

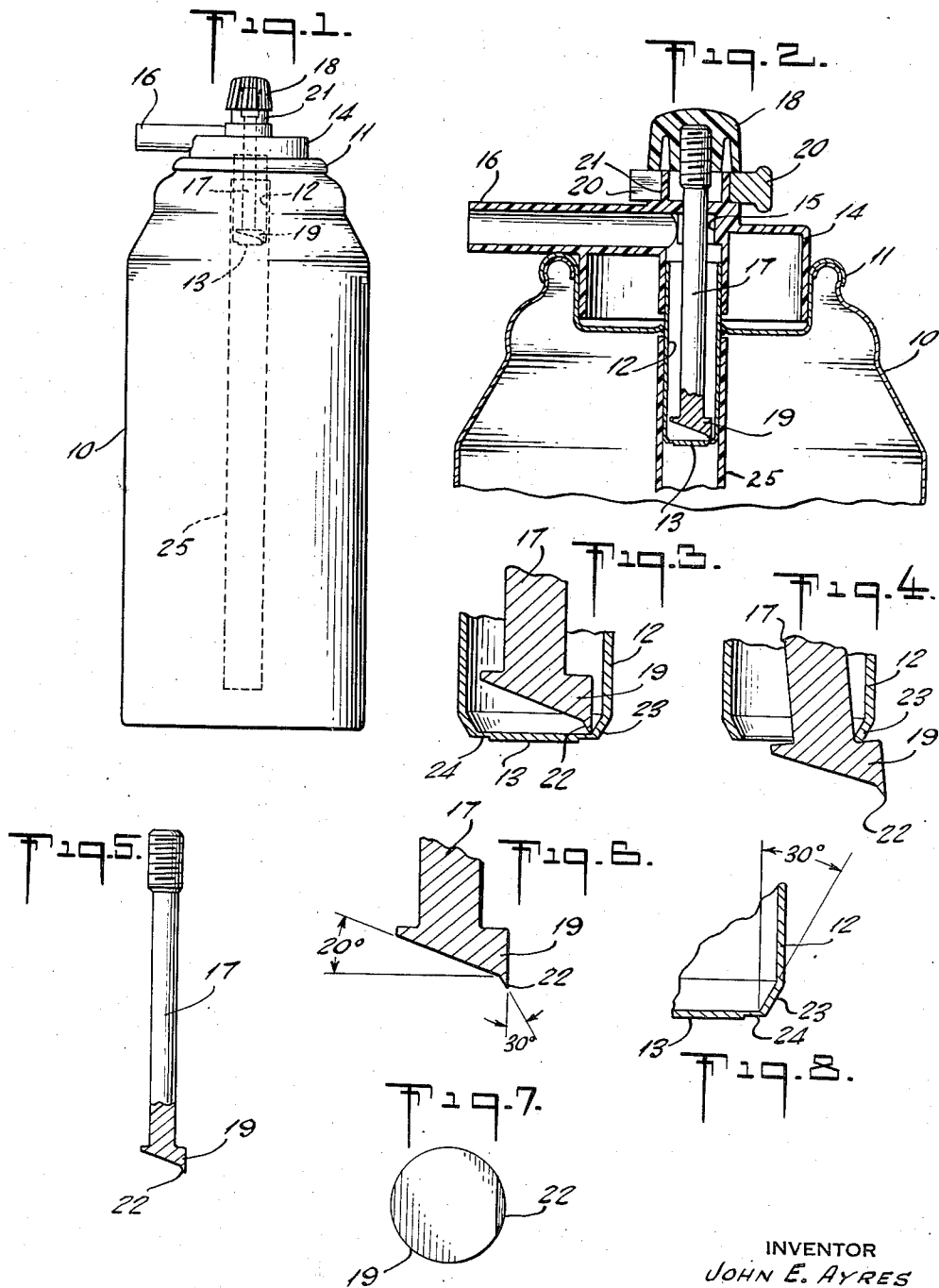
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RUPTURABLE CLOSURE FOR PRESSURIZED CONTAINERS

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RUPTURABLE CLOSURE FOR PRESSURIZED CONTAINERS

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The present invention relates to a closure device and relates, more particularly, to a rupturable closure device for use with a fire extinguisher.

An object of the present invention is to provide a rupturable closure device for a pressurized container such as a fire extinguisher, which upon operation will permit the contents of the container to be discharged rapidly and which can be made cheaply for use on containers of the throw-away type. Other objects and advantages of the invention will be apparent and best understood from the following description and the accompanying drawings in which:

Fig. 1 is a side elevation of a pressurized container having a rupturable closure device embodying the invention;

Fig. 2 is a vertical section view of the rupturable closure device illustrated in Fig. 1;

Fig. 3 is a fragmentary view in section of a portion of the closure device illustrated in Fig. 2, but on an enlarged scale;

Fig. 4 is a fragmentary view in section corresponding to Fig. 3, but with the parts shown in their positions after operation of the device;

Fig. 5 is a side elevation in partial section of a part of the closure device illustrated in Fig. 2;

Fig. 6 is a fragmentary view in section of a portion of the part shown in Fig. 5, but on an enlarged scale;

Fig. 7 is an end view as seen from the left of the part shown in Fig. 5, but on an enlarged scale; and

Fig. 8 is a fragmentary view in section of another part of the closure device illustrated in Fig. 2.

Referring to the drawings in detail, there is a container of the type commonly used for packaging and dispensing various commodities under pressure. In the case of a fire extinguisher, the container 10 may contain a dry powder, such as baking soda or other suitable fire extinguishing medium, and a suitable propellant, such as dichlorodifluoromethane ("Freon-12").

The container 10 is provided with the customary closure cap 11 which is applied thereto in the usual manner. As shown in Fig. 2, the central portion of the closure cap is depressed and there is an opening therein in which an elongated tubular shell or body 12 is secured. Portions of the tubular body extend above and below the depressed central portion of the closure cap and the tubular body is sealed to the edges of the opening in the closure cap. The lower end of the tubular body is closed by a rupturable disc or diaphragm 13 with the upper end of the body being open. If desired, the tubular body or a portion thereof may be formed integrally with the closure cap for the container.

A plastic discharge cap 14 has a central opening 15 extending through it. The opening 15 is fitted over and communicates with the upper end of the tubular body which extends above the opening in the closure cap. The discharge cap 14 fits into the depressed portion of the closure cap and is normally held in place by frictional engagement with the tubular body and the closure cap.

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The discharge cap 14 is also provided with a discharge spout 16 which communicates with the central opening therein and through which the contents of the container will be discharged when the disc 13 is ruptured.

An operating member 17 extends into the tubular body and has a stem portion which extends through the opening in the discharge cap with the top thereof projecting beyond the top of the discharge cap to a position where it may be operated manually. The top of the operating member is threaded and an operating button 18 is attached thereto.

The lower end of the operating or piercing member 17 carries an enlarged cutting head 19 which is positioned inside of the tubular body in opposing relation to the rupturable disc. In operation of the device, the cutting head is brought into engagement with the rupturable disc 13 by pressing down on the operating button 18 at the top end of the operating member and the disc is quickly severed from the tubular body. The opening 15 in the discharge cap is reduced in area at the top thereof and makes a close fit with the stem portion of the operating member at this point. This prevents discharge of the contents of the container through the top of the discharge cap and also prevents the operating member from being removed from the discharge cap and the tubular body. However, it should be noted that the stem portion of the operating member is considerably smaller in diameter than the inner diameter of the tubular body and does not interfere with the discharge of the contents of the container through the tubular body.

In order to prevent the operating member from being depressed accidentally, a forked clip 20 is located between the top of the discharge cap 14 and the bottom of the operating button 18. The clip 20 engages with ribs 21 on the top of the discharge cap and spaces the operating button from the cap a sufficient distance to prevent the cutting head from being brought into engagement with the rupturable disc 13. For operation of the device, the clip can be quickly removed.

As shown best in Figs. 6 and 7, the lower surface of the cutting head 19 is cut at an angle to the axis of the operating member and has a sharp knife-like cutting edge 22 extending at an angle to the lower surface along a portion of its outer edge. The lower surface of the cutting head is cut at an angle of about 20° from a perpendicular to the axis of the operating member and the cutting edge is cut at an angle of about 30° to the axis of the operating member. The operating member may be formed on a standard cold heading machine with the angular surfaces on the lower surface of the cutting head being formed on a standard screw machine provided with a suitable cutter.

As shown best in Fig. 8, the lower end of the tubular body 12 is bevelled inwardly at an angle of about 30° to the axis of the tubular body as indicated at 23. The lower end of the tubular body is joined to the bottom closure disc 13 by a relatively thin membrane 24 which extends around the outer edges of the disc. The tubular body may be formed on a standard eyelet machine.

In operation, the inwardly sloping portions 23 of the tubular body guide the cutting edge of the cutting head into engagement with the thin membrane 24 and permits the bottom disc to be ruptured thereby as the result of light finger pressure on the operating button. When the cutting head is moved down, the cutting edge engages with and ruptures the connection of the disc to lower end of the tubular body and the angular lower surface of the cutting head causes the cutting head to slide to one side under the lower end of the tubular body as the cutting operation is completed. In this position, the end of the tubular member engages with the rear of the enlarged cutting head, as shown in Fig. 4, and latches the operating

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member to the tubular member. This prevents the operating member and the discharge cap from being blown off of the closure cap under the force of the contents being discharged from the container.

If desired, a siphon tube 25 may be telescoped over the lower end of the tubular body 11 in the usual manner.

It will be seen from the foregoing that a closure device embodying the present invention may be mass produced on standard types of machines and as a result, production costs are kept to a minimum. Also, the tubular body may be formed as a one-piece metal part and will effectively seal the opening in the closure cap without the use of sealing gaskets or the like which are subject to deterioration. The discharge rate may be varied, if desired, by changing the diameter of the cutting head. In addition, the closure device described provides for a quick rupture and a rapid discharge of the contents of the container, which is of importance in a fire extinguisher.

It will be understood that various changes and modifications may be made in the embodiment of the invention illustrated and described herein without departing from the scope of the invention as defined by the following claims.

I claim:

1. In a rupturable closure device for a pressurized container having a tubular body defining a discharge passageway communicating with the interior of the container, said tubular body having an upper and a lower end and being open at the upper end thereof, the improvement which comprises a disc severably attached to said body and closing the lower end of said tubular body, a cutting head movably mounted within the tubular body, a cutting edge formed on a surface of the cutting head opposing said severable disc, said cutting edge being positioned for engagement with the severable disc at a point adjacent the tubular body, means for moving the cutting head and the cutting edge thereon into engagement with the disc, said means including a stem of smaller diameter than the inner diameter of the tubular body, said stem extending through the tubular body and beyond the open end thereof, and means for moving said cutting head and stem laterally with respect to the tubular body and into latching engagement with the end of the tubular body as the cutting edge engages with the severable disc.

2. In a rupturable closure device for a pressurized container, the improvement as defined in claim 1 wherein the means for moving the cutting head and stem laterally with respect to the tubular body includes an upwardly inclined surface on the cutting head, said surface being in opposing relation to the severable disc.

3. In a rupturable closure device for a pressurized container, the improvement as defined in claim 1 wherein the severable disc is formed integrally with the tubular body and a thin membrane connects the disc thereto.

4. In a closure device for a pressure container, the combination of a tubular body, said tubular body being open at one end thereof, a disc closing the other end of said tubular body and being severable therefrom, a discharge cap having an opening extending therethrough and communicating with the open end of the tubular body, an operating stem extending through the opening in said cap and into the tubular member through the

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open end thereof, said operating stem being movable with respect to the tubular body and being of smaller diameter than the inner diameter of the tubular body with a portion of said stem extending beyond the top of the discharge cap, an enlarged cutting head carried by the stem within the tubular body, said cutting head opposing the severable disc and having a cutting edge formed thereon, said cutting edge being positioned for engagement with the severable disc at a point adjacent the tubular body, and means on the cutting head for moving the cutting head laterally with respect to the tubular body and into latching engagement with the end of the tubular body as the cutting edge engages with the disc.

5. In a closure device for a pressurized container, the combination as defined in claim 4 wherein the means for moving the cutting head laterally and into latching engagement with the end of the tubular body includes an upwardly inclined surface on the cutting head opposing the severable disc and engaging therewith as the disc is severed from the body.

6. In a closure for a pressurized container, the combination as defined in claim 4 which includes means on the end of the operating stem extending beyond the top of the tubular body for engaging with and holding the discharge cap in communication with open end of the tubular body when the cutting head is in latching engagement with the tubular body, said means including a member of larger diameter than the opening in the discharge cap.

7. In a rupturable closure device for quick release of the contents of a pressurized container having a tubular member communicating with the interior thereof and forming a discharge passageway, said tubular member having a lower end closed by a rupturable membrane and being open at its upper end, the improvement which comprises a dispenser cap mounted on the open end of the tubular member and having a discharge passageway therein communicating with the tubular member, a cutting head movably mounted within the tubular member in opposing relation to the rupturable membrane at the lower end thereof, said cutting head having an inclined surface opposing the rupturable membrane and a cutting edge extending downwardly from the outer edge of said inclined surface at a point closest to the rupturable membrane, an operating stem connected to the cutting head and extending upwardly therefrom through the open end of the tubular member and through an opening in the dispenser cap, said stem being substantially smaller in diameter than the inner diameter of the tubular member and being movable laterally with respect to the sides of the tubular member by engagement of the inclined surface of cutting head with the rupturable membrane and a member secured to the operating stem at a point outside of the dispenser cap, said member engaging with and holding the dispensing cap in communication with the open end of the tubular member when the rupturable membrane is severed.

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