United States Patent

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[54] **FIRE EXTINGUISHER WITH REMOVABLE FUSIBLE LINK**
13 Claims, 3 Drawing Figs.

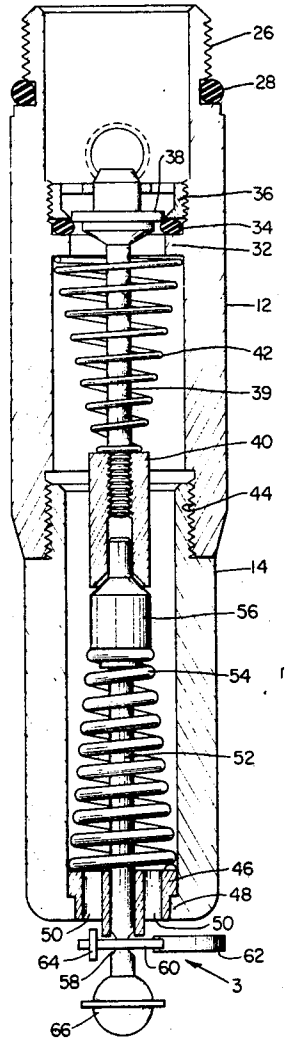
[52] **U.S. Cl.** **169/26,** 169/31, 169/42
[51] **Int. Cl.** **A62c 35/02**
[50] **Field of Search** 169/26, 29, 30, 31, 42

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ABSTRACT: Fire extinguisher of the type employing a container of pressurized extinguisher material characterized by a normally closed discharge valve which remains attached to the container and a detachable element including a spring retained in loaded condition by a fusible link and adapted to open the discharge valve upon melting of the link only when the detachable element is operatively associated with the discharge valve. During shipment and other handling prior to attachment of the detachable element to the container at the situs of intended use, it remains in nonoperational association to thus prevent premature and unintended operation of the discharge valve.



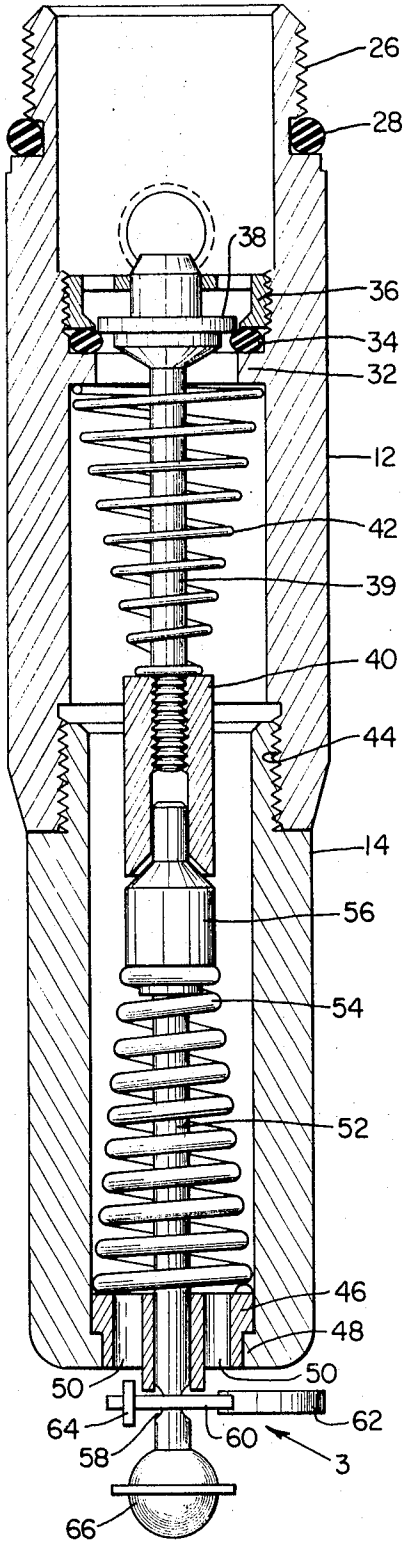


FIG. 2

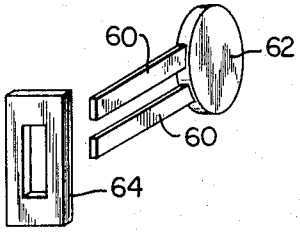


FIG. 3

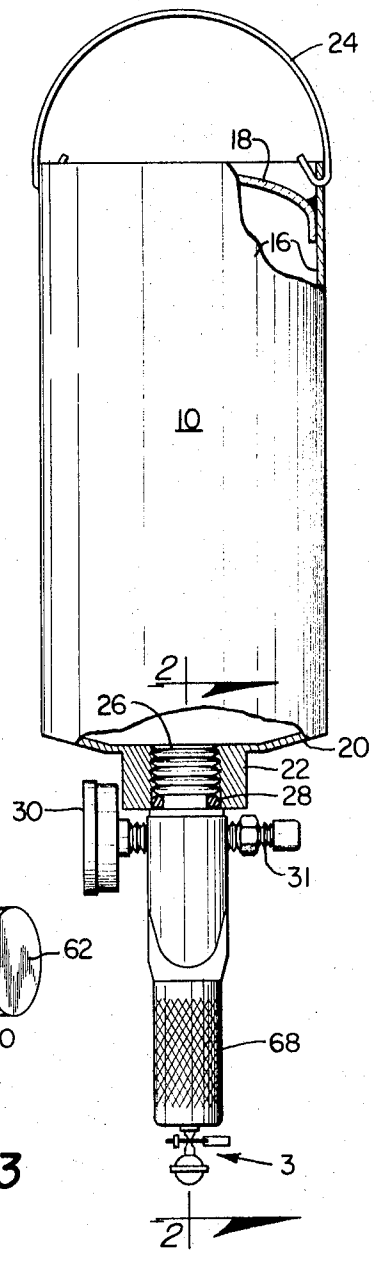


FIG. 1

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FIRE EXTINGUISHER WITH REMOVABLE FUSIBLE LINK

BACKGROUND OF THE INVENTION

Fire extinguishers of the relatively small portable self-contained pressurized type are being increasingly used and are well adapted for installation in close quarters such as exhaust hoods, motor compartments, dip tanks, spray booths, welding compartments and others where relatively small fires are likely to occur and which are susceptible to control by relatively small quantities of extinguisher supply which may be a liquid or a dry powder extinguisher, dependent upon the nature of the fire. It is conventional practice to locate such devices in close proximity to the fire hazardous loci and render their operation responsive to an excessive or unsafe temperature which opens a suitable valve allowing the pressurized extinguisher to be sprayed onto the fire locus. Fusible links, such as low melting temperature metals, are generally employed to respond to the excessive temperature which, upon melting, provide communication between the pressurized source and the fire locus. The patent to Mascarini 2,674,324 generally exemplifies such type of device, disclosing a spring maintained in preloaded condition by a fusible link, which upon melting opens a container discharge valve.

One of the difficulties of a system of the type just referred to resides in the possibility of premature actuation, particularly during shipping and handling. Thus, if the device should encounter an excessive temperature during shipping or storage it would discharge its extinguisher contents at a nonintended locus.

One of the principal objects of the present invention resides in a construction in which the fusible link system may be readily detached from the remainder of the system so that in event of premature and unintended actuation of same during shipping, storage, handling or the like, the contents of the extinguisher remain intact in their pressurized container.

Another object is to render the fusible link system readily and quickly detachable from the remainder of the system so that even after intended actuation and suppression of a fire it may be detached to close the discharge valve and prevent unnecessary discharge of the extinguisher after it has served its fire suppression purpose.

Further objects including simplicity of construction, economy of manufacture and efficiency and dependability of operation will become more apparent as the description proceeds.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side elevation of the subject of the invention, portions being broken away;

FIG. 2 is an enlarged section taken on line 2–2, FIG. 1; and

FIG. 3 is an isometric view of a detail as viewed in the direction of arrow 3, FIGS. 1 and 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and first to FIG. 1, the subject of the invention comprises, in general, a container unit **10**; a conduit unit **12** containing a discharge valve, and a conduit unit **14** with which is associated a fusible link system and an actuator for opening the discharge valve, each of which will now be described in detail.

Container **10** comprises a cylindrical wall **16** to which is secured, such as by welding, end walls **18**, **20**, the latter including an internally threaded hollow neck **22**. A bail **24** is pivotally connected to one end of the container which serves to support it from a suitable ceiling or wall hook (not shown). Since the container per se forms no part of the invention and may be varied as desired, it will be understood that the specific container is exemplary, only.

Conduit unit **12**, as best shown in FIG. **2**, is provided with an external thread **26** which engages a corresponding thread in neck **22** and is sealed in any suitable manner such as by an O-ring **28**. Its wall is provided with threaded apertures which receive a pressure gauge **30** and a valve **31** (FIG. **1**), the latter, if desired, being in the form of a conventional tire check valve through which pressurized air may be admitted. An annular shoulder **32** is provided between its ends upon which is disposed an O-ring valve seat **34** retained on same by a collar **36** which threadedly engages the bore of the conduit. A poppet valve **38** is axially guided in any suitable manner, such as by the collar, and is provided with a circular edge or face which engages the O-ring seat. An integral stem **39** extends axially through the conduit, its outer end having an axially adjustable coupling member **40** threadedly affixed to same, a compression spring **42** being disposed between coupling **40** and shoulder **32**.

Conduit unit **14** is provided with an external thread **44** which engages in a corresponding thread in the outer end of conduit unit **12**. A nozzle **46** seats against an annular shoulder **48**, the nozzle preferably being provided with a plurality of angularly spaced parallel apertures **50** extending through same. The nozzle is also provided with a central aperture which slideably receives a valve actuator stem **52** which is urged in a direction toward conduit unit **12** by a compression spring **54**, the ends of which engage the nozzle and an abutment member **56** affixed to actuator stem **52**, one end of the latter being slidable within coupling member **40**. An annular groove **58** is formed in actuator stem **52** adjacent its exposed free end which receives the bifurcated legs **60** of a fusible link **62**, a retainer clip **64** engaging the legs to prevent spreading of same. A ball **66** is affixed to the exposed free end of the actuator stem which serves as a deflector for the nozzle and also as a finger knob which may be grasped for compressing spring **54** to permit application of the fusible link to the actuator stem.

In the handling of the device preparatory for use it will be assumed that container **10** is filled with suitable fire extinguisher at the point of manufacture. This may be most conveniently accomplished prior to application of unit **12** to container **10**. After filling, unit **12** is applied to container **10**, discharge valve **38** now being urged onto its seat with a relatively light force applied by spring **42**. Valve **31** is then connected to a pressure source such as air, nitrogen or other inert gas and the container pressurized to a desired value as indicated by gauge **30**. It is then tested against leakage and tolerance of parts, particularly the position of coupling **40** relative to unit **12**. Unit **14** is assembled and the tolerance of the position of actuating stem **52** is checked to ensure that when unit **14** is ultimately secured to unit **12** and the fusible link melts the actuating stem **52** will open the discharge valve. The container and its attached unit **12** and separated unit **14** are now ready for packaging. As will be apparent, in the event of melting of the fusible link during transit, storage or the like, discharge valve **38** is not actuated, thus preventing premature and unintended discharge of the extinguisher contents. When the device reaches the location of installation, unit **14** is threadedly secured to unit **12** and the device is now ready for its intended mode of operation.

Unit **14** should be readily attachable to unit **12** and preferably without use of wrenches or the like. For this purpose, knurling **68** may be provided so that it may be grasped by the hand of an operator for attaching same or for detaching same after a fire is extinguished to thereby permit the discharge valve to close and obviate discharge of unneeded extinguisher onto the fire locus. After actuation, the entire device is then replaced by a filled device and the depleted or partially depleted device returned to a suitable locus for refilling.

In one operative embodiment of the invention nozzle apertures **50** and deflector ball **66** are so proportioned to provide a downward conical spray pattern of dry extinguisher powder onto an area of about 50 square feet at a distance of about 8 feet from the point of discharge with a gas pressure in the container of about 100 p.s.i. The fusible link may be formed of well-known low melting alloy having a melting point of about 165° F. Spring **42** preferably has a low spring content and exerts a force only sufficient to move valve **38** onto its seat. After container **10** is pressurized the pressure on the seat is in-

creased by its cross-sectional area times the unit pressure in the container. This increase in pressure plus the force exerted by spring **42** is thus the total pressure on the valve which must be overcome by spring **54** when fusible link **62** melts. The loading on spring **54** is thus proportioned to always open valve **38** with pressure in the container within its safe limit. Some clearance between coupling **40** and abutment **56** should be maintained so that valve **38** may freely move toward its seat. This clearance also serves a second purpose in that the energy stored in spring **54** is released with impact of abutment **56** with coupling **40**, thus aiding in rapid opening of valve **38**.

It is to be understood that this invention is not limited to the exact embodiments of the methods and apparatuses shown and described, which are merely by way of illustration and not limitation, as various other forms and modifications will be apparent to those skilled in the art, and it is therefore intended that the appended claims cover all such changes and modifications.

We claim:

1. In a fire extinguisher of the type including a container having extinguisher material therein and a pressurized gas for discharging it through a first extinguisher material flow conduit, the improvements, in combination, comprising:

a. a discharge valve disposed in said first conduit and urged to closed position at least partially by pressure in the container;

b. a second extinguisher material flow conduit forming a continuation of the first conduit;

c. means for detachably connecting the second conduit to the first conduit;

d. said second conduit including a discharge valve actuator, a loaded spring for moving same, a fusible link associated with the actuator for preventing movement of same, and a discharge opening for the extinguisher material; and

e. the construction and arrangement being such that said actuator is operative for movement under urge of the spring after melting of the fusible link when the second conduit is disconnected from the first conduit at which time the actuator is inoperative to open the discharge valve, and also operative for movement under urge of the spring after melting of the fusible link when the second conduit is connected to the first conduit at which time the actuator is operative to open the discharge valve, whereby the discharge valve may be opened by the spring only when the second conduit is connected to the first conduit.

2. Apparatus in accordance with claim **1** wherein the first and second conduits are axially aligned.

3. Apparatus in accordance with claim **2** wherein said actuator is axially movable within the discharge opening and the fusible link is carried by the actuator outwardly therebeyond.

4. Apparatus in accordance with claim **3** wherein the discharge opening includes a plurality of generally parallel angularly spaced apertures and said actuator is provided with a deflector at the outer end of same for deflecting the material into a divergent spray cone.

5. Apparatus in accordance with claim **2** wherein said discharge valve is provided with a stem extending axially within the first conduit and said actuator extends axially within the second conduit, said loaded spring surrounding the actuator, said stem having limited axial movement without abutting the actuator whereby the discharge valve may move to a seat without interference from the actuator.

6. Apparatus in accordance with claim **5** wherein the actuator is axially spaced from the stem, whereby upon melting of the fusible link it impacts the stem to open the discharge valve.

7. Apparatus in accordance with claim **6** including a spring surrounding the stem for initially closing the discharge valve to prevent gas leakage past same during pressurization of the container.

8. Apparatus in accordance with claim **1** wherein said first conduit is provided with a valve for pressurizing the container with a gas and means for indicating the pressure.

9. Apparatus for use with a fire extinguisher of the type including a container having extinguisher material therein and a pressurized gas for discharging it, comprising:

a. a first extinguisher material flow conduit adapted to be connected to the container;

b. a discharge valve disposed in said first conduit and urged to closed position at least partially by pressure in the container;

c. a second extinguisher material flow conduit forming a continuation of the first conduit, conduit;

d. means for detachably connecting the second conduit to the first conduit;

e. said second conduit including a discharge valve actuator, a loaded spring for moving same, a fusible link associated with the actuator for preventing movement of same, and a discharge opening for the extinguisher material; and

f. the construction and arrangement being such that said actuator is operative for movement under urge of the spring after melting of the fusible link when the second conduit is disconnected from the first conduit at which time the actuator is inoperative to open the discharge valve, and also operative for movement under urge of the spring after melting of the fusible link when the second conduit is connected to the first conduit at which time the actuator is operative to open the discharge valve, whereby the discharge valve may be opened by the spring only when the second conduit is connected to the first conduit.

10. Apparatus for use with a fire extinguisher of the type including a container having extinguisher and pressurized gas therein and a normally closed discharge valve adapted to be automatically opened upon melting of a fusible link, comprising:

a. a conduit unit having a discharge valve actuator, a loaded spring for moving same, a fusible link associated with the actuator for preventing movement of same, and a discharge opening for the extinguisher material;

b. said unit being detachable from the extinguisher at desired times, such as during shipping or until it is otherwise desired to render the discharge valve operative, so that the discharge valve may not be opened by melting of the fusible link during such times; and

c. said unit, when connected to the extinguisher, having the valve actuator disposed in such position to abut the discharge valve and open same by the spring upon melting of the fusible link.

11. Apparatus in accordance with claim **10** wherein said discharge valve may be automatically closed by manually removing the unit from the extinguisher prior to expenditure of the contents of the extinguisher.

12. Apparatus in accordance with claim **10** wherein the melted fusible link is readily replaceably connected to the actuator, whereby the spring may be restored to loaded condition for a subsequent operation of the extinguisher.

13. Apparatus in accordance with claim **10** including means for adjusting the relative positions of the actuator and discharge valve to prevent opening of the latter when the unit is connected to the extinguisher to thereby compensate for assembly tolerances.