

June 19, 1951

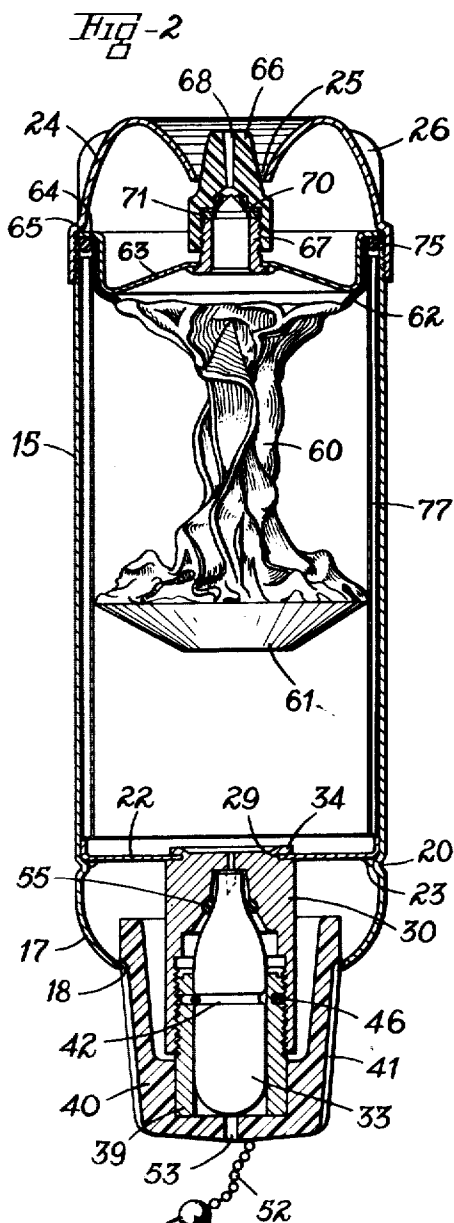
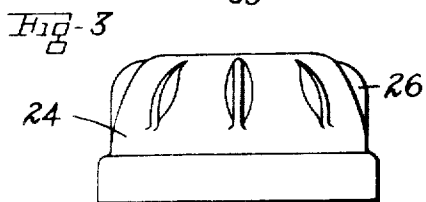
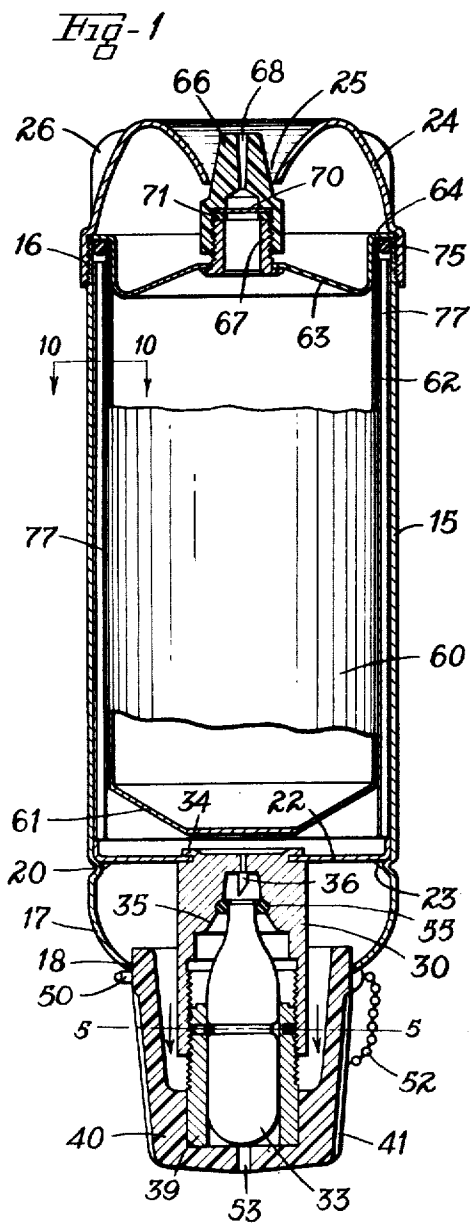
W. M. WETZEL ET AL

2,557,162

FIRE EXTINGUISHER

Filed May 6, 1949

2 Sheets-Sheet 1



INVENTORS
William M. Wetzel
 BY *Edward R. Bork*
Marshall K. Reibel
 ATTORNEYS

June 19, 1951

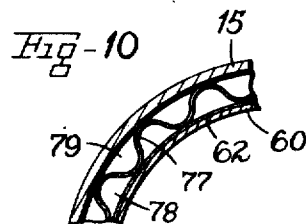
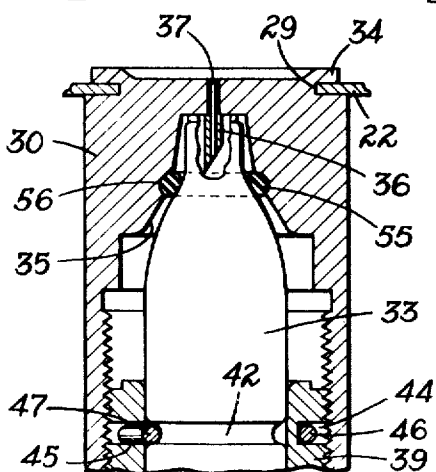
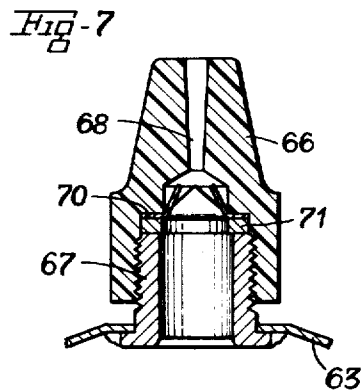
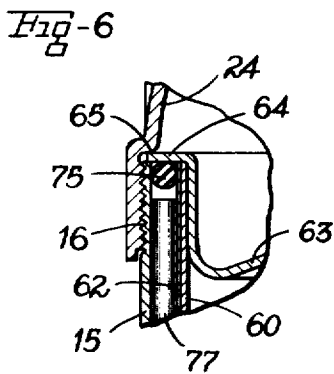
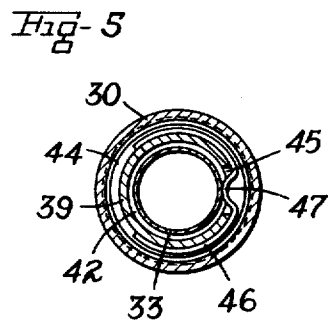
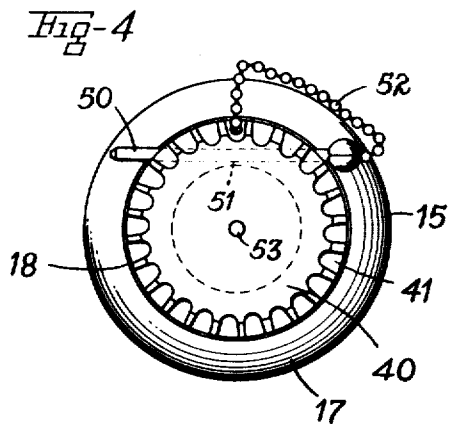
W. M. WETZEL ET AL

2,557,162

FIRE EXTINGUISHER

Filed May 6, 1949

2 Sheets-Sheet 2



INVENTORS
William M. Wetzel
 BY *Edward R. Bork*
Marshall Bichel
 ATTORNEYS

UNITED STATES PATENT OFFICE

2,557,162

FIRE EXTINGUISHER

William M. Wetzel, White Plains, N. Y., and
Edward R. Bork, Dayton, Ohio, assignors to
The Fyr-Fyter Company, Dayton, Ohio, a cor-
poration of Ohio

Application May 6, 1949, Serial No. 91,782

19 Claims. (Cl. 169—31)

1

This invention relates to fire extinguishers.

More particularly, the invention relates to fire extinguishers of the type wherein the fire extinguishing material is stored in a collapsible container mounted within a casing, and discharge of the material is accomplished by the development of gas pressure within the casing to collapse the container and thus to effect discharge of the contents thereof. For example, the invention has special application to fire extinguishers of relatively small size for ready operation in the hand of the user and wherein the desired gas pressure is developed by release of a compressed gas such as CO₂ from a cartridge of the usual type.

In accordance with the invention, there is provided a fire extinguisher having a collapsible container of fire extinguishing material mounted within the main casing and having a readily rupturable or frangible closure. A sealed cartridge of compressed CO₂ or other suitable gas is also mounted within the casing to supply operating pressure for the extinguisher when it is moved against an opening or piercing pin, and a releasable locking pin is provided for preventing accidental opening movement of the cartridge. In use, this locking pin is removed and the gas pressure cartridge is then forced against the piercing pin to release its contents within the casing. As a result, a pressure is developed around the outside of the container of extinguisher fluid which effects rupture of the closure of the container ruptured and discharge of the fire extinguishing material through the metering outlet of the device. After use, the spent container and cartridge may be quickly removed from the casing and replaced by fresh recharges.

The invention accordingly has among its objects the provision of a fire extinguisher having the above characteristics which is simple and economical to construct, easy to use and refill as well as reliable in operation, and which includes simple and effective sealing rings arranged to be forced into sealing position by the gas pressure during operation and thus to seal against loss of pressure and assure maximum fire extinguishing effectiveness.

Another object of the invention is to provide such an extinguisher wherein the collapsible container of fire extinguishing material has a relatively pliable main body which is supported in inwardly spaced relation with the wall of the main casing for adequate protection and uniform application of pressure and wherein the container also has a stiff end portion at the discharge end of the casing which cooperates with

2

the casing and the adjacent sealing ring to assure a pressure tight seal in operation without requiring tools for assembling the parts.

An additional object is to provide such an extinguisher wherein the container is supported within the casing in such manner as to leave the discharge nozzle thereof free of the casing, and wherein the discharge nozzle serves independently of the casing to maintain a rupturable closure member in sealing position on the container prior to actuation of the extinguisher.

It is also an object of the invention to provide such a fire extinguisher having a simple and effective locking device for preventing accidental actuation of the extinguisher, and in addition to provide such a locking device which is effective when removed from locking position for use as an ejector in replacing the spent gas cartridge.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawing—

Fig. 1 is a view in longitudinal section of a fire extinguisher in accordance with the invention, the view showing the parts in their positions prior to use of the extinguisher;

Fig. 2 is a view similar to Fig. 1 showing the relative positions of the parts following use of the extinguisher;

Fig. 3 is an elevational view of cap at the discharge end of the extinguishers;

Fig. 4 is an end view of the operating cap of the extinguisher and showing the locking pin in locking position;

Fig. 5 is a section on the line 5—5 of Fig. 1 showing the arrangement for releasably retaining the gas cartridge within the operating cap;

Fig. 6 is a fragmentary sectional view on an enlarged scale showing the sealing arrangement between the collapsible container and the casing;

Fig. 7 is an enlarged fragmentary section showing the discharge end of the container and the nozzle;

Fig. 8 is a detail view of the rupturable closure for the container;

Fig. 9 is an enlarged fragmentary section showing the sealing arrangement of the gas cartridge; and

Fig. 10 is an enlarged fragmentary section on the line 10—10 of Fig. 1 showing the corrugated liner which supports the container within the casing.

Referring to the drawings, which illustrate a preferred embodiment of the invention, the main

casing 15 is a generally cylindrical shell having an open forward end which is threaded at 16 (Fig. 6) and the rearward end 17 of the casing is rounded inwardly and has a central opening 18 therethrough. The casing is formed with an inwardly extending circumferential bead 20 adjacent its rearward end, and a bottom disk 22 is seated against this bead and soldered in place as indicated at 23 to seal this part of the interior of the casing. A cap 24 is threaded on the threaded end of casing 15, and it is formed with a concave circular portion providing a discharge outlet 25. The outer surface of the cap is formed with ribs or teardrops 26 to present a streamlined appearance and also to facilitate gripping thereof during screwing or unscrewing of the cap with respect to the casing.

The bottom disk 22 of the casing has a central opening 29 into which is fitted the inner end of the receiving member or socket 30 for the gas cartridge 33, the inner end of socket 30 extending through this opening 29 and being staked or peened at 34 and then soldered or welded to form a tightly sealed connection. The inner end of socket 30 is formed with a tapered throat 35 to receive the tapered neck of cartridge 33, and a piercing pin 36 having a passage 37 (Fig. 9) therethrough is set in the center of the end wall of socket 30 and extends into throat 35 for engagement with the end of cartridge 33.

The gas cartridge 33 is carried by a sleeve portion 39 of a cap 40 mounted for axial movement with respect to casing 15. As shown, the cap 40 may be readily formed of molded plastic material, and the sleeve 39 may be formed of steel having a knurled or otherwise roughened outer end portion, the cap 40 being molded on this roughened outer end of sleeve 39 to secure the two parts together. The inner end of sleeve 39 is threaded for engagement in the complementary tapped outer portion of socket 30, and the outer surface of cap 40 is shown as fluted at 41 for ready gripping during use.

The cartridge 33 is releasably retained with the sleeve 39 by a resilient locking arrangement illustrated in detail in Figs. 5 and 9. As shown, the cartridge 33 has a circumferential groove 42 therein, and the outer surface of sleeve 39 has a groove 44 therein which is spaced from the outer end of the sleeve by a distance substantially equal to the distance between the groove 42 and the rearward end of cartridge 33. This groove 44 extends completely through the wall of the sleeve at one position to form a slot 45 of limited peripheral extent opening into the interior of the sleeve. A resilient wire retainer 46 is mounted in groove 44, and it includes an inwardly bowed portion 47 which is proportioned to extend through slot 45 and snap into groove 42 when the cartridge is inserted in sleeve 39.

It will thus be seen that when cap 40 is screwed inwardly of the casing and socket 30, it will carry cartridge 33 inwardly and force it against the piercing pin 36 to release its contents within the casing. In order to prevent accidental actuation of the device, a locking pin 50 is mounted in a tangentially arranged passage 51 in cap 40, the passage 51 being so located that when pin 50 is mounted therein, it will abut the rearward end of the casing before the cartridge is in engagement with the piercing pin as shown in Fig. 1. In order to prevent loss of pin 50, it is connected with cap 40 by a suitable chain 52.

The pin 50 also serves as an ejector for removing a spent cartridge 33 from sleeve 39.

Ordinarily the cartridge can simply be manually withdrawn from the sleeve, against the resilience of retainer 46. However, if the cartridge should stick after cap 40 has been removed from the casing, pin 50 can be inserted through the central opening 53 in the outer end of the cap to force the cartridge out of sleeve 39 by expanding the retainer 46 sufficiently to move its bowed portion 47 out of the groove 42 in the cartridge.

The retainer 46 also serves to prevent the use of a cartridge not provided with the groove 42, since a cartridge formed without the groove would engage the bowed portion 47 and force the retainer outwardly into the threads on sleeve 39 and prevent insertion of the sleeve in socket 30 beyond groove 44. The retainer 46 thus prevents the use of a cartridge which is unauthorized or of inferior quality by assuring that the device will operate only with a cartridge designed to fit therein.

In order to seal against leakage of gas at the rearward end of the casing, an O-ring 55 of rubber or other suitable yieldable material is mounted between the tapered throat portion 35 of socket 30 and the tapered neck of the cartridge 33, the throat 35 being provided with an intermediate circumferential groove 56 (Fig. 9) for retaining O-ring 55. The dimensions of throat 35 are so proportioned with respect to the tapered neck of the cartridge that when the cartridge is forced inwardly of socket 30, ring 55 will be compressed as shown in Fig. 9. It will also be seen that under these conditions, a tight joint is established, with the pressure itself developing a force tending to cause tighter seating of the ring between the neck of the cartridge and throat 35, thus assuring complete sealing of this end of the casing.

A container 60 of carbon tetrachloride, chlorobromomethane or other suitable fire extinguishing material is mounted within casing 15 in position to discharge its contents through the outlet 25 when the gas from cartridge 33 is released within the casing. The main body of container 60 is formed of a relatively pliable and readily compressible material such as lead foil, with the inner end 61 of the container being of heavier and stiffer stock. For example, satisfactory results have been obtained in a lead foil container 60 of one quart capacity with the cylindrical wall of the container approximately 0.010 inch in thickness and the end wall approximately 0.040 inch in thickness.

A layer of tough paper 62, for example a paper sheet 0.005 inch in thickness, is shown as cemented to or adhesively secured over substantially the entire outer cylindrical wall of the container 60 to help in supporting and equally distributing the stresses set up by vibration and expansion of the liquid contents of the container. It is found from vibration tests that this paper layer is effective in keeping the container in its original shape and also where the unit is subjected to elevated temperatures, the paper helps in preventing the container wall from expanding outwardly as a result of expansion of its liquid contents. It is also quite desirable in preventing the container wall from creasing, puckering, or distorting in different portions as might otherwise occur under changes in room temperature and the like, the fact that the paper material is cemented or adhered over the entire cylindrical surface of the container having been found especially advantageous in this respect.

The outer end of the container 60 is formed

5

of a relatively stiff, cupped member 63 having a circumferential flange 64 which is of sufficient diameter to seat on the outer end of casing 15, and the cap 24 includes an internal shoulder 65 (Fig. 6) arranged to seat on the upper surface of flange 64 and thus to clamp this flange against the end of casing 15 when the cap is screwed tightly in position on the casing.

A nozzle 66 is screwed on a threaded neck 67 at the center of the end member 63 of container 60 and is formed to extend outwardly through the discharge outlet 25 of cap 24. The nozzle 66 has a metering discharge passage 68 therethrough, and this passage is slightly tapered to diverge in the direction of flow to impart a circular spread pattern to the spray of liquid in use for effective coverage. For example, with the passage 68 approximately $\frac{3}{8}$ inch in length and tapering from approximately 0.067 inch in diameter at its inner end to approximately 0.078 inch in diameter at its outer end, a circular spread pattern substantially 2 feet in diameter has been obtained at a distance of approximately 20 feet.

The container 60 is normally closed and sealed by a rupturable disk 70 which is held in normally sealed relation against lead gasket 71, both such parts being clamped against the outer end of neck 67 by nozzle 66. As shown in Fig. 8, the disk 70 may be scored at 72 to facilitate rupture thereof under the internal pressure of the compressed liquid when sufficient pressure is applied to the outer surface of the container.

It will be seen that the container is thus supported with nozzle 66 free of the casing and cap 24, and in order to assure adequate sealing of the casing against escape of gas pressure at its forward end, an O-ring 75 similar to ring 55 is mounted adjacent the flange portion 64 of end member 63 and between the outer surface of the container and the inner surface of casing 15. With this arrangement, as best seen in Fig. 6, when the gas pressure is released within the casing, it will act against the O-ring 75 in such manner as to force it with increasing tightness against the junction between the flange 64 and the end of casing 15, thus effectively sealing this end of the casing against escape of gas. It will thus be seen that this construction does not require a particularly tight fit for cap 24 on the casing, but prior to actuation of the device, it is advantageous for the ring 75 to be slightly compressed to center the container 60 in casing 15 and thus to assure proper seating of flange 64 on the end of the casing.

It will be noted that the container 60 is of appreciably smaller diameter than the inner diameter of casing 15, and in order to support the container in inwardly spaced relation with the casing, a liner 77 of ribbed or otherwise corrugated configuration is employed. As shown in Fig. 10, satisfactory results have been obtained with the liner 77 formed of one-sided corrugated paperboard, this material being readily rolled to the desired cylindrical shape and also possessing sufficient resilience to support and protect the container against shock and vibration such as may be encountered in transport. In addition, the corrugations of the liner provide channels 78 which extend lengthwise of the container to facilitate rapid flow of gas along the entire circumference of the container when the device is actuated by opening cartridge 33. The liner 77 terminates short of the O-ring 75, and its internal channels 79 serve to maintain uniform

6

pressure throughout the casing and also to transmit the gas rapidly to apply the desired sealing pressure against the O-ring 75.

Fig. 1 shows the complete device ready for operation, and in use the first step is to withdraw the locking pin 50 from cap 40. This cap can then be screwed inwardly on socket 30 until pin 36 has been forced completely through the sealed neck of cartridge 33, thus releasing the gas from the cartridge. Since during this inward movement of the cartridge, the O-ring 55 is forced into increasingly tight sealing relation with the neck of the cartridge and the throat 35 of the socket, the gas cannot escape outwardly but is free to pass through the passage 37 in pin 36 and into the interior of the casing. The pressure within the casing thus rapidly increases until it compresses container 60 sufficiently to burst the closure disk 70 as shown in Figs. 2 and 7, and the contents of the container will then be discharged through the passage 68 in nozzle 66, the pressure of the gas being sufficient to collapse the container and effect this discharge of its contents.

The discharge will continue at a substantially constant rate so long as any material remains within the container, since the discharge is metered by passage 68. In a typical hand type fire extinguisher in accordance with the invention, a gas pressure cartridge containing 0.3 oz. of CO₂ under 850 pounds per square inch pressure at 70° F. was used in conjunction with an inner container of the capacity 1 quart of carbon tetrachloride. A stream was produced which projected over about 25 feet and continued at an approximately constant discharge rate for about 30 seconds. It should also be noted that the container 60 should not be completely filled with liquid, in order to provide space for expansion of its contents at elevated temperatures. For example, if the capacity of the container is 1015 c. c. a safe margin is provided by charging it with only 950 c. c.

In order to recharge the device, it is then necessary merely to unscrew the caps 24 and 40 and replace the spent container and cartridge with a new container and cartridge, removal of the cartridge being facilitated as described by using pin 50 as an ejector if necessary. The recharging operation is facilitated by the arrangement as described with nozzle 66 free of the casing and mounted directly on the container to hold the closure disk 70 in sealing position. These nozzles are readily manufactured at low unit cost from molded plastic and can thus be mounted on each container at the factory and then disposed of with the spent container after use. The full containers can, therefore, be supplied as complete units each provided at the factory with its own nozzle as well as its own liner 77 and O-ring 75, and in recharging, this unit is merely slipped into place in the casing and the cap 24 screwed back in place.

It will accordingly be seen that this device is simple to construct and operate as well as highly effective and reliable in operation. The sealing arrangements with the O-rings as described offer particular advantages in the device, since with the construction disclosed, the sealing action of these rings increases with the gas pressure, thus effectively preventing loss of pressure during operation and assuring that the discharge of the fire extinguishing material will be constant and uniform during the entire operating period of the device. Furthermore, with this sealing arrange-

ment it is not necessary to screw the cap 24 in place with more than such degree of tightness as can readily be obtained by hand and without wrenches or other tools, thus facilitating assembly and recharging of the device.

The use of a corrugated liner as described also offers substantial advantages both from the standpoint of protecting the container when the device is not in use and also from the standpoint of accelerating its operation. It will also be noted that these liners are advantageous for use in storing or shipping additional containers, as well as in handling each container while it is being installed in the casing, since when the container is handled by means of the corrugated liner, it is protected against accidental denting or crushing such as might otherwise occur and which might subsequently interfere with its proper operation.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas, comprising a casing member having a discharge outlet, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, means at the opposite end of said casing from said outlet for supporting said cartridge, a cap member positioned at said opposite end of said casing for axial movement with respect to said casing, opening means within said opposite end of said casing in position to engage said cartridge for effecting release of gas therefrom upon movement of said cap member inwardly of said casing to collapse said container and cause discharge of the contents thereof through said outlet, and a stop member removably received in one of said casing and cap members in position to abut the other of said members for preventing movement of said cap inwardly of said casing except when said stop member is removed.

2. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas, comprising a main casing having a discharge outlet, means for supporting said container within said casing, a cap mounted at the opposite end of said casing from said outlet for axial movement with respect to said casing, means for supporting said cartridge in said cap for movement therewith, an opening member within said opposite end of said casing in position to engage said cartridge for effecting release of gas therefrom upon movement of said cap inwardly of said casing to collapse said container and cause discharge of the contents thereof through said outlet, and a stop pin for preventing accidental operation of said extinguisher, said cap having a transversely arranged passage therein for receiving said pin in position to abut the end of said casing and prevent inward movement of said cap when said pin is mounted in said passage, and said cap having an opening in the outer end thereof for receiving said pin to eject said cartridge from said cap following operation of said extinguisher.

3. A fire extinguisher of the character de-

scribed for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas having a circumferential groove in the outer surface thereof, comprising a casing having a discharge outlet, means for supporting said container within said casing, a cap mounted at the opposite end of said casing from said outlet for axial movement with respect to said casing, a sleeve mounted within said cap for receiving said cartridge therein, a resilient member carried by said sleeve for engagement in said groove in said cartridge to retain said cartridge releasably in said sleeve for movement with said cap, and means within said opposite end of said casing in position to engage said cartridge for effecting release of gas therefrom upon movement of said cap and cartridge inwardly of said casing to collapse said container and cause discharge of the contents thereof through said outlet.

4. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas having a circumferential groove in the outer surface thereof, comprising a casing having a discharge outlet, means for supporting said container within said casing, a cap mounted on the opposite end of said casing from said outlet for axial movement with respect to said casing, a sleeve mounted within said cap for receiving said cartridge therein, said sleeve having a circumferential groove in the outer surface thereof, said groove extending completely through the wall of said sleeve to form a slot of limited angular extent opening into the interior of said sleeve, a resilient member mounted in said groove and including a portion extending through said slot to engage in said groove in said cartridge for releasably retaining said cartridge in said sleeve for movement with said cap, and means within said opposite end of said casing in position to engage said cartridge for effecting release of gas therefrom upon movement of said cap and cartridge inwardly of said casing to collapse said container and cause discharge of the contents thereof through said outlet.

5. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas having a circumferential groove in the outer surface thereof, comprising a casing having a discharge outlet, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, a socket supported in said casing, a sleeve arranged for threaded insertion in said socket to receive and support said cartridge for movement therewith inwardly of said socket, said sleeve having a recess in the outer surface thereof extending completely through the wall of said sleeve at one position to form a slot opening into the interior of said sleeve, and a resilient retainer member mounted in said recess and including a portion adapted to extend through said slot for engagement in said groove in said cartridge to retain said cartridge within said sleeve, said retainer member being proportioned to project outwardly of said groove recess and to prevent threaded insertion of said sleeve in said socket when a cartridge formed without said groove is inserted in said sleeve.

6. A fire extinguisher of the character described for use in conjunction with a collapsible

9

container of fire extinguishing material and a sealed cartridge of compressed gas having a circumferential groove in the outer surface thereof, comprising a casing having a discharge outlet, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, a socket supported in said casing, a sleeve arranged for threaded insertion in said socket to receive and support said cartridge for movement therewith inwardly of said socket, said sleeve having a recess in the outer surface thereof extending completely through the wall of said sleeve at one position to form a slot opening into the interior of said sleeve, and a resilient retainer member mounted in said recess and including a portion adapted to extend through said slot for engagement with the wall of said cartridge to expand said member into interfering position preventing insertion of said sleeve in said socket, said groove in said cartridge in the fully assembled position of said cartridge on said sleeve being located in cooperating relation to receive said member allowing retraction thereof from said interfering position.

7. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas having a tapered neck portion, comprising a casing having a discharge outlet, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, a cartridge-receiving member mounted in the opposite end of said casing from said outlet, said member having an internally tapered throat for receiving the neck of said cartridge upon movement of said cartridge inwardly of said casing, means for effecting opening of said cartridge upon movement thereof inwardly of said throat to release said gas within said casing causing collapse of said container and discharge of the contents thereof through said outlet, and a yieldable sealing ring of substantially circular cross section mounted in said throat for compression between said cartridge and the inner surface of said throat as said cartridge moves inwardly to seal against the escape of said gas outwardly of said casing through said throat, said throat and said tapered neck of said cartridge being proportioned to position said ring entirely outwardly of the inner end of said cartridge throughout at least a major portion of the forward movement of said cartridge and to wedge said ring in place preventing dislodgment of said ring by said gas.

8. A fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing material and a sealed cartridge of compressed gas having a neck portion of reduced diameter with respect to the remainder of said cartridge, comprising a casing having a discharge outlet, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, a cartridge-receiving member mounted in the opposite end of said casing from said outlet, said member having a throat for receiving said neck portion of said cartridge upon movement of said cartridge inwardly of said casing, means for effecting opening of said cartridge upon movement thereof inwardly of said throat to release said gas within said casing causing collapse of said container and discharge of the contents thereof through said outlet, said throat having a circumferential groove in the inner surface

10

thereof intermediate the inner and outer ends thereof, and a yieldable ring seated in said groove for compression by said neck portion of said cartridge as said cartridge moves inwardly of said casing to seal against the escaping of said gas outwardly of said casing through said throat, said groove being located in said throat in outwardly spaced relation with said cartridge opening means to position said ring entirely outwardly of the inner end of said cartridge throughout at least the major portion of the forward movement of said cartridge.

9. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having a discharge outlet, said container including a relatively soft body and a relatively rigid end member having a circumferential flange thereon, means for retaining said end member within said casing and adjacent said discharge outlet, means for releasing gas under pressure in the interior of said casing to effect collapse of said container and discharge of the contents thereof through said outlet, and a yieldable sealing ring received between said casing and said container inwardly of and adjacent said flange for compression by said gas between said container and the wall of said casing to seal against the escape of gas from within said casing.

10. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having an open end, said container including a relatively soft body and a relatively rigid end member having a circumferential flange thereon of such diameter as to seat on said open end of said casing, a removable cap for said casing adapted to clamp said flange against said end of said casing, said cap having a discharge outlet therein, means for releasing gas under pressure in the interior of said casing to effect collapse of said container and discharge of the contents thereof through said outlet, and a yieldable sealing ring received between said casing and said container inwardly of and adjacent said flange for compression by said gas against the junction between said flange and said end of said casing to seal against the escape of gas from within said casing.

11. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having a discharge outlet, said container including a relatively soft body and a relatively rigid end member having a circumferential flange thereon, means for retaining said end member within said casing and adjacent said discharge outlet, means for releasing gas under pressure in the interior of said casing to effect collapse of said container and discharge of the contents thereof through said outlet, a yieldable sealing ring received between said casing and said container inwardly of and adjacent said flange for compression by said gas between said container and the wall of said casing to seal against the escape of gas from within said casing, and ribbed spacer means arranged lengthwise of said casing for supporting said container in inwardly spaced relation with the inner surface of said casing to form channels for effecting rapid and complete distribution of said gas around the circumference of said container when said gas is released within said casing, said spacer means terminating short of said sealing ring and said channels being open at both ends thereof to provide for

11

application of full pressure against said sealing ring.

12. In a fire extinguisher of the character described for use in conjunction with a collapsible container of fire extinguishing liquid and including a casing for said container having a discharge outlet and provided with means for developing pressure in the interior thereof to compress said container, means for supporting said container within said casing, a nozzle having an elongated metering passage therethrough for cooperation with said container and said outlet to effect discharge of the contents of said container through said outlet upon collapse of said container, said metering passage being tapered to diverge in the direction of flow outwardly therethrough over substantially the entire extent thereof for imparting a circular spread pattern to the liquid discharged therethrough, and means for developing pressure within the interior of said casing to compress said container and cause collapse thereof and discharge of the contents thereof through said metering passage of said nozzle.

13. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having a discharge outlet, said container including a relatively pliable body and a relatively stiff end member secured to said body, said end member having a threaded neck portion, a discharge nozzle threaded on said neck in position to extend through said outlet and having a discharge passage therethrough, means for supporting said container within said casing with said nozzle free of said casing, a rupturable disk clamped between said nozzle and the outer end of said neck to seal said container independently of said casing, and means for releasing gas under pressure within the interior of said casing to compress said container and cause rupture of said disk and discharge of the contents of said container through said nozzle.

14. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having a discharge outlet, said container including a relatively pliable body and a relatively stiff end member secured to said body, a threaded neck projecting from said end member, a nozzle threaded on said neck and having an internal annular shoulder adapted to seat on the outer end of said neck, a disk clamped between said shoulder and said end of said neck to seal the interior of said container, said disk being scored on one surface thereof to weaken the same, means for supporting said end member in said casing with said nozzle projecting through said discharge outlet, means forming a pressure tight seal between said end member and said casing, and means for releasing gas under pressure within the interior of said casing to compress said container and cause rupture of said disk along said scored portion thereof and discharge of the contents of said container through said nozzle.

15. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having a discharge outlet, said container including a relatively pliable body and a relatively stiff end member secured to said body, a threaded neck projecting from said end member, a nozzle threaded on said neck and having an internal annular shoulder adapted to seat on the

12

outer end of said neck, a disk clamped between said shoulder and said end of said neck to seal the interior of said container, means for supporting said end member in said casing with said nozzle extending through said outlet, means forming a pressure tight seal between said end member and said casing, means for releasing gas under pressure within the interior of said casing to compress said container and cause rupture of said disk and discharge of the contents of said container through said nozzle, said nozzle having a restricted passage therethrough for metering said discharge of the contents of said container, and said nozzle having a bore of greater diameter than said passage located intermediate said passage and said shoulder for receiving the ruptured portions of said disk.

16. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having an open end, said container including a relatively pliable body and a relatively stiff end member secured to said body, said end member being cup-shaped with the concave side thereof outermost and being of less diameter than the inner diameter of said casing, said end member having a circumferential flange thereon of such diameter as to seat on said open end of said casing, a removable cap for said casing adapted to clamp said flange against said end of said casing to maintain the remainder of said end member in inwardly spaced relation with the inner surface of said casing leaving an annular space adjacent the inner surface of said flange, said cap having a discharge outlet therein, means for releasing gas under pressure within the interior of said casing to compress said container and cause discharge of the contents thereof through said outlet, and a yieldable sealing ring positioned in said angular space adjacent said flange for compression by said gas against the junction between said flange and said end of said casing to seal against the escape of gas from within said casing, said end member and said casing being so proportioned with respect to each other and to said ring that said ring is relatively uncompressed prior to release of said gas to effect accurate centering of said container in said casing.

17. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a casing for said container having an open end, said container including a relatively pliable body and a relatively stiff end member secured to said body, said end member being cup-shaped with the concave side thereof outermost and being of less diameter than the inner diameter of said casing, said end member having a circumferential flange thereon of such diameter as to seat on said open end of said casing, a removable cap for said casing adapted to clamp said flange against said end of said casing to maintain the remainder of said end member in inwardly spaced relation with the inner surface of said casing leaving an annular space adjacent the inner surface of said flange, said cap having a discharge outlet therein, said end member having a threaded neck portion, a discharge nozzle threaded on said neck in position to discharge through said outlet, a rupturable disk clamped between said nozzle and the outer end of said neck to close said container, means for releasing gas under pressure within the interior of said casing to compress said container and cause rupture of said disk and discharge of the contents

13

of said container through said nozzle, and a yieldable sealing ring positioned in said annular space adjacent said flange for compression by said gas against the junction between said flange and said end of said casing to seal against the escape of gas from within said casing.

18. A fire extinguisher of the character described comprising a collapsible container for fire extinguishing material, a container for said container having a discharge outlet, said casing including a pliable cylindrical wall portion of metal foil, means for supporting said container within said casing in position to discharge the contents thereof through said outlet, means for developing pressure in the interior of said casing to effect collapse of said container and discharge of the contents thereof through said outlet, and a layer of relatively tough paper adhered to said cylindrical wall portion of said container over substantially the entire area thereof to protect said wall against changes in shape resulting from vibration of said extinguisher and to prevent distortion of said cylindrical wall portion resulting under changes in temperature.

19. A collapsible container adapted for use in a fire extinguisher of the character described containing fire extinguishing material for discharge from said casing upon the development of pressure effecting collapse of said container within said casing, comprising a relatively stiff outer end portion arranged to support said con-

14

tainer in predetermined relation with the discharge outlet of said casing, a relatively thin and pliable cylindrical wall portion of metal foil, an inner end portion of substantially thicker and more rigid construction than said cylindrical wall portion, and a layer of tough paper overlying and adhered to said cylindrical wall portion to support the same against distortion resulting from vibration or expansion of the contents of said container caused by changes in temperature.

WILLIAM M. WETZEL.
EDWARD R. BORK.

REFERENCES CITED

- 15 The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
20 676,012	Stafford	Jan. 11, 1901
937,549	Read et al.	Oct. 19, 1909
1,086,532	Huss	Feb. 10, 1914
1,207,393	Gammeter	Dec. 5, 1916
1,890,140	Badger	Dec. 6, 1932
25 1,918,191	Paulus et al.	July 11, 1933
2,066,517	Campbell	Jan. 5, 1937
2,346,183	Paulus et al.	Apr. 11, 1944

FOREIGN PATENTS

Number	Country	Date
30 13,823	France	July 13, 1911