July 24, 1962 F. S. PATTON 3,045,854

VENTING SEAL FOR A CLOSURE

Filed Nov. 28, 1958

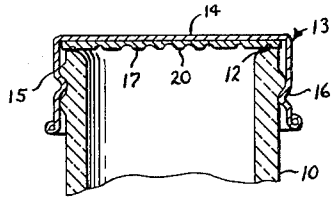


FIG. 1

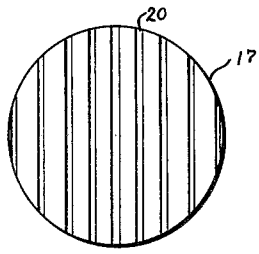


FIG. 2

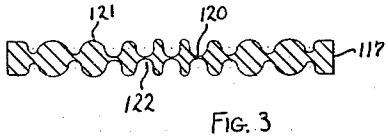


FIG. 3

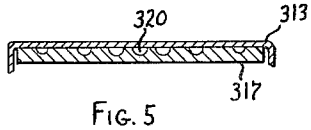


FIG. 5

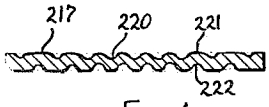


FIG. 4

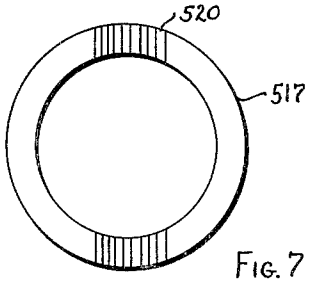


FIG. 7

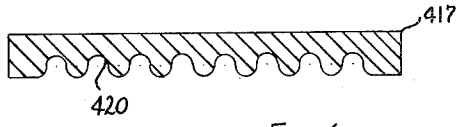


FIG. 6

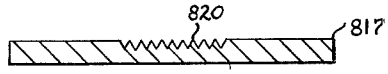


FIG. 10

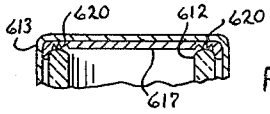


FIG. 8

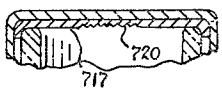


FIG. 9

INVENTOR.
FRANKLIN SEVILLE PATTON

BY

Charles L Lorenbeck
ATTORNEY

United States Patent Office 3,045,854 Patented July 24, 1962

3,045,854

VENTING SEAL FOR A CLOSURE

Franklin Seville Patton, Erie, Pa., assignor to Sterling Seal Co., Erie, Pa., a corporation of Pennsylvania

Filed Nov. 28, 1958, Ser. No. 776,837
7 Claims. (Cl. 215—56)

This invention relates to receptacle closures of the self-venting type and, more particularly, to plastic type liners for closures.

In the packaging of certain types of materials, a serious difficulty arises as a result of the tendency of such materials to liberate gases under particular conditions of shipment, storage, or the like. When such gases are liberated as a result of chemical or physical changes in the materials, the pressure within the container necessarily increases and, if the liberation of gases continues, the pressure may increase toward or past the danger point whereupon the container may be broken or the closure seal destroyed, with the result that the contents of the receptacle are spoiled or otherwise rendered worthless and persons in the vicinity of the containers are liable to injury.

Some previous liners provided internal disks in a metal cap wherein the disk had a groove on the upper side thereof which was deformable when the pressure inside the container exceeded a predetermined value.

In the present invention, the disk is made of a synthetic material, preferably a plastic. It may be made in the form of a ring. The material may be made of extruded ribbons of material having small ribs with grooves between the ribs. The disk may be put in the closure with these grooves against the inside surface of the closure so that the ribs will not be exposed to the contents. By controlling the torque exerted in tightening the closure, the internal gas pressure at which it vents can be controlled.

It is, accordingly, an object of this invention to overcome the disadvantages of previous venting type closures and, more particularly, it is an object of this invention to provide a closure which is simple in construction, economical to manufacture, and simple and efficient to use.

Another object of the invention is to provide an improved form of cushioned disk which may be used with a conventional closure cap to convert the same into a self-venting closure.

It is another object of the invention to provide a liner of the type which, when occasion arises, will vent gases under pressure from the receptacle and which will then immediately reseal the receptacle to prevent the escape of the contents of the receptacle as well as to prevent the entrance of moisture or external air into the receptacle.

A further object of the invention is to provide an improved liner for a container closure wherein the liner may be tightened to various degrees of sealing whereby various degrees of venting will be provided.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:

FIG. 1 is a cross sectional view of a liner in a closure and the closure supported on a container;

FIG. 2 is a bottom view of the liner shown in FIG. 1;

FIG. 3 is an enlarged cross sectional view of another liner according to the invention;

FIG. 4 is another view of another embodiment of a liner according to the invention;

FIG. 5 is a view of still another liner inside a closure;

FIG. 6 is a view of yet another liner;

FIG. 7 is a top view of another embodiment of the invention; and

FIGS, 8, 9, and 10 are cross sectional views of other embodiments of the invention.

Now with more specific reference to the drawing, in FIGS. 1 and 2, a neck **10** of a conventional receptacle such as a bottle is provided with the usual screw threads indicated at **11** and with an upper annular sealing surface **12** along the top thereof. A screw cap **13** has a top **14** and a depending skirt **15** with a continuous thread **16**. The cap **13** is secured on the neck **10** by cooperative relation between the threads **11** and **16** in such manner that the cap **13** can be drawn downwardly in the usual manner to compress a cushion liner disk **17** between the top and the sealing surface **12**, as is well understood in the art. It will be understood that instead of using a continuous thread type of cap and a bottle neck or jar having a similar finish, a lug type cap may be employed and the jar provided with the well known "amerseal" finish.

The cushion disk **17** preferably comprises a sheet of plastic material such as vinyl plastic having resilient properties and having the properties of being resistant to acid and various other chemicals. The cushion liner disk **17** is cut in the form of a disk to fit inside the screw cap **13** and the disk **17** is provided with a plurality of spaced grooves **20** extending laterally across the inner side of the disk **17** and parallel to a diameter thereof. The grooves **20** are spaced near together at the center of the disk **17** and have wider spacings as they extend outwardly therefrom so that an even pressure will be provided on any unit area of the disk **17**. That is, the convolutions are narrow at the center and wider at the outside as shown. The disk **17** is smaller than the closure so that there is a clearance around the peripherad edge of the disk **17** and the inside periphery of the closure.

In FIG. 3, another embodiment of the invention is shown wherein a disk **117** is in the form of grooves **120** which are formed on each side of the disk **117**. Crests **121** of the grooves **120** on both sides thereof are on a vertical line from each other. The crests **121** will be distorted when the closure is tightened, thus closing the grooves **120**. Thus, by tightening or loosening the closure, a lesser pressure thereon will provide a venting by reopening the grooves **120** due to fluid pressure.

The grooves **120** can be made closer together or further apart. They will normally be made further apart to accommodate viscous materials and closer together for more fluid materials so that if any of the viscous materials or fluid materials, as the case may be, gets into the convolutions, it will be forced out by the gases. The spacing of the grooves **120** will be between .005 inch and .060 inch. The spacing of the grooves **120** further out will be between .060 inch and .100 inch.

In the embodiment of the invention shown in FIG. 4, grooves **220** are formed on both the upper and lower sides of a disk **217**; however, the crests **221** and the grooves **220** above and below are not opposite each other but in a staggered plane so that a groove above overlies a crest below. Thus, the crest on one side is directly opposite a root **222** on the other side.

A disk **317** in FIG. 5 is similar to that shown in FIGS. 1 and 2; however, grooves **320** are placed on the upper side of the disk **317** with the grooved side adjacent the inner side of a closure **313**.

A disk **417** shown in the embodiment disclosed in FIG. 6 is similar to those shown in FIGS. 1, 2, and 5. In FIG. 6, however, grooves **420** are evenly spaced across the disk **417** whereas in FIGS. 1, 2, and 5, the grooves are closer together at the center and wider at the outside of the disk.

FIG. 7 shows a ring disk **517** made of resilient mate-

rial such as vinyl plastic with saw tooth edges or grooves **520** running laterally across the center of the disk **517** parallel to a diameter thereof. The disk **517** is adapted to seal against the annular sealing surface around the outlet of a receptacle. The grooves **520** are compressed so that gas cannot escape at normal pressure but will be released when the pressure therein reaches a predetermined value. The pressure at which venting occurs is detrmined by the torque by which the disk **517** is tightened.

A disk **617** in FIG. 8 is round in shape with the outer edges rolled down so as to form a convex side to receive the receptacle. When a screw cap **613** is turned down, grooves **620** are formed laterally on the outer edge and underside of the disk **617** parallel to a diameter to form a vent on an annular sealing surface **612** of the receptacle.

The embodiment of the invention shown in FIG. 9 discloses a venting insert for a closure similar to that shown in FIG. 8; however, grooves **720** are formed laterally across the center and underside of a disk **717** parallel to a diameter and as distinguished from FIG. 8 which shows the grooves in the center.

FIG. 10 shows grooves **820** in a disk **817** to obtain a sealing and venting cap. The grooves **820** are formed on the side adjacent the closure and extend laterally across the central portion of the disk **817**.

In other words, the disclosure herein shows three basic types of embodiments of the invention. First, a smooth top with grooves and crests on the bottom as shown in FIGS. 1, 2, 6, 8, and 9; second, a smooth underside having the grooves and crests in the outer side thereof as shown in FIGS. 5 and 10; and third, grooves on both sides as shown in the embodiments in FIGS. 3, 4, and 7.

The foregoing specification sets forth the invention in its preferred practical forms but it will be understood that the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In combination, a closure for a container and a container, said closure comprising a cup shaped member, a sealing disk in said closure, said disk being made of relatively thin, flexible resilient material, laterally spaced parallel grooves formed in said disk on both sides thereof, said grooves completely traversing said disk, one side of said disk resting on said container around the opening therein, and means on said closure forcing said disk tightly against said container whereby said disk is compressed between said closure and said container, said disk being adapted to be distorted adjacent said grooves by gas adapted to be generated in said container whereby the material of said disk is forced away from said container, providing a path for said gas to escape.

2. The combination recited in claim 1 wherein said grooves are spaced further apart at two diametrically opposite sides of said disk.

3. The combination recited in claim 2 wherein the bottoms of said grooves on opposite sides of said disk are disposed directly opposite each other.

4. The combination recited in claim 2 wherein the bottom of each said groove on one side of said disk is directly opposite the space between two adjacent said grooves on the opposite side thereof.

5. In combination, a closure for a container and a container, said closure comprising a cup shaped member, a sealing disk in said closure, said disk being made of relatively thin, flexible resilient material, laterally spaced parallel grooves formed in said disk on both sides thereof, said grooves completely traversing said disk, one side of said disk resting on said container around the opening therein, and means on said closure forcing said disk tightly against said container whereby said disk is compressed between said closure and said container, said disk being adapted to be distorted adjacent said grooves by gas adapted to be generated in said container whereby the material of said disk is forced away from said container, providing a path for said gas to escape, said grooves being V-shaped and the spaces between said grooves being V-shaped.

6. The combination recited in claim 5 wherein several of said grooves are formed parallel and adjacent each other and extending across as chords on one side thereof, the surface of said disk adjacent said grooves being smooth.

7. The combination recited in claim 6 wherein said disk is made in the form of a ring with flat overturned edges.

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