June 19, 1951 J. W. KNOBLOCK 2,557,120

FIRE EXTINGUISHER

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Fig. 1

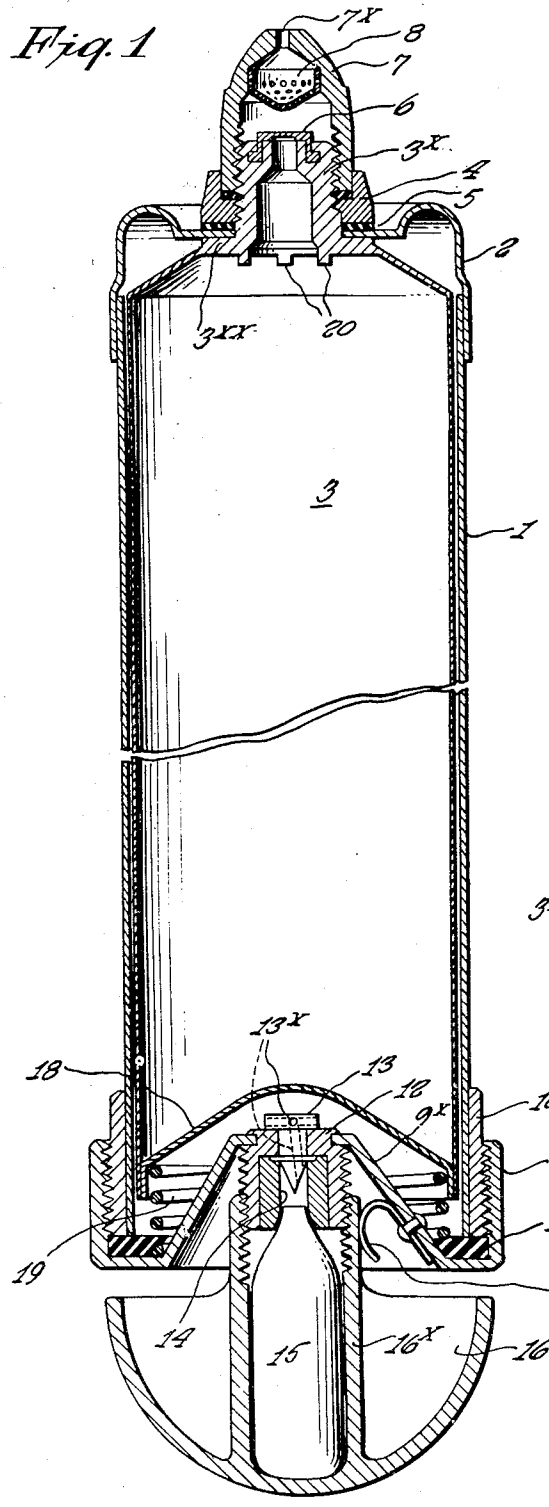

Fig. 2

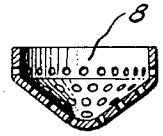

Fig. 3

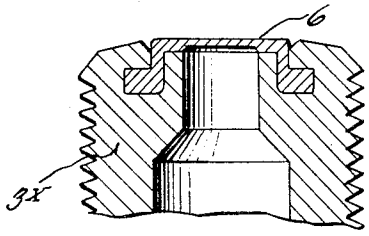

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Fig. 4

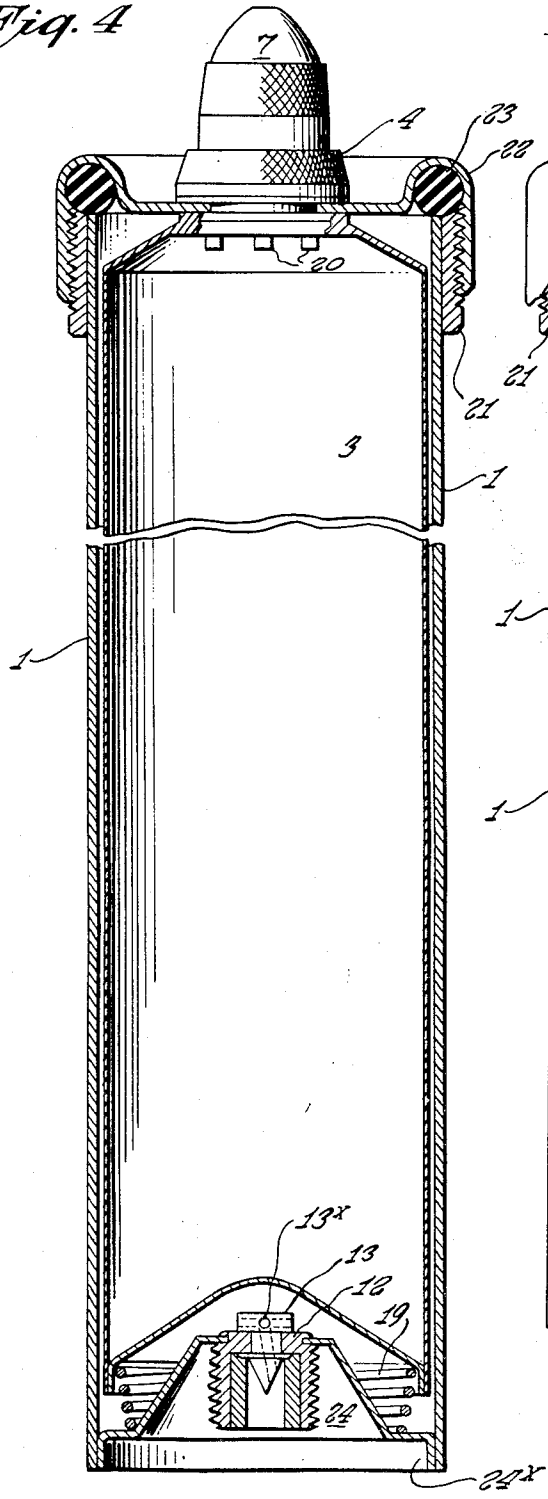
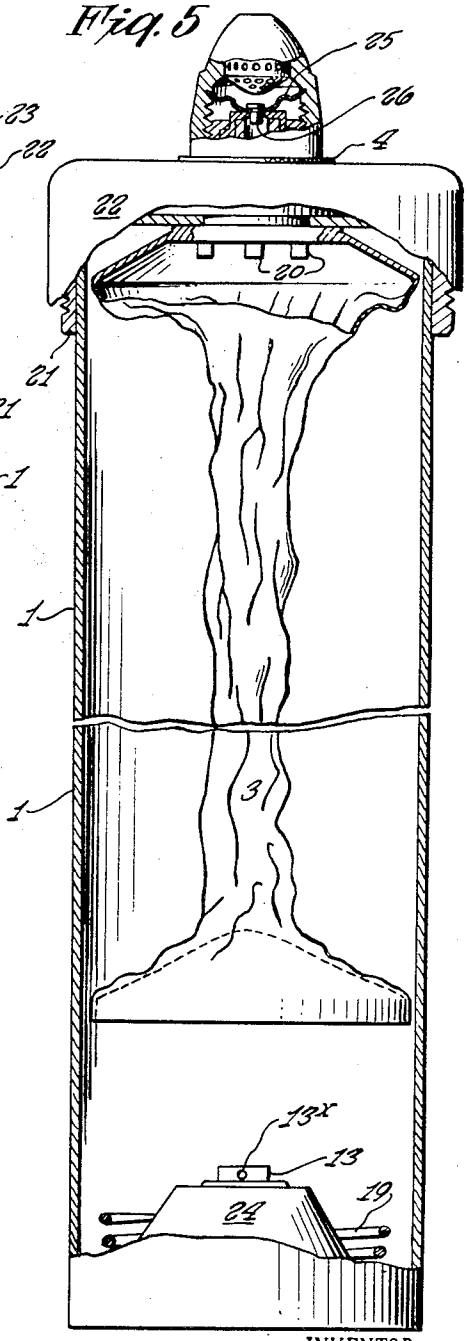


Fig. 5



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FIRE EXTINGUISHER

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4 Claims. (Cl. 169—31)

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The characteristic of the invention is that within a casing there is supported in a special manner a collapsible tube of such form that when gas pressure is applied to its base and about its major wall the tube will collapse, thereby exerting pressure upon the fire extinguishing liquid which it contains, that pressure opening a tube closure and permitting the liquid to be discharged under pressure through a nozzle carried by the casing.

A number of attempts have been made to provide a fire extinguisher which will employ a collapsible tube for containing the liquid, in conjunction with gas pressure means, but all of these attempts have commercially failed because of deficiencies in construction. For the most ejection of liquid under pressure from the tube has required a fixed cutting element for the latter, and the suspension or holding of the tube in the casing has been faulty in both design and action.

The specific object of the invention is to provide a fire extinguisher of the stated type, which will be of high efficiency, and at the same time which may be easily manufactured, readily assembled, and quickly re-charged after use, and also one which will involve lower cost than with preceding extinguishers of the same general type.

The invention will be described with reference to the accompanying drawings, in which:

Fig. 1 is a view in longitudinal section through an embodiment of the invention;

Fig. 2 is a detailed view in longitudinal section showing one form of a detent for the tube closure, it being in the form of a screen;

Fig. 3 is an enlarged sectional view of the tube nozzle and one form of pressure-opening closure;

Fig. 4 is a view similar to Fig. 1, showing a modification, in that the collapsible tube is inserted from the top of the casing, the pressure cartridge mount having been removed;

Fig. 5 is a schematic view showing the condition of the collapsible tube after an operation of the extinguisher.

Referring to the drawings, and particularly Figure 1, it will be seen that the construction therein shown comprises a casing 1, which may be of tube section of any suitable metal or plastic, and of any desired cross-section. Usually it will be cylindrical. At its top the tube is provided with a flanged cap 2, having an opening at its top through which the neck 3x of a collapsible tube 3 may be received.

In order that the tube 3 may be suspended within the tubular casing 1 the neck 3x is preferably threaded to receive a nut 4, which nut will bear

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directly against a washer 5 and exert pressure upon the underlying wall of cap 2, pressing it in turn tightly upon the shouldered area 3xx of the collapsible tube 3. It will be understood that the means just described operates to maintain a gas type connection between the interior of the casing 1 and the neck of the collapsible tube 3. Also it will be understood that the cap 2 will be welded or otherwise made a part of the casing 1.

The opening through the neck 3x of collapsible tube 3 is closed by a pressure-opening member 6 of any suitable form, the function of which is to maintain a seal against the passage of liquid from the collapsible tube in the normal handling thereof, but which will be opened by applied pressure upon the liquid in the tube, as when the extinguisher is put into action.

In the present embodiment the member 6 consists of a flanged member having a thin wall at its top, either throughout the top or at its center area, which thin wall will break when the tube is collapsed by gas pressure and such pressure is communicated to the liquid within the tube and by the said liquid to the thin wall of member 6.

The neck of the collapsible tube is protected by a nozzle or shield member 7, which in the present embodiment is internally threaded to be received upon the collapsible tube neck. The nozzle has a discharge opening at 7x and below the nozzle is placed a detent 8, in the sense that member 8, formed as a screen, will hold back any broken part of the pressure-opening closure 6 from movement to the nozzle opening 7x and thereby clogging said opening.

The face of casing 1 is adapted to removably receive a base member 9. Preferably the lower end of the casing receives and has secured thereto an exteriorly threaded ring 10 which receives the closure 9, and the latter may be provided with a washer 11 in its base area. This arrangement enables the use of a casing 1 of very thin wall, yet sufficiently resistant to withstand substantial internal pressure.

The base closure member 9 is of special formation. Its central area is formed as an inverted cup apertured to receive a plug 12 which in turn supports centrally thereof a cutting implement 13. The latter member is pointed at its lower end and received within a compressible ring 14 supported by plug 12, as shown by dotted lines at 13x. Registering apertures for ducts are formed in member 13 for the passage of gas under pressure.

In the present embodiment plug 12 is placed in position and then its upper margin is turned

or rolled outwardly for engagement with the base of the cup area 9x of base closure 9. The exterior of plug 12 is adapted to releasibly hold a holding member for a gas cartridge 15. I prefer to form the said gas cartridge holder as a semi-spherical member 16, which member may be a die casting provided with an upwardly projected tubular area 16x internally threaded to be received upon threaded plug 12. Reference to Figure 1 will show that when the gas cartridge holder 16 is rotated it will ride up the threaded plug 12 until the end of cartridge 15 is penetrated by the cutter 13, whereupon gas under relatively high pressure will pass into the casing 1 for collapse of the tube 3.

As a means for restraining the gas holder from accidental rotation and unwanted release from the extinguisher I have shown the use of a spring detent 17 which may engage flutes or knurls (not shown) on the element 16x of the gas cartridge holder 16.

The base of the collapsible tube 3 is closed by a stiff concavo-convex member 18 having a flanged rim which is ring shaped when the collapsible tube is cylindrical, thereby providing a satisfactorily broad area for surface engagement with the interior of the collapsible tube. Thus when the collapsible tube is made of lead or other thin wall-metal, it may be joined to the flange of member 18 by fusion, as for example welding, by a soldering operation or simply by tight seaming.

In order to relieve the neck 3x of collapsible tube 3 from total suspension-support of the collapsible tube, and for more balanced support, I prefer to employ a coiled spring or similar expedient for support of the tube at its base. For example, a rubber ring could be used. In Fig. 1 I have shown a coiled spring 19.

In the operation of the structure shown in Fig. 1, the user may rotate the cartridge holder 16, as by clockwise rotation, until the cartridge is punctured. This will cause immediate forceable discharge of gas under relatively high pressure within the casing, and by simultaneous compound movement the collapsible tube will move inwardly at its major wall area and upwardly at its base to finally assume about the collapsed formation shown in Fig. 5. In such collapsing movement the concavo-convex formation of the collapsible tube base is of great assistance. Also it will be noted that the top wall of the collapsible tube is thicker and therefore has greater resistance than the side wall. This latter formation gives support to the tube where it is needed.

In the structures shown in Figs. 4 and 5 the collapsible tube formation is the same as in the preceding figures, including the provision of guard figures 20 surrounding the opening 3x through the collapsible tube, the latter preventing any abnormal closing of the opening by a collapsed wall area of the tube. The major difference between the two forms, i. e., that of Figures 1 and 4, is that in the latter figure the construction permits assembly of the collapsible tube, and its withdrawal, at the top of the casing, the bottom of the casing being permanently sealed. To this end the casing 1 at its top receives an externally threaded ring 21 on which is threaded cap 22, a gasket 23 being placed between them. The same washer 4 and nozzle 7 shown in Figure 1 will be used, together with, as I have said, the same form of collapsible tube with its pressure-opening closure, and the latter may be that of element 6, if desired. In such case, cap 2 will be welded or otherwise made gas-tight a part of casing 1. The formation of the closure means for the bottom end of casing 1 will be substantially similar to that of the preceding figure with the exception that the inverted cup member, shown at 24 in Fig. 1, will have a sealed connection with the casing, as by a flange 24x welded to the casing or otherwise sealed thereto.

As stated above, to achieve the most complete collapse of the tube 3, with the least pressure, the bottom is concavo-convex, and is free to move upwardly. Efficient collapse is important since the approval agencies require that the full rated capacity of liquid be spilled when the extinguisher is used. The form of the collapsible tube is such that it may be made by standard extrusion practice followed by the application of the end member 18 and the pressure-opening closure at the top of the nozzle or neck 3x. The cartridge holder co-acts with the concavo-convex formation of the casing base to protect and symmetrically enclose those elements which house the cutter and the cartridge. In fact the cutter is wholly within the base of the casing and there are no protruding parts as in former constructions of the same general type.

In Fig. 4 the pressure-opening closure for the collapsible tube is carried by the cap 7 and consists of a spring 25 carrying a plug 26 so that when the cap is threaded into position on the neck of the collapsible tube the plug 26 will seal its opening, and at the same time the pressure of liquid within the tube will force the cap out against the moderate tension of spring 25, that tension being sufficient to retain plug 26 in position during normal handling of the extinguisher.

Having described my invention, it will be understood that various modifications may be made in the form and arrangement of the elements constituting the two embodiments shown, without departing from the spirit of the invention. What I claim and desire to secure by Letters Patent is as follows:

1. A fire extinguisher comprising a pressure-tight casing, an inner liquid container formed as a collapsible tube, means carried by said casing for supporting and puncturing a gas cartridge, means for delivering gas released from said cartridge into the space between said inner container and said casing, an outlet member formed integrally with said tube and having a discharge passage therethrough, a pressure-opening seal carried by said outlet member, and means for mounting said seal on said member over said discharge passage with the outer portion thereof exposed and unsupported for outward rupture under the internal pressure of the liquid on said inner container following release of gas from said cartridge.

2. A fire extinguisher comprising a pressure-tight casing, an inner liquid container formed as a collapsible tube, means carried by said casing for supporting and puncturing a gas cartridge, means for delivering gas released from said cartridge into said casing at the end of said container across substantially the entire area thereof, an outlet member formed integrally with said tube and having a discharge passage therethrough, a pressure-opening seal carried by said outlet member, and means for mounting said seal on said member over said discharge passage with the outer portion thereof exposed and unsupported for outward rupture under the internal pressure of the liquid on said inner container following release of gas from said cartridge.

3. A fire extinguisher comprising a gas-tight

casing, a collapsible container within the casing, means carried by the casing for holding and puncturing a gas cartridge, means for delivering the gas from said cartridge into the space between said container and said casing to develop pressure upon the liquid within said container, the collapsible container being provided with an apertured neck and a shoulder surrounding said neck, said neck projecting into an opening in the casing, means for clamping said shoulder of said collapsible container to the wall of said casing, a pressure opening seal normally closing the aperture in said neck, and means for mounting said seal on said neck with a portion of said seal exposed through said aperture and unsupported for outward rupture under the internal pressure of the liquid within said container on release of said gas.

4. A fire extinguisher as defined in claim 3 in

which the collapsible container is formed with a relatively thin side wall and with a neck and shoulder of heavier construction.

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