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STORED PRESSURE FLUID MEDIUM CONTAINER CLOSURE

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Fig. 1.

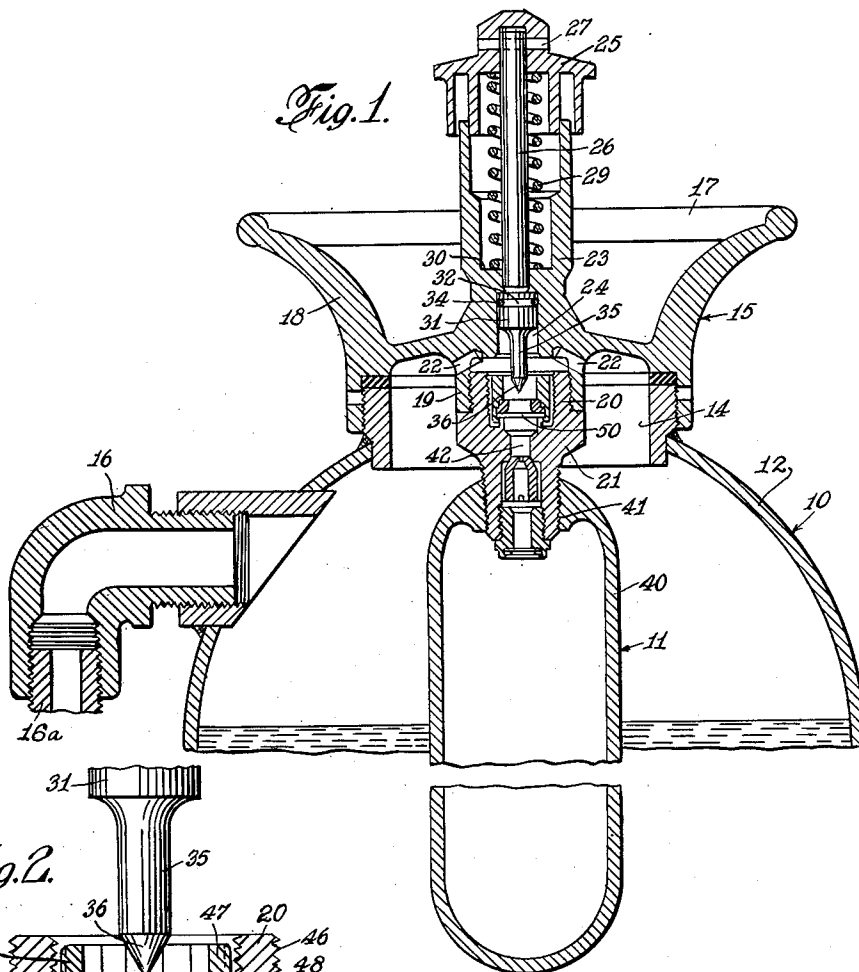
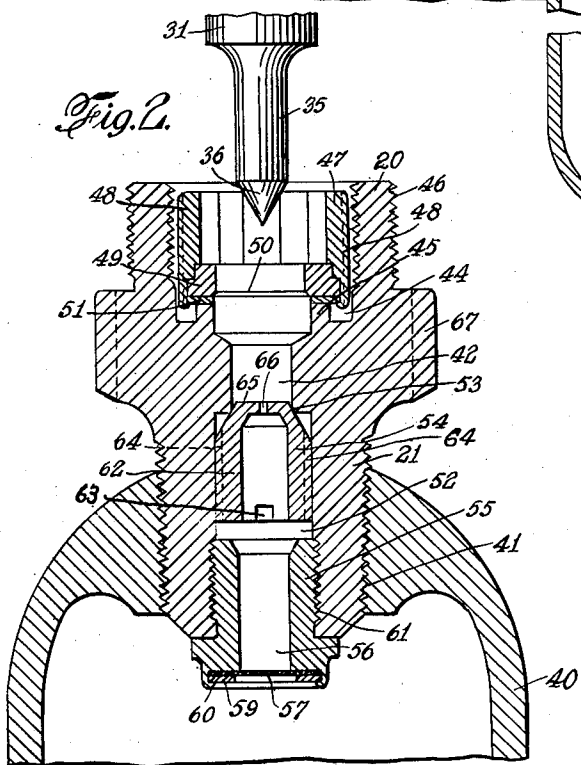


Fig. 2.



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STORED PRESSURE FLUID MEDIUM
CONTAINER CLOSURE

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Application January 31, 1950, Serial No. 141,539

8 Claims. (Cl. 169—31)

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The present invention relates to a stored pressure fluid medium container closure such as is used principally for containers to pressurize a fire extinguisher or other device containing an agent to be expelled by pressure means.

The containers are charged with a compressible fluid at a high pressure and are provided with closure means so that the fluid may be released as desired at a predetermined and controlled rate of discharge.

A container fitted with a closure in accordance with the invention is particularly suitable for use as a pressurizing vessel for a water fire extinguisher. It is important in a container of this type that a leakproof closure seal be provided as the device may not be used for some time but the stored fluid must always be available for instant action in the event of a fire. In a liquid or water extinguisher, the liquid almost completely fills the storage vessel leaving only a small air space for the pressurization of the liquid to expel it from the extinguisher. By reason of the practical incompressibility and insolubility in the liquid of the pressurizing fluid, it is desirable that the pressurizing fluid be discharged at a slow rate commensurate with the rate of discharge of the fire extinguisher. In this manner a steady pressure is had, resulting in an even flow of the fire extinguishing fluid over the entire period of discharge. Heretofore stored pressure fluid medium container closures have been provided wherein a restricting means has been placed in the neck of the container to limit the discharge therefrom. This means has not been found wholly satisfactory particularly in the charging of the containers in that either a considerable length of time or an extremely high pressure is required to introduce the recharging medium through the small orifice. Another construction has been provided, disclosed in a co-pending application, owned by the same assignee, entitled Stored Pressure Medium Container With Discharge Control, Serial No. 137,847, filed January 10, 1950, in which there has been provided a removable orifice member in juxtaposition to the seal disc.

The present invention aims to overcome the foregoing difficulties and disadvantages by providing a disc-sealed stored pressure fluid medium container closure having a limited discharge rate wherein valve means are provided for readily permitting the charging or recharging of the extinguisher at a high rate, yet in which the discharge rate is limited to a predetermined safe value.

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Another object of the invention is to provide a container closure having a predetermined discharge rate.

Another object of the invention is to provide a stored pressure fluid medium container closure which is simple and economical in manufacture, efficient in operation and durable in use.

In accordance with the invention, the foregoing objects are accomplished by providing a high pressure storage container closure having an apertured check valve arranged to readily pass fluid into the container, the check valve closing and limiting the discharge through the aperture for flow outwardly from the container. A disc seal is provided which is adapted to be opened by a puncturing member to release the pressure medium, and to automatically rupture in the event the pressure in the container exceeds a predetermined amount.

Other objects and advantages of the invention will be apparent from the following description and from the accompanying drawing which shows by way of example an embodiment of the invention.

In the drawing:

Fig. 1 illustrates a fragmentary vertical sectional view of a liquid fire extinguisher incorporating a stored pressure fluid medium container with a closure made in accordance with the invention.

Fig. 2 is an enlarged fragmentary sectional view of the upper portion of the stored pressure fluid medium container with the closure showing a puncturing member in position to rupture the frangible disc.

Referring to the drawing, there is shown in Fig. 1 a liquid fire extinguisher 10 pressurized by a stored pressure fluid medium container 11. Any liquid fire extinguishing agent such as water, carbon tetrachloride, etc., may be used in the extinguisher. The liquid fire extinguisher 10 is illustrated to show a use for the stored pressure fluid medium container 11 and includes a standard shell 12 adapted to be almost completely filled with liquid such as water or other fire extinguishing agent through a filling opening 14 closed by a conventional filling cap 15. Upon the discharge of the extinguisher, the fire extinguishing liquid is pressurized by stored pressure medium from the container 11 and expelled through an outlet elbow 16 and a discharge hose 16a through a suitable nozzle (not shown). The filling cap 15 has a hand ring 17 spaced from the body of the cap by legs 18 and is used to facilitate engaging the cap with the container

as well as for use as a carrying handle. On the underside of the filling cap 15 is a downwardly extending tubular portion 19 having its inner surface threaded to engage the upper threaded end 20 of a closure fitting or nipple 21 for the container 11. Apertures 22 are made in the wall of the tubular portion 19 for the passage of fluid from the container 11.

In order to open the stored pressure fluid medium container, puncturing means are provided in the cap member including an upwardly turned extension 23 having a passage 24 therethrough and covered by a discharge cap member 25. Within the passage 24 is slideably positioned an operating rod 26 secured to the discharge cap member 25 by a pin 27 extending through aligned openings in both parts. A spring 29 is positioned between the cap member and a shoulder 30 about the passage 24 in the extension 23 to normally urge the rod 26 outwardly from the cap member 15. At the lower end of the extension 23 the passage 24 is enlarged to receive an enlarged portion 31 of the rod 26 having an annular groove 32 thereabout adapted to receive an O-ring 34 to provide a leakproof seal between the enlarged portion 31 and the wall of the passage 24. The lower end of the enlarged portion 31 is reduced in size to provide a puncturing member 35 made with a pointed end 36 to facilitate the opening of the stored pressure fluid medium container 11.

The stored pressure fluid medium container or pressure vessel 11 is formed with a body or container portion 40 made of any suitable material such as steel to store a fluid medium under high pressure. The upper end of the container 11 is made with a threaded discharge opening 41 in which is secured the closure fitting 21 forming the neck of the container and having a fluid passage 42 extending therethrough. In alternative constructions, the closure fitting 21 may be formed integrally with the body of the container 11.

As may be seen more easily in Fig. 2, the outer end of the fluid passage 42 is enlarged as indicated at 44 and formed with an upwardly extending sealing seat 45. The outer surface of the upper end of the closure fitting 21 is threaded as indicated at 46 to engage with the downwardly depending extension 19 of the cap member 15. The corresponding inner surface of the closure member 21 is also threaded to receive a ring nut 47 having longitudinally extending filling grooves 48 and having an enlarged inner lower end to receive a washer 49. A rupturable sealing disc 50 adapted to rupture at a safe predetermined bursting pressure lower than the bursting pressure of the wall of the container 11 is positioned against the washer 49 to close the passage 42. In order to prevent leakage of fluid from the container 11 between the sealing seat 45 and the sealing disc 50, a thin deformable ring gasket 51 is interposed therebetween. The lower end of the passage 42 is enlarged to provide a valve chamber 52. A shoulder formed at the meeting point of the wall of the passage 42 and the upper wall of the valve chamber 52 is bevelled to provide a valve seat 53. A valve member 54 is freely positioned in the valve chamber 52 and loosely secured in position by a nipple 55 having a passage 56 extending therethrough. The lower end of the nipple 55 is fitted with a screen 57 having its edge held by a washer 59 and secured in position by lower inwardly turned edge 60 of the nipple. The nipple 55 is threadedly engaged with

the lower end of the valve chamber 52 as indicated at 61.

The valve member 54 preferably has a cylindrically shaped skirt portion 62 having a slotted end 63 and made with longitudinally extending filling grooves 64 for the passage of fluid between the cylindrical skirt portion 62 and the wall of the valve chamber 52. In an alternative construction, the skirt portion might be made with outwardly extending ribs instead of grooved to make the filling fluid passage. The upper end of the valve member 54 is closed as indicated at 65 and made with an orifice 66 of a size to limit the outward fluid flow through the valve member 54 to a predetermined safe value. To facilitate inserting the closure member 21 in position in the container 11, the outer surface of the closure member 21 is formed with an enlarged center portion 67 which may be provided with faces for engagement with a wrench or other tool.

The extinguisher 10 is actuated by inverting it and striking its discharge cap 25 against a surface to move the puncturing member 35 inwardly against the sealing disc 50 to release the stored pressure fluid medium to expel the fire extinguishing liquid. By reason of the limiting size of the orifice 66, the pressurizing fluid is discharged at a comparatively slow rate commensurate with the discharge rate of the liquid from the fire extinguisher. Accordingly, a constant pressure is maintained on the fluid providing an even discharge.

In recharging the container 11, the ring nut 47 is unloosened and the closure member 21 secured to a suitable filling machine, the pressurizing fluid passing through the filling grooves 48 across the sealing seat 45 into the passage 42 to unseat the valve member 54. The fluid then flows through the filling grooves 64 in the skirt portion of the valve member and through the slots 63 to fill the container 11. After the charging operation is completed, and during a discharge of the container 11, the pressure in the container 11 urges the check valve 54 onto its seat and leakage through the orifice 66 is prevented by tightening the ring nut 47 to keep the seal between the sealing disc 50 and the gasket member 51.

In the event the charged container 11 is subjected to an excessive temperature which increases the pressure of the stored fluid to an unsafe amount, the sealing disc is adapted to burst at a pressure lower than the bursting pressure of the container wall. The recoil of the container 11 is limited by reason of the restriction of the orifice 66 and there is practically no possibility of damage to property or injury to persons by reason of the bursting of the sealing disc 50.

It is thus apparent that the present invention provides a stored pressure fluid medium container closure which may be readily recharged yet which has a limited discharge rate in the event the container is opened by a puncturing member or in the event it has been subjected to a high temperature causing an increase in its internal pressure to the extent that the sealing disc 50 has been ruptured.

While the invention has been described and illustrated with reference to a specific embodiment thereof, it will be understood that other embodiments may be resorted to without departing from the invention. For example, while the check member has been described of generally

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tubular shape, it is obvious that other shapes of check member may be used such as a fiat disc in which event it may be preferable to use a spring to normally urge the valve member against its seat. Furthermore, while the aperture has been shown as positioned in the center of the check member, it is obvious that it might be positioned any place within the area encompassed by the valve seat 52 providing a fluid flow. Therefore, the form of the invention set out above should be considered as illustrative and not as limiting the scope of the following claims.

I claim:

1. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, safety means closing the passage in the closure and adapted to be opened by a predetermined container pressure below the bursting pressure of the container, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, an apertured valve member positioned to engage the valve seat during fluid flow from the inlet to the outlet as upon the discharge of the container, the valve member adapted to be held away from the valve seat by fluid flow from the outlet to the inlet as upon the charging of the container, and means to retain the valve member in operative position to engage the valve seat, whereby upon the opening of the safety means the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the aperture in the valve member.

2. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, a rupturable disc closing the passage in the closure and adapted to be ruptured by a predetermined container pressure below the bursting pressure of the container, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, an apertured valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat during fluid flow from the inlet to the outlet as upon the discharge of the container, the valve member adapted to be held away from the valve seat by fluid flow from the outlet to the inlet as upon the charging of the container, and means to retain the valve member in operative position to engage the valve seat, whereby upon the rupturing of the disc, the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the aperture in the valve member.

3. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, a rupturable disc closing the passage in the closure and adapted to be ruptured by a predetermined container pressure below the bursting pressure of the container, a reduced section of the passage wall forming valve seat means and defining inlet and outlet portions thereof and facing the inlet, an apertured skirted valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat during fluid flow from the inlet to the outlet as upon the discharge of the container, the valve member adapted to be held away from the valve seat by fluid flow from the outlet to the inlet as upon the charging of the container, the skirt adapted

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to slide in the inlet passage to guide the valve member, and means to retain the valve member in the inlet portion of the passage, whereby upon the rupturing of the disc, the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the aperture in the valve member.

4. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, a rupturable disc closing the passage in the closure and adapted to be ruptured by a predetermined container pressure below the bursting pressure of the container, a reduced section of the passage wall forming valve seat means and defining inlet and outlet portions thereof and facing the inlet, an apertured skirted valve member of cylindrical shape and having a closed upper end with the aperture therein, the cylindrical wall having a longitudinally extending fluid passage therein, the upper corner of the valve member beveled to form a surface to engage the valve seat, the valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat during fluid flow from the inlet to the outlet as upon the discharge of the container, the valve member adapted to be held away from the valve seat by fluid flow from the outlet to the inlet as upon the charging of the container, the skirt adapted to slide in the inlet passage to guide the valve member, and means to retain the valve member in the inlet portion of the passage, whereby upon the rupturing of the disc, the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the aperture in the valve member.

5. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, a shoulder about the closure passage forming a disc seat, a rupturable disc engaging the disc seat, a ring nut threadedly engaged with the wall of the closure passage to secure the disc against its seat, the disc closing the passage and adapted to be opened by a predetermined container pressure below the bursting pressure of the container, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, an apertured valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat by fluid flowing from the inlet to the outlet as during the discharge of the container, the valve member to be held away from the valve seat by fluid flowing from the outlet to the inlet as during the charging of the container, and means to retain the valve member in the inlet portion of the passage, whereby upon the opening of the safety means the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the aperture in the valve member.

6. A closure member for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, a shoulder about the closure passage forming a disc seat, a rupturable disc engaging the disc seat, a ring nut threadedly engaged with the wall of the closure passage to secure the disc against its seat, the disc closing the passage and adapted to be opened by a predetermined container pressure below the bursting pressure of the con-

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tainer, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, an apertured valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat by fluid flowing from the inlet to the outlet as during the discharge of the container, the valve member to be held away from the valve seat by fluid flowing from the outlet to the inlet as during the charging of the container, and means to retain the valve member in the inlet portion of the passage, the valve member of cylindrical shape having a closed upper end with the aperture therein, the cylindrical wall having a fluid passage therein, the diameter of the valve member slightly less than the diameter of the inlet so that the valve member is guided by the wall of the inlet.

7. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the closure of the container, a shoulder about the outlet passage forming a disc seat, a rupturable disc engaging the disc seat, a ring nut threadedly engaged with the wall of the closure passage to secure the disc against its seat, the disc closing the passage and adapted to be opened by a predetermined container pressure below the bursting pressure of the container, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, an apertured valve member positioned in the inlet portion of the passage, the valve member adapted to be engaged with the valve seat by fluid flowing from the inlet to the outlet as during the discharge of the container, the valve member to be held away from the valve seat by fluid flowing from the outlet to the inlet as during the charging of the container, and means to retain the valve member

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in the inlet portion of the passage, the valve member of cylindrical shape having a closed upper end with the aperture therein, the cylindrical wall having a fluid passage therein, the diameter of the valve member slightly less than the diameter of the inlet so that the valve member is guided by the wall of the inlet, the upper corner of the valve member beveled to form a surface to engage the valve seat.

8. A closure for a stored pressure fluid medium container having an outlet, the closure having a passage therethrough, means to hold the closure in the outlet of the container, safety means closing the passage and adapted to be opened by a predetermined container pressure below the bursting pressure of the container, valve seat means positioned about the passage and defining inlet and outlet portions thereof and facing the inlet, a valve member positioned to engage the valve seat during fluid flow from the inlet to the outlet as upon the discharge of the container, the valve member adapted to be held away from the valve seat by fluid flow from the outlet to the inlet as upon the charging of the container, means to retain the valve member in operative position to engage the valve seat, and fluid passage means by-passing the valve member and terminating inwardly of the safety means, whereby upon the opening of the safety means the outward flow of fluid pressure medium is limited to a predetermined rate depending upon the size of the by-pass fluid passage.

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