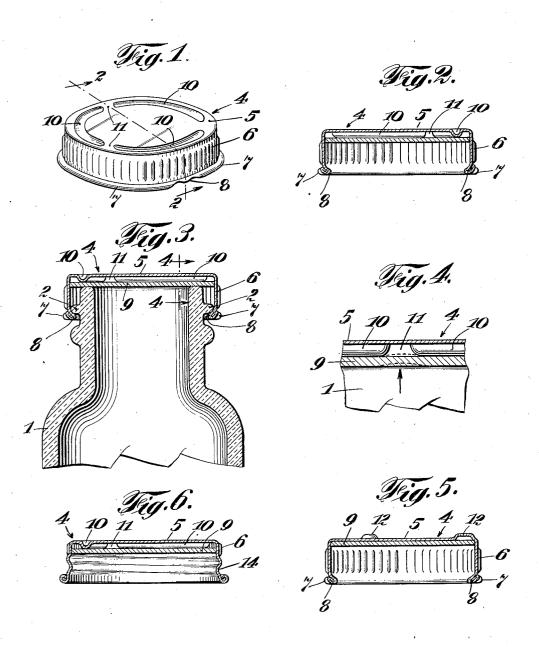
## J. C. GIBBS

CLOSURE CAP AND PACKAGE
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## CLOSURE CAP AND PACKAGE

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The present invention relates to the sealing art, and more particularly to an improved closure cap and sealed package formed thereby.

Certain products, when sealed, tend to form or generate pressure within the package; for example, a product having effervescent salts therein, such as Bromo-Seltzer, may create a pressure of sixty or more pounds per square inch, depending upon the amount of moisture in the product. Where a glass container is used, such pressures are particularly dangerous be-cause fragments of broken glass projected by the pressure within the container may, in case of breakage, do serious injury to both person and property. While glass would probably sustain a substantial internal pressure, there is always the chance of the container being broken by contact with external objects, in which case, the particles of glass will be blown outwardly with considerable force. Another objection is that the sudden release of the pressure when the cover is removed tends to blow out some of the contents of the package. These characteristics, directly attributable to pressure within the container, cause complaints by consumers and, in many cases, cause the consumers to think that the product is spoiled. Clesure caps are sold in enormous quantities, and the cost thereof must necessarily be reduced to a minimum. Any slight increase in the cost of caps is likely to cause packers to refuse to use the caps. Therefore, the solution of the above problem, in order to be practical, must not increase substantially the cost of the cap.

The present invention aims to provide a simple, inexpensive closure and package, which will eliminate the above difficulties, without increas-

ing the cost of the package.

An object of the invention is to provide an 40 inexpensive closure adapted to vent a package when excessive pressure accumulates therein.

Another object of the invention is to provide an inexpensive closure adapted to relieve the pressure in a package when excessive pressure 45 accumulates therein, without impairing the effectiveness of the seal.

Another object of the invention is to provide an inexpensive closure cap which will relieve pressure in a package and will reseal itself after 50 the pressure has been relieved.

Another object of the invention is to provide an inexpensive sealed package which will automatically vent when excessive pressure exists in it, and will automatically reseal after the pres-55 sure is relieved.

Another object of the invention is to provide an improved cap and package particularly useful for products likely to generate pressure within the package.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment 10 of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein 15

Fig. 1 is a perspective view of a preferred form of the closure cap;

Fig. 2 is a vertical sectional view along the line \_2 of Fig. 1;

Fig. 3 is a sectional view of the closure cap 20 shown in Figs. 1 and 2, applied to a container; Fig. 4 is a fragmentary sectional view, along the

line 4-4 of Fig. 3;

Fig. 5 is a sectional view of a closure cap, illustrating a slightly different embodiment of the 25 invention: and

Fig. 6 is a sectional view of the closure cap, illustrating the invention applied to a continuous

thread closure cap.

Referring again to the drawing, and more par- 30 ticularly to Figs. 1 to 4 thereof, there is shown a container 1, having screw threads or lugs 2 at the upper end thereof adapted to cooperate with similar threads or lugs on a closure cap. Preferably, the container is made of glass, although other 35 materials might be utilized. The container is sealed by means of a closure cap 4, having a cover portion 5, a depending skirt 6, with its lower edge rolled upwardly and outwardly to form a bead 7. The bead I, in the preferred form of cap, is struck 40 inwardly at intervals about the periphery thereof to provide a series of lugs 8 adapted to engage, and cooperate with, the threads or lugs 2 on the container to secure the cap to the container. A liner 9 is provided in the upper part of the closure 45 cap and is adapted to engage the rim of the con-. tainer to form a seal thereon.

In order to obtain maximum sealing pressure between the rim of the container and the cover portion of the cap, an annular groove 10 is pro- 50 vided, which concentrates the pressure on the liner over a small area and thereby increases the effectiveness of the seal. The annular groove 10, which forms a depending ridge for engagement with the liner, is preferably interrupted at inter- 55

vals, as shown at ii. The purpose of these interruptions is to provide one or more points above the rim of the container, where the liner 3 is not directly in contact with the cover portion of The ends of the depending ridge 10, adjacent the interruptions, apply sufficient pressure to seal the package under normal conditions and to hold the liner 3 against the rim of the container at the interruptions 11. The arcuate seg-10 ments of the groove 10, shown herein as three, form a series of pressure members which are spaced from each other, leaving short gaps below which less pressure is applied to the liner. When such a closure cap is applied to a product which 15 tends to form pressure within the container, the seal retains the product in sealed condition and prevents access of moisture or other extraneous matter. However, when pressure forms inside the package, while the liner is held rigidly in posi-20 tion by the spaced arcuate gripping portions 10, the portions of the liner directly below the interruptions !! have very little pressure thereon. As a result, the internal pressure within the container forces the liner upwardly at 11, as shown in 25 exaggerated form by the dotted lines in Fig. 4, permitting the pressure to leak out very gradually. The amount of distortion of the liner to relieve the pressure is so slight that, when the pressure is relieved, the liner returns to its sealed position, 30 preventing access of moisture, or other matter, to the interior of the container.

By increasing or decreasing the amount that the arcuate ribs 10 are separated, that is, the width of the gaps 11, the cap may be constructed to relieve internal pressure at five, ten, or fifteen pounds, as desired, without impairing the effectiveness of the seal against the entrance of air or moisture.

In Fig. 5, a slightly modified construction is shown, which differs from that shown in Figs. 1 to 4 in that the arcuate depressed grooves 10 are omitted and one or more upward depressions 12 are made in the cover part of the cap directly above the rim of the container. In this construction, a flat surface is presented to the liner for pressing it against the rim of the container. The pressure applied by the cover portion of the cap is relieved at one or more points by the raised portions 12, in the cover portion of the cap. By 50 the proper design of the sizes of the portion 12, the cap can be made to relieve the pressure within the package when a particular pressure is reached.

In Fig. 6, the present invention is illustrated applied to a closure cap having a continuous 55 thread 14 in the skirt thereof, adapted to cooperate with a continuous thread on the upper end of a container.

It will be understood that the present invention may be applied to other types of screw 60 closure caps, with advantage, although the preferred embodiment is particularly applicable to the types shown. In utilizing the invention, the closure cap is made by the manufacturer, with the spaced sealing grooves 10 therein and the liner 9 assembled with the cap. The packer seals the cap to the container in the ordinary way. When the cap is screwed home, an effective seal is formed. The manufacturer of the cap may 70 regulate the relative position and sizes of the sealing grooves 10 to permit the package to vent at desired pressures. Ordinarily, a single form of cap may be used for various products, because it is only necessary to relieve the pressure when 75 it has exceeded a certain magnitude, which is

generally the same, irrespective of the type of product.

It will be seen that the present invention provides an inexpensive closure cap which will vent a product at a desired pressure, without impairing 5 the effectiveness or efficiency of the seal against entrance of external atmosphere or moisture. The closure is made from a single piece of metal or of other suitable material and the improvement may be embodied in existing machines by 10 changing the construction of the tools used for forming the caps. The cap may not only be used on packages likely to develop excessive pressures, but may be used on various types of products, irrespective of whether or not the venting feature is 15 necessary with the product. The many characteristics are achieved without increasing the amount of material used for the cap and without increasing the cost of the cap. The simplicity of the closure for achieving the result is an im- 20 portant feature of the invention.

As various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention and without sacrificing its advantages, 25 it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. A screw closure cap comprising the combina- 30 tion of a cover portion, a depending skirt, a liner seated in said cap, means in said skirt for engaging threads or lugs on a container, and an impervious disc liner in said cap, said cover portion having a portion thereof pressed upwardly 35 above the rim of the receptacle to decrease the pressure on the liner at said upwardly pressed portion to permit flexing of the liner to relieve excess pressure without entrance of external atmosphere.

2. A sealed package comprising the combination of a container having thread engaging means thereon, a screw closure cap having a cover portion and a depending skirt, a disc liner seated in said cap sealing the container at the rim thereof, and means in the skirt of said cap for engaging 45 the thread engaging means on said container, said cover portion having a portion thereof pressed upwardly to decrease the pressure on the liner and to permit said liner to move out of sealing relation with the rim of the container at said upwardly 50 pressed portion.

3. A sealed package comprising the combination of a container having screw lugs thereon, a screw closure cap having a cover portion and a depending skirt, the bottom of said skirt being 55 rolled into a bead, a liner seated in said cap, and lugs formed from said bead for engagement with the lugs on the container, said cover portion having a depending annular ridge therein positioned to lie vertically above the rim of the conformation at a portion thereof to decrease the downward pressure on the liner against the rim of the container at said interrupted portion to release excess pressure within the container.

4. A sealed package comprising the combination of a container having closure engaging means at the upper end thereof, a closure cap having a cover portion and a depending skirt, container engaging means formed in the skirt of said cap 70 and a disc liner seated in said cap, the cover portion of said cap having a downwardly depending ridge directly above the rim of the container adapted to press the liner against the rim of the container, said ridge being interrupted at a por- 75

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tion thereof to provide a radially extending passage between the liner and cap extending across the rim to permit flexing of said liner to relieve pressure in the package without permitting en-

trance of air or moisture.

5. A sealed package comprising the combination of a container having screw threads or lugs at the upper end thereof, a closure cap having a cover portion and a depending skirt, an im-10 pervious disc liner in said closure cap, and means in the skirt of said cap for engaging the container, and means in the cover portion of said cap directly above the rim of the container for applying an uneven pressure to said liner over the 15 rim of the container and to hold said liner in sealing engagement with said rim, and providing a radial passage in said cap across the rim of the container, whereby the pressure on said liner is less at a certain point circumferentially of the rim 20 than at others to permit said liner to flex at said portion where less pressure is exerted thereon to relieve excessive gaseous pressure within the container.

6. A sealed package comprising a container having cap engaging means at the upper end thereof, a liner adapted to seal said container, and a closure cap having a cover portion and a depending skirt, means in the skirt of said cap for engaging the container, and an annular depending rib in said cover portion directly above the rim of the container for pressing portions of the liner downwardly against the rim of said container, said rib being interrupted at intervals to provide radial passages across the rim to permit said liner to flex upwardly at said interruptions and relieve pressure within the package.

7. A screw closure cap comprising the combination of a cover portion, a depending skirt, means in said skirt for engaging threads or lugs on a container, a liner of cardboard in said cap, and an annular depending ridge in said cover portion having substantially the same diameter as that of a rim of a container adapted to receive the cap and positioned to lie circumferentially above the rim of the container when the cap is applied thereto, said ridge being interrupted at a portion thereof to permit the liner to flex at said interruption to vent upon the formation of substantial pressures in the container.

8. A screw closure cap comprising the combination of a cover portion, a depending skirt, means in said skirt for engaging threads on a container, a disc liner in said cap, and a plurality of definitely spaced arcuate projections in said cover portion positioned to lie above the rim of a container, said projections having recesses between the ends thereof, said projections being substantially deep, thereby spacing said disc liner from said cover portion to provide passages extending radially above the rim when said cap is sealed on a container and permitting said liner to flex upwardly into said recesses and relieve excessive pressure.

9. A sealed package comprising the combina65 tion of a container having cap engaging means
thereon, a closure cap having a cover portion and
a depending skirt, container engaging means
formed in the skirt of said cap, and a series of
downwardly depending arcuate projections having recesses between the ends thereof, said recesses extending radially across the rim of the
container, said projections being annularly arranged substantially close to the outer periphery
of said cover part and adapted to press said
55 liner vertically downwardly against the rim of

the container, said recesses permitting said liner to flex upwardly at the rim of the container to relieve excessive pressure within the container.

10. A sealed package comprising in combination, a container, a screw cap adapted to be sealed on said container, a disc liner in said cap, and an annular zone in the cover of said cap adapted to press said liner downwardly at portions in contact with the rim of the container, said zone having passages between the cap and 10 the liner, said passages extending radially across the rim of the container to permit said liner to flex upwardly at the rim and facilitate venting the pressure in the container.

11. A sealed package comprising a container, 15 a closure cap having a cover portion and a depending skirt, means in the skirt for engaging said container and sealing said cap thereon, a disc liner in said cap, and an annular sealing ridge positioned vertically above the rim of the 20 container, said ridge having passages therein extending radially across the rim to permit said liner to flex upwardly in response to pressure in the package.

12. A screw closure cap comprising a cover 25 portion, a depending skirt having means for engaging a container, a liner mounted in said cap, and a sealing zone in the cover portion positioned with respect to the skirt so that it is adapted to lie circumferentially above the rim of the container and is adapted to press the liner vertically downwardly against the rim, said zone having radially extending passages therein to permit said liner to flex upwardly at portions in contact with the rim.

13. A sealed package comprising the combination of a container having screw threads or lugs at the upper end thereof, a closure cap having a cover portion and a depending skirt provided with container engaging means, a disc liner in 40 said closure cap, an annular zone in the cover portion directly over the rim of the container for applying pressure to the liner to hold it against the rim of the container, said zone having radially extending passages at portions therefor extending across the rim of the container to permit said liner to flex at said passages to relieve pressure within the container.

14. A metal closure for a container comprising a cap, to be securely fastened to the container, 50 having inverted radially extending channels across its closed end, said channels being of sufficient width and depth that a liner fitted inside of the cap will buckle upwardly into said channels upon increased internal gas pressure in the 55 container to allow escape of excess gas or vapor from the container, the liner being resilient to reseat itself against the rim of the container upon reduction of the internal gas pressure.

15. A metal closure for a container comprising a cap, to be securely fastened to the container, having a series of inverted radially extending channels in the cap crown coincident with the container rim, said channels being of sufficient width and depth that a liner fitted inside of the cap crown will buckle upwardly along its peripheral portions into said channels upon increased internal gas pressure in the container to allow the escape of excess gas or vapor from the container, the liner being resilient to reseat 70 itself against the rim of the container upon reduction of the internal gas pressure.

16. A metal closure for a container comprising a cap, to be securely fastened to the container, having a series of inverted radially ex- 75

tending channels spaced-apart in the cap crown ing a cap to be securely fastened to the container, coincident with the container rim, said channels being of sufficient width and depth that a liner fitted inside of the cap crown will buckle up-5 wardly along its peripheral portions into said channels upon increased internal gas pressure in the container to allow the escape of excess gas or vapor from the container, the liner being resilient to reseat itself against the rim of the con-10 tainer upon reduction of the internal gas pressure.

17. A metal closure for a container comprising a cap to be securely fastened to the container, said cap having a plurality of inverted channels 15 spaced-apart in the cap crown along its sealing surface with the rim of the container, said channels being of sufficient width and depth that a liner fitted inside the cap will buckle upwardly into said channels upon increased internal gas 20 pressure in the container to allow the escape of excess gas or vapor therefrom, said liner being resilient to reseat itself against the container rim upon reduction of the internal gas pressure.

18. A metal closure for a container compris-

said cap having an inverted channel in the cap crown along its sealing surface with the rim of the container, said channel being of sufficient width and depth that a liner fitted inside the cap will buckle upwardly into said channel upon increased internal gas pressure in the container to allow the escape of excess gas or vapor therefrom, said liner being resilient to reseat itself against the container rim upon reduction of the 10 internal gas pressure.

19. A closure for a container comprising a cap, to be securely fastened to the container, having channels across its closed end adapted to extend over the rim of a container, said channels being 11 of sufficient width and depth that a liner fitted inside of the cap will buckle upwardly into said channels upon increased internal gas pressure in the container to allow the escape of excess gas or vapor from the container, the liner being re- 20 silient to reseat itself against the rim of the container upon reduction of the internal gas pres-

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