cartridge, a second apertured disc of readily deformable metal arranged across the opening, an extension on the valve extending adjacent the aperture in the second disc, means to effect an integral seal between the second disc and said extension to seal the contents of the cartridge, and means to secure the two discs to the cartridge proper to effect a seal between the two discs and the cartridge proper.

7. As an article of manufacture, a replaceable self-contained cartridge for fire extinguishers, comprising an elongated cartridge proper having an opening at one end, a disc arranged across the opening and having an aperture with a conical seat within the cartridge, a conical valve within the cartridge engaging the conical seat for controlling the discharge of the contents of the cartridge, a second disc of readily deformable metal arranged across the opening and having an aperture in alignment with the first mentioned aperture, an extension on the valve extending within the last named aperture, means to effect an integral seal between the second disc and said extension to seal the contents of the cartridge, and means to secure the two discs to the cartridge proper to effect a seal between the two discs and the cartridge proper.

8. As an article of manufacture, a replaceable self-contained cartridge for fire extinguishers, comprising an elongated cartridge proper having an opening at one end, an apertured disc arranged across said opening, a valve within the cartridge cooperating with the aperture for controlling the discharge of the contents of the cartridge, a second apertured disc arranged across the opening, an extension on the valve extending adjacent the aperture in the second disc, and means to effect an integral seal between the second disc and said extension, said last named means serving to seal the contents of the cartridge.

9. As an article of manufacture, a cartridge for fire extinguishers, comprising a container having an opening at one end, apertured closure means secured across the opening, means for hermetically sealing the closure means to the container across the opening, said closure means having an aperture therethrough forming two seats, a movable valve member within said container having two independent seating surfaces, means for normally holding said valve member so that its two seating surfaces contact with the two seats on the closure means, and means to effect an integral seal between one pair of cooperating seating surfaces so as to seal the contents of the cartridge, the other pair of cooperating seating surfaces serving to control the discharge of the contents thereof.

DANIEL MAPES.