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PERFORATING DEVICE FOR DEFLATING A CAN

Filed March 9, 1965

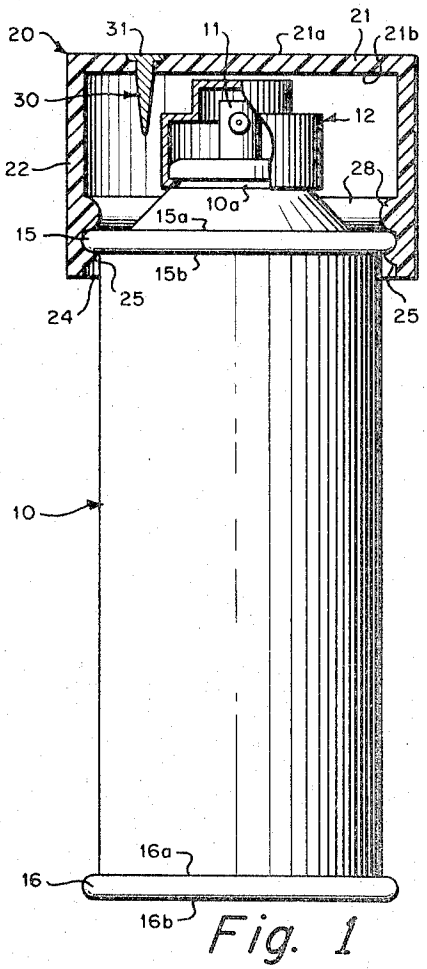


Fig. 1

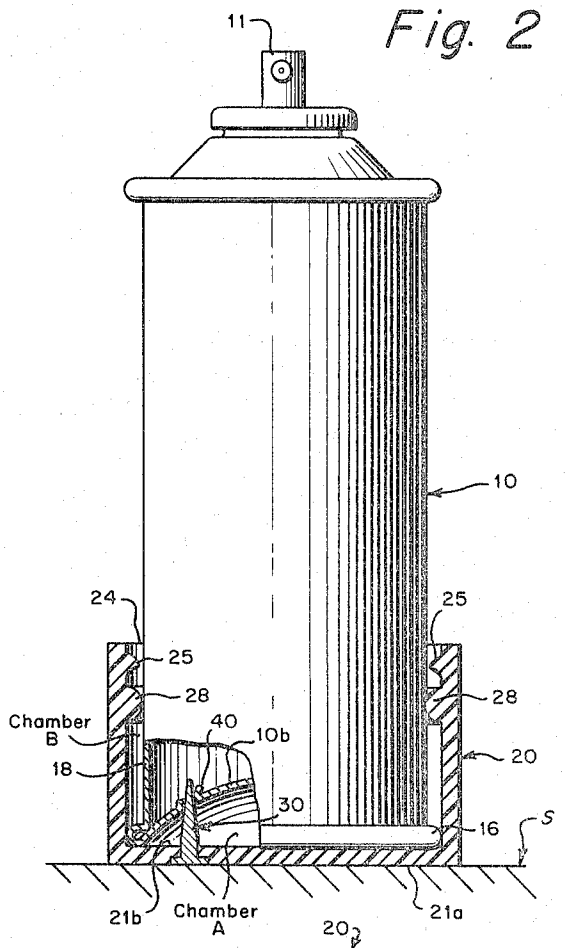


Fig. 2

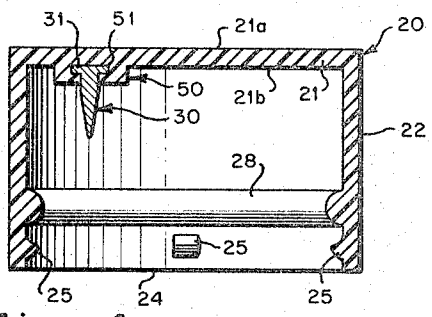


Fig. 4

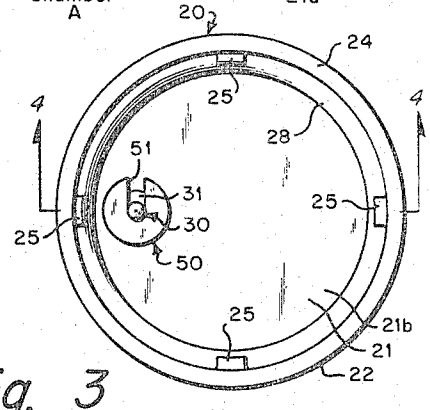


Fig. 3

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PERFORATING DEVICE FOR DEFLATING A CAN

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The present invention relates to a puncturing device and more particularly to a puncturing device for a pressurized container.

Pressurized containers, such as aerosol type dispensers, are presently being used for a variety of purposes—for shaving cream, insect repellent, hair spray, tooth paste, deodorant, paint, varnish, polish, wax, air freshner, deicer, ether car starter and whipped cream, to name several. These dispensers have been eagerly accepted by the consuming public because of the compact, convenient, uncomplex and inexpensive nature thereof but have been found additionally to be dangerous if improperly handled or if improper disposal methods are used.

Gas is sealed in these dispensers under pressure and although the product is finished and the remaining gas is bled from the container, as by maintaining the dispensing valve in an open condition, a significant residual pressure still exists within the container. Experience has shown that when these "empty" containers are placed in an incinerator for disposal purposes, the applied heat builds up the residual pressure and the container explodes like a bomb, possibly injuring and killing individuals who are nearby.

Recognizing the potential danger present in the aerosol type containers, the product manufacturer provides a warning on the label to the effect that the user should not dispose of the container in an incinerator or fire. Commercial and military consumers being on notice and aware of the hazards inherent in the disposal of the containers have taken various precautions to avoid possible injury and death. Some have adopted strict safety rules requiring personnel to bring all empty containers to a specified location where special disposal methods are used. One such method involves wrapping the container in newspaper and storing under refrigeration to lower any residual pressure. The next day, with the container still wrapped, the bottom end thereof is turned away and punctured with an appropriate opener. Then the container can be disposed of without danger.

The method described above and any other technique requiring special handling of a vacated aerosol type container is costly, inefficient, inconvenient and significantly lessens the benefits accrued in the original use thereof.

The present invention obviates the deleterious conditions enumerated above by providing a puncturing device which may be conveniently employed as the container cover during periods of non-use and which when placed at the bottom of an "empty" aerosol container may be used to puncture the same thereby rendering the container safe for convenient and confident disposal.

An object of the present invention is to provide an inexpensive, conveniently operable, simple puncturing device for pressurized containers.

Another object of the present invention is to provide a device for safely puncturing and completely vacating a pressurized vessel thereby rendering the vessel safe for disposal.

A further object is the provision of a puncturing device for a pressurized container which permits the slow, gradual and controlled escape of any residual pressure which remains in the container after the contents have been exhausted, thereby rendering the container safe for disposal.

A still further object is the provision of a device for puncturing a pressurized container and for insuring the slow, gradual and controlled escape of any residual pressure which remains in the container after the contents have been exhausted, thereby precluding the residual material contained therein from being dispersed upon the operator of the device or about the adjacent surroundings.

A still further object is to provide a device for puncturing an aerosol container and for insuring the slow, gradual and controlled escape of any residual pressure which remains in the aerosol container after the contents have been exhausted thereby precluding the residual entrained material from being dispersed upon the operator and adjacent surroundings and rendering the aerosol container safe for disposal.

A still further object is to provide a cover for an aerosol container which is alternatively usable for puncturing the bottom of the container and for insuring the slow, gradual, and controlled escape of any residual gas under pressure which remains in the aerosol container after the contents thereof have been exhausted, thereby precluding the residual entrained material from being dispersed and also rendering the container safe for disposal.

Various other objects and advantages will appear from the following description of several embodiments of the invention, and the most novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the drawings:

FIG. 1 is an elevation view of an aerosol container with certain portions removed for purposes of clarity and illustrating a vertical cross-section view of the novel container cover and puncturing device;

FIG. 2 is a view similar to FIG. 1 with the novel cap in the container-puncturing position;

FIG. 3 is a view looking inwardly of a modified cap and puncturing device; and

FIG. 4 is a cross-sectional view taken along the lines 4—4 of FIG. 3.

In the illustrated embodiment of the invention and with reference to FIG. 1, a standard commercial aerosol container or bomb generally noted at **10** is formed with a dispensing nozzle **11** which is enveloped by a protective cover **12** for insuring against accidental discharge of the contents of the container **10**. The cover **12**, in the conventional manner, releasably engages the upper neck portion **10***a* formed on the container **10**. The bottom of the container **10**, as viewed in FIG. 2 is formed with the standard concave bottom wall portion **10***b*.

An upper marginal bead **15** having top and bottom edges **15***a* and **15***b*, respectively, and a lower marginal bead **16** having top and bottom edges **16***a* and **16***b*, respectively, are formed on the container **10** in a conventional manner known in the art and function as the upper and lower terminous of the side wall **18** of the container **10**. As is understood, the external diameters of the beads **15** and **16** are equal and are greater than the outside diameter of the side wall **18**.

The novel cap and puncturing device generally noted at **20** is illustrated in FIG. 1 in the non-puncturing or cap position wherein the cap **20** engages the top of the container, as will now be described, to protect the same and to allow vertical stacking and convenient packaging.

Cap **20**, constructed of any of the well-known synthetic resins generally known as plastics such as polyethylene, or any other appropriate flexible and durable material, is shown to comprise a bottom wall portion **21** and a depending wall **22** extending thereform and defining therewith a cup shaped member, for application to both the top and bottom of the container **10**, as will be described below. The free marginal edge **24** of cap **20** includes a plurality of ribs **25** which extend inwardly of the cap wall **22**

and are circumferentially spaced thereabout for engagement with the underside 15*b* of the bead 15 when the cap 20 is positioned thereover. The ribs are shown more clearly in FIGS. 3 and 4.

The upper edge 15*a* of the bead 15 is engaged along the entire circumference thereof by an arcuate lip portion 28 when the cap 20 is positioned over the top of the container 10 with the rib 25 snapped over the bead 15 and engaging the underside 15*b* thereof. Lip 28 extends inwardly and circumferentially about the interior of the cap 20, has an interior diameter equal to the diameter of the body of the container and is integrally or otherwise formed with the depending wall 22 adjacent to and above (as viewed in FIG. 1) the rib 25 to engage the upper edge 15*a*.

The lip 28 is constructed of sufficient rigidity and extends inwardly from the wall 22 a sufficient distance to form a shoulder and preclude the cap 20 from inadvertent downward movement beyond the position of FIG. 1 when the cap 20 is applied to the top of the container 10. This is of particular importance when the cover 12 is not used to protect the nozzle 11. In the latter situation, unimpeded downward movement would cause the bottom portion 21 to engage nozzle 11 and discharge the contents of the container 10.

As viewed in FIG. 1, a cutting device 30, such as roofing nail or the like, is molded or otherwise formed in the bottom portion 21 of the cap 20 with the puncturing element thereof extending inwardly of the confines of the cap and offset from the center thereof in order not to interfere with the cap cover 12 or nozzle 11.

In the embodiment of FIG. 1 the head 31 of the cutting device 30 is formed flush with the exterior surface 21*a* of the bottom portion 21 of the cap 20 for reasons now to be discussed.

When the contents of container 10 have been exhausted the cap is ready for use in the container-puncturing mode. In this mode of operation, the cap 20 has an initial position wherein the cap is placed on the lower marginal bead 16 in the same manner as the cap was placed on the upper marginal bead 15. In this mode as distinguished from the container-covering mode the rib 25 engages the upper side 16*a* of the marginal bead 16 and the lip 28 engages the underside 16*b* of the marginal bead 16; it is this latter engagement which prevents the cap from attaining the puncturing position of FIG. 2 until an additional force is applied.

The cap 20 attains the puncturing position of FIG. 2 by the operator grasping the container 10 around the side wall 18 while the cap 20 is in the initial position, lifting the container and cap above a surface S and then sharply bringing the cap and container down into engagement with the surface S. Because of the force thereby imposed, the lower marginal bead 16 is forced beyond the lip 28 and downward against the inner surface 21*b* of the bottom wall 21 whereby the concave wall 10*b* of the container 10 is pierced at 40 by the cutting device 30.

Chamber A, formed by concave wall 10*b*, surface 21*b* and the engagement of the marginal bead 16 therewith receives the residual gas under pressure which had remained within the container 10 and which now escapes through the hole 40. If the now lowered pressure in the container and chamber A is still sufficiently high, the gas will pass beyond the marginal bead 16 and enter chamber B; this chamber is formed by side wall 18 of container 10, wall 22 of cap 20, marginal bead 16 and lip 28 which, being of the same diameter as container 10, engages the side wall 18 thereof. If the still lowered pressure in the container, chamber A and chamber B is still sufficiently high, the gas will pass the "bleeding seal" formed by the lip 28 and vent to the atmosphere. It is obvious that the heavier particles of paint, varnish, etc., which may be entrained within the pressurized gas will fall out into the chambers A and B due to the decrease in pressure (due to increase in volume) and any gas venting to the atmosphere will be relatively free of any heavier particles. The container may now be disposed of in any manner without fear of any injury resulting from incineration or the like.

In the embodiment of FIGS 3 and 4, the bottom wall 21 has a lug 50 extending inwardly of and formed integrally with the interior surface 21*b* of the bottom wall 21. A T-shaped slot 51 is formed in the lug 50 and extends partially therethrough for slidably receiving and frictionally grasping a broad-base cutting device 30 such as a roofing nail or the like.

It is within the contemplation of the present invention that the use of cover 12 is optional and can be eliminated whereby the cap 20 would provide the required protection. Also, it is understood that the cutting device 30 may be positioned in the bottom portion 21 in a manner to extend normal to the surface of the bottom wall 10*b* which is to be punctured, in lieu of the angular relationship illustrated in FIG. 2 without departing from the scope of the present invention. It is further contemplated that the lip 28 may be formed in the cap 20 by circumferentially depressing the exterior surface of wall 22 until the interior surface of the wall forms a continuous lip or dimple of the proper dimension.

It will be understood that various changes in the details, materials, steps and arrangement of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention as expressed in the appended claims:

What is claimed is:

1. A puncturing device comprising:
an elongated hollow member open at one end and comprising a solid continuous wall thereof,
closure means closing the other end of said hollow member,
puncturing means secured to said closure means and extending within the interior of said hollow member, and
a continuous lip portion on the interior wall of said hollow member and intermediate the ends thereof, said lip portion extending within the interior of said hollow member for use as a control surface.

2. The device as defined in claim 1, further including:
means on the interior wall of said hollow member positioned adjacent said continuous lip portion between said continuous lip portion and the open end of said hollow member, said means extending within the interior of said hollow member a distance less than the distance said continuous lip portion extends within said hollow member.

3. The device as defined in claim 1, further including:
means on the interior wall of said hollow member, said means formed at equidistant diametrically spaced points along the interior wall adjacent said continuous lip portion between said lip portion and the open end of said hollow member, said means extending within the interior of said hollow member a distance less than the distance said continuous lip extends within said hollow member.

4. A puncturing device comprising:
an elongated hollow member open at one end and comprising a solid continuous wall thereof,
closure means closing the other end of said hollow member,
puncturing means secured to said closure means and extending within the interior of said hollow member,
a continuous lip portion on the interior wall of said hollow member and intermediate the ends thereof, said lip portion extending within the interior of said hollow member for use as a control surface, and
a plurality of ribs on the interior wall of said hollow member positioned adjacent said continuous lip portion between said continuous lip portion and the open end of said hollow member, said ribs extending within the interior of said hollow member a distance

less than the distance said continuous lip portion extends within said hollow member.

5. In the puncturing device as set forth in claim 4,

said hollow member, closure means, lip portion and ribs being integrally formed and made of flexible material, and

said puncturing means being made of metal, extending substantially axially of said hollow member and offset from the center thereof.

6. The puncturing device as set forth in claim 5 wherein said flexible material is metal.

7. A combination protective and puncturing device for a container having an upper marginal bead adjacent the top of the container, an equally formed lower marginal bead adjacent the bottom of the container and a coninuous side wall intermediate the beads comprising:

an elongated hollow member open at one end and comprising a solid continuous wall thereof,

a closure means closing the other end of said hollow member,

puncturing means secured to said closure means and extending within the interior of said hollow member,

means on the interior wall of said hollow member positioned adjacent said open end of said hollow member, said means extending within the interior of said hollow member for snapping interlocking engagement with the marginal bead on the container, and

a continuous lip portion on the interior wall of said hollow member spaced axially inward beyond said interlocking engagement means a distance substantially equal to the thickness of the marginal beads, said lip portion extending within the interior of said hollow member for engagement with the marginal beads prior to the puncturing operation and with the continuous side wall of the container during the puncturing operation.

8. A combination protective and puncturing device for a container having an upper marginal bead adjacent the top of the container, an equally formed lower marginal bead adjacent the bottom of the container and a continuous side wall intermediate the beads comprising:

an elongated hollow member open at one end and comprising a solid continuous wall thereof,

a closure means closing the other end of said hollow member,

puncturing means secured to said closure means and extending within the interior of said hollow member,

a plurality of ribs on the interior wall of said hollow member positioned adjacent said open end of said hollow member, said ribs extending within the interior of said hollow member for snapping interlocking engagement with the underside of the upper marginal bead when the device is used as a protective cap and with the upperside of the lower marginal bead prior to the puncturing operation, and

a continuous lip portion on the interior wall of said hollow member spaced axially inward beyond said ribs a distance substantially equal to the thickness of the marginal beads, said lip portion extending within the interior of said hollow member for engagement with the upperside of the upper marginal bead when the device is used as a protective cover and with the continuous side wall of the contatiner during the puncturing operation.

9. The device as defined in claim 8 wherein the inner peripheral wall of said hollow member adjacent said closure means abuts the lower marginal bead of the container when the bottom of the container is punctured by said puncturing means.

10. In the puncturing device and protective cap as set forth in claim 9, said hollow member, closure means, lip portion and ribs being integrally formed and made of flexible material, and

said puncturing means being made of metal, extending substantially axially of said hollow member and offset from the center thereof.

11. A combination including a protective and puncturing device and a container having an upper marginal bead adjacent the top of the container, an equally formed lower marginal bead adjacent the bottom of the container and a continuous side wall intermediate the beads, the device being operable in a protective mode and a puncturing mode and comprising:

an elongated, flexible, hollow cylindrical member comprising a solid continuous wall open at one end thereof,

closure means closing the other end of said hollow member,

puncturing means secured to said closure member and extending within the interior of said container, said puncturing means offset from the center of said closure means and normal to the bottom of the container when the device is in the puncturing mode,

a plurality of flexible, annular elongated ribs on the interior wall of said hollow member positioned adjacent said open end of said hollow member, said ribs extending within the interior of said hollow member for snapping interlocking engagement with the underside of the upper marginal bead when the device is used in the protective mode and with the upperside of the lower bead immediately prior to the device being used in the puncturing mode,

a continuous, flexible circumferential lip portion on the interior wall of said hollow member spaced axially inward beyond said ribs a distance substantially equal to the thickness of the marginal beads, said lip portion extending within the interior of said hollow member for engagement with the upperside of the upper marginal bead when the device is used in the protective mode, for engagement with the underside of the lower marginal bead immediately prior to the use of the device in the puncturing mode and for engagement with the continuous side wall of the container and forming a bleeding seal therewith during the puncturing operation, and

the inner peripheral wall of said hollow member adjacent said closure means formed for abutment with the lower marginal bead of the container when the bottom of the container is punctured by said puncturing means.

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