SELF-REFRIGERATING CONTAINER

Jerald F. Goldberg, Silver Spring, Md.

Application September 3, 1954, Serial No. 454,187

10 Claims. (Cl. 62—92)

The present invention relates to the refrigeration of the contents of cans and other similar containers normally utilized in the packaging of beer, soft drinks and other commodities.

The basic object of the invention is to provide a practical and economical self-cooling container for portable liquids which will enable the self-cooling of the liquid in the container substantially uniformly throughout the container at any time prior to or subsequent to the opening of the container without the use of ice or other already pre-cooled refrigerating means.

There are many occasions, such as fishing trips, picnics, afternoon outings and the like, where it is inconvenient and impractical to obtain the use of refrigerators for cooling soft drinks, beer and the like; consequently, with my invention there is provided a hollow wall container wherein the chamber formed between the walls of the container may be filled with a compressed gas having a refrigerating effect upon expansion, such as "Freon" or the like, whereby upon exposure of the hollow wall space to the atmosphere, the contents of the container will be cooled.

An extremely important objective of the invention is in a container wherein the hollow wall space is so formed within the container that a substantially uniform cooling effect is provided on the bulk of the liquid between the ends of the container without departing from conventional container shapes or greatly increasing the cost of the container.

I am aware that other attempts have been made to provide practical, self-refrigerating containers which may be utilized as beer cans and the like; however, to my knowledge, none of these has been successful because of unequal refrigeration throughout the contents of the container, impracticality of manufacturing the container, and the incidence of exceedingly high and uncompetitive initial cost for the container.

Accordingly, it is among the objects of the present invention to provide a container which may be competitively marketed by virtue of a reasonable initial cost of the container, which will preserve the normal shape of a container such as a beer can or the like without detracting from the conventional and well known and advertised appearance of such containers, and which will create with a minimum of refrigerating substance, a substantially homogeneous cooling effect throughout the bulk of the body of the liquid within the container.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of a container made in accordance with the present invention;

Figure 2 is a cross-sectional view taken substantially along the plane of section line 2—2 of Figure 1 of the container;

Figure 3 is a cross-sectional view of the container taken substantially along section line 3—3 of Figure 2; and

Figure 4 is an enlarged detail view in cross-section of the juncture of portions of the container to one another at one end of the container.

In the drawings, the container constructed in accordance with the present invention is designated in its entirety by the numeral 10. As will be noted, the container externally appears much the same as a conventional can having a cylindrical side wall or shell 12 and at ends 14 sealing the interior of the container. Although this shape is the conventional one most found in cans, as will become apparent as the description proceeds, this particular shape is not essential to the practice of the invention, the invention being applicable to other conventional shapes as well as special shapes for containers.

In accordance with the invention, there is disposed within the body of the container 10 an inner liner or shell 16, this inner liner being concentric with the side wall or outer shell 12 of the container. As will be noted from Figure 2, the inner shell is in the shape of a Venturi tube having a narrow waist 18 and being flared outwardly from the waist towards its ends.

The liner 16 is sealingly secured at its ends 20 to the ends of the container side wall 12. Thus, the liner in effect tapers from its ends toward its center forming a progressively increasing space between the ends of the shell and the liner toward the waist or center of the shell and liner.

The preferred manner of attaching the ends of the inner shell or liner 16 to the lids or covers 14 and the ends 22 of the outer shell or side wall 12 of the container body is shown most clearly in Figure 4. As shown in this figure, the ends 22 of the side wall 12 of the container 10 are inwardly bent to form an outwardly open inwardly disposed peripheral flange 24, the lid or cover 14 at each end of the container being upwardly bent, as at 26, along its peripheral edge to form an inwardly opening channel which embraces the lower channel flange of the edge channel 24 of the container side wall 12.

Received within the channel 24 is the upper end 20 of the liner 16, this upper end 20 being inwardly bent, as at 28, and received between the flanges of the channel 24 whereby the same is sealed between the lid and the side wall 12.

To protect the contents of the container from contamination, the inner surface of the liner 16 and of the lids or covers 14 closing the ends of the container are coated with a suitable non-corroding, non-contaminating coating 30 which may be of any conventional nature.

When the container has been so assembled with the inner liner 16 disposed therein, a refrigerating gas, such as "Freon," designated by the numeral 32, is injected through a suitable opening in the container side wall 12 under pressure, the quantity of gas necessary being, of course, determined by many variables, the size of the container, and efficiency of the heat exchange surface of the liner being the primary considerations in determining the amount of gas.

Upon the injection of the gas into the chamber formed between the liner 16 and the shell or side wall 12 of the container, the injection opening is sealed immediately in any suitable manner, such as with a puncturable plastic cover, a removable soldered keystrip arrangement, such as shown at 34 in Figure 1 or any other suitable means.

In this connection, it might be noted that the opening in the side wall 12 could simply be soldered over at the conclusion of the injection of the gas since the sides of the container of conventional beer cans and the like are generally of a puncturable nature and may be so punctured by the usual beer can opener.
With the particular liner construction recited above, very little change is necessitated in the conventional manufacture of cylindrical containers of the nature shown. Further, by virtue of the Venturi tube shape of the liner, the bulk of the refrigerant is disposed adjacent the central portion of the container as opposed to the end sections of the container, whereby the refrigerating effect upon puncturing of the outer shell 12 to release the refrigerating gas is retained longest at the heart of the liquid in the can, rather than adjacent the ends thereof so that the liquid itself may assist in preserving the cooling effect of the gas by reducing to a minimum the heat exchange between the surfaces of the liquid and the lids 14 of the container.

Also, this particular shaped liner enables a complete cooling effect throughout the length of the liquid column within the container rather than just adjacent one end of the container, and the heat exchange surface of the liner encompasses the greatest possible area of surface contact with the liquid in the container.

To even further increase this heat exchange area, the liner 16 may be corrugated or otherwise broken down from a plain or smooth surface, as shown in Figure 2.

Likewise, with this construction, the center of gravity of the can 10 is made substantially identical to that of an ordinary can or beverage container.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed is new as is follows:

1. A self-refrigerating container comprising tubular outer and inner members forming a container body, means closing the ends of said body, the ends of said inner member sealingly engaging said outer member adjacent the ends of said outer member, inner member intermediate the ends thereof being spaced from said outer member forming a confined hollow wall space between the ends of said container body, and a refrigerant confined in said space at a pressure greater than atmospheric to cool the contents of the container upon release and expansion from said space.

2. The combination of claim 1, said inner member taping inwardly from its ends to its central portion.

3. The combination of claim 1, said inner member having at least one portion thereof intermediate its ends of reduced cross section thereby increasing the cross sectional area of said hollow wall space adjacent said one portion.

4. A self-refrigerating container comprising tubular outer and inner members forming a container body, means closing the ends of said body, the ends of said inner member being sealingly attached to said outer member, said inner member intermediate the ends thereof being spaced from said outer member forming a confined hollow wall space between the ends of said container body, and a refrigerant confined in said space at a pressure greater than atmospheric to cool the contents of the container upon release and expansion from said space.

5. The combination of claim 4, said inner member being concentric with said outer member.

6. The combination of claim 4, said inner member being of corrugated material.

7. The combination of claim 1, said inner member tapering inwardly from its ends to its central portion, said hollow wall space increasing in cross sectional area from the ends of said container body toward the central portion thereof.

8. A self-refrigerating container comprising a cylindrical outer shell, a top and a bottom secured to said outer shell, an inner liner in said shell and fixed at its upper and lower ends at the junctures of said top and bottom with said outer shell, so that any part of the entire outer surface of the top may be pierced by a can opener without piercing said inner liner, the part of said inner liner between its ends being spaced from said outer shell to form a confined chamber which encircles said liner and which is on the inner surface of said outer shell, an expandable refrigerant confined in said chamber and at superatmospheric pressure, and a part of said outer shell being adapted to be opened to provide a refrigerant expansion orifice to cool the container.

9. A self-refrigerating container comprising a cylindrical outer shell having open ends, an inner liner that has open ends nested with the open ends of said outer shell, a top and a bottom wall, a seam connecting the edge of said top wall with an end of said liner and said outer shell so that said top wall closes said liner, a seam connecting the edge of said bottom wall to said liner and said outer shell so that said bottom closes said liner, liner being spaced at least in part from the inner surface of said shell in order to provide a confined chamber, an expandable refrigerant under superatmospheric pressure in said chamber to provide in response to escape of the refrigerant refrigeration for the contents of the liner initiating from the exterior surface thereof toward the center of the liner.

10. The combination of claim 9 wherein said inner liner is corrugated and has at least a surface film of non-contaminating material thereon.

References Cited in the file of this patent

UNITED STATES PATENTS

2,005,247 Thompson .................. June 18, 1935
2,193,318 Floyd ....................... Mar., 12, 1940
2,413,639 Martin ..................... Dec. 31, 1946
2,536,893 Zweibach et al. ............... June 12, 1951