

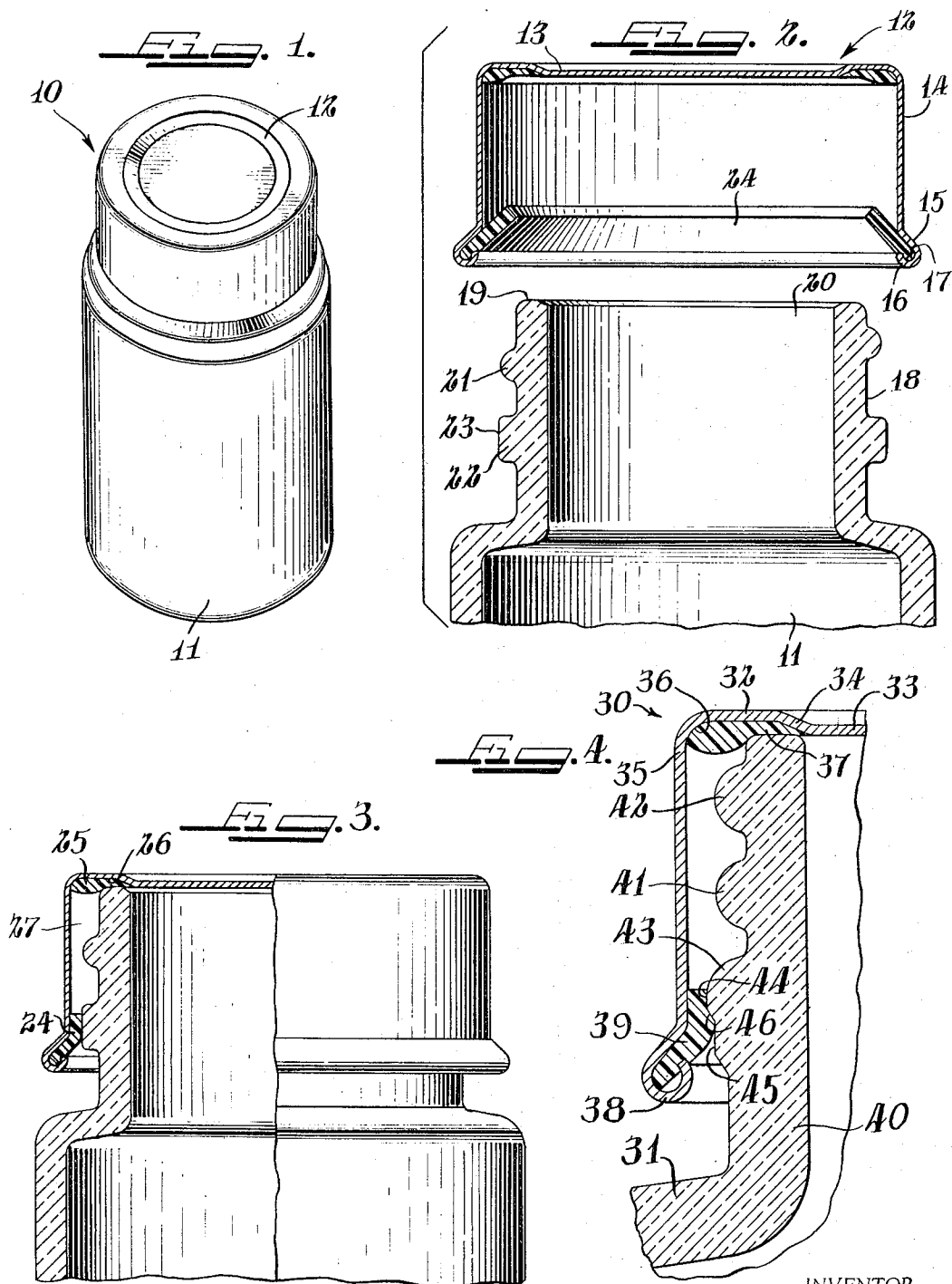
Feb. 21, 1967

R. C. OWEN

3,305,120

DEEP SLIP-ON CAP

Filed June 4, 1965



INVENTOR.  
RONALD C. OWEN

BY  
Greist, Lockwood, Greenawalt & Dewey  
Attys.

1

3,305,120

DEEP SLIP-ON CAP

Ronald C. Owen, Harwood Heights, Ill., assignor to Continental Can Company, Inc., New York, N.Y., a corporation of New York

Filed June 4, 1965, Ser. No. 461,396

8 Claims. (Cl. 215-40)

This invention relates to closure assemblies in general and more specifically deals with a new and improved deep slip-on type cap having a combination double seal for hermetically sealing the open top of a container.

Double sealed caps, as such, are not in and of themselves completely new to the field of closure assemblies. In the past, formation of one of the seals has relied to a large degree upon external deformation of the skirt portion of the closure cap either to obtain the required grip on the sides of the container or to establish an effective seal or both. Oftentimes, it is impossible in high speed production to conveniently accomplish the deforming step, especially when the container being capped is disposed within a chamber to subject the contents to the usual high vacuum. When additional structure such as thread means or the like are located on the finish of the container for subsequent use when the deep slip-on cap is removed, the formation of a combination double seal at the required high speeds becomes virtually impossible. The importance of an easily established double seal on a container will become manifest upon consideration of a full description of the unique structural arrangement of the present invention which is given below.

It is, therefore, an object of this invention to provide a new and improved slip-on closure adapted for application to a container having thread means thereon.

It is a further object of this invention to provide a slip-on cap having a double seal for co-operation with a container, the double seal consisting of a side seal and top seal.

Still a further object of this invention is the provision of a double sealed deep slip-on cap in combination with a container finish having means associated therewith for co-operation with a second type of closure cap to be applied after the double sealed deep slip-on can has been removed.

Further and fuller objects will become readily apparent when reference is made to the accompanying drawings wherein:

FIG. 1 is a perspective view of a container having the deep slip-on cap of the present invention applied thereto;

FIG. 2 is an enlarged fragmentary cross sectional view of the container of FIG. 1 with the cap also shown in cross section poised above the container finish in position for application thereto;

FIG. 3 is a view similar to FIG. 2 with the deep slip-on cap applied to the container with one half of the container and closure cap assembly being shown in cross section and the other half in full section; and

FIG. 4 illustrates an enlarged half section similar to that of FIG. 3 however having a modified finish.

Referring now to FIG. 1, reference numeral 10 indicates a closure assembly embodying the principles of the present invention including a container 11 and deep slip-on closure cap 12. As is best seen in FIGS. 2 and 3, the closure cap 12 is of the same general design as known forms of closure caps, having a top panel portion 13 which curls at its marginal edges into a depending skirt portion 14. The lower extremity of the skirt 14, which is of substantial length compared to existing caps of like size, extends outwardly in a generally frusto-conical manner as illustrated at 15, curling inwardly as at 16 to define an annular

2

groove 17 opening towards the finish 18 on the container 11.

The container finish 18 includes an annular rim 19 defining the perimeter of the container mouth 20. Positioned immediately below the annular rim 19 is provided suitable means to facilitate removable means for attachment of a dispensing cap, nozzle or the like. In the present case, the means consists of threads 21 adapted to receive a co-operating closure cap, such as a spray cap, nipple or the like provided with co-operating threads to be applied after removal of the slip-on cap 12. Immediately below the thread means 21 is provided an annular continuous sealing ring 22 having a cylindrical peripheral portion 23 adapted for co-operation with the closure cap 12 in a manner to be described below.

The annular groove 17 formed by the curled end of the skirt 14 receives a sealing gasket 24 which extends continuously around the lower margin of the skirt and consists of an elastomeric or plastomeric endless member of generally rectangular cross section. As seen in FIG. 2, in the free state, the gasket 24 projects radially inwardly so that the inner diameter as measured at the smallest point is somewhat less than the outside diameter 23 of the sealing ring 22.

When the closure cap 12 is applied, as shown in the cross sectional view of FIG. 3, substantial interference between the sealing ring 23 and the side seal 24 carried in the closure cap 12 is established. Since the inside diameter of the seal 24 is greater than the diameter of the sealing ring 23, this causes the sealing ring 24 to develop substantial tension as it is expanded during its passage over the sealing ring 23. The inside diameter of the skirt 14, when compared with the diameter of the sealing ring 23, is such that the differential diameter is somewhat less than the thickness of the sealing ring 24, resulting in compressive forces being applied to the outside of the seal 24 to urge it into contact with the sealing ring 23. Accordingly, the seal 24 is under both compression and tension to develop substantial interference which is of sufficient magnitude and direction so as to hold the closure cap on the container rim 19.

The direction of the force developed by the interference of the side seal 24 with the sealing ring 23 holds the top panel 13 on the rim 19 defining the container mouth 20. In closure designs wherein the container 11 is evacuated, atmospheric pressures acting on the top panel 13 assist the force developed by the side seal to hold the cap firmly on the container 11, so long as the hermetic seal is retained to keep the vacuum intact.

In the present design, the side seal alone is sufficient to maintain a proper hermetic seal. Problems of another type have been encountered when a side seal alone is used for hermetic sealing and coacts with the container in spaced relation to the rim in that the container contents have a tendency to collect intermediate the seal ring 23 and the rim 19 on the outside finish which is undesirable for two reasons. First, it is obvious that subsequent removal of the cap 12 permits any of the contents collected on the exterior of the finish to fall on the neck of the container or on the surface supporting the container which is aggravating to the usual homemaker. Secondly, when the container finish is provided with threads, as is the case in the container illustrated, the tendency of the container contents to collect on the threads not only presents a poor appearance when the cap is removed but is objectionable as it presents an unsanitary appearance.

The problems and objections raised by the use of a side seal along with a container finish such as that shown, is effectively obviated by the top panel gasket indicated generally at 25 and serving to confine the contents within the container proper. The top panel gasket 25 may take

3

various forms and be of any suitable material such as the conventional plastomeric or elastomeric materials presently used in top seal types of caps. If desired, a gasket recess 26 may be provided at the marginal edge of the top panel or at the intersection of the skirt and top panel to act as a well for the gasket material and insure snug reception of the container rim 19.

The method of applying the cap 12 to the container 11 may include the evacuating of the container 11 if desired, and then directly applying the cap with a press-on motion to expand the seal 24 and simultaneously cause it to be squeezed between the sealing ring 23 and the container skirt 14. This technique results in an effective seal being established and sufficient holding force developed to maintain the cap positioned on the container as shown in FIG. 3 without requiring additional holding means. Simultaneously with the capping, the rim 19 is embedded in the top seal 24 causing the plastomeric material to conform with an irregularities or the like on the container rim 19. In this manner, a hermetic seal is established precluding the container contents from escaping into the space 27 between the top and side seals.

Referring to FIG. 4, reference numeral 30 indicates a modified form of the invention including a container 41 shown fragmentarily in cross section and a deep slip-on cap 32 also shown in cross section. The deep slip-on cap 32 is like that of FIGS. 1-3 including a top panel portion 33 which is depressed at the center to form a stacking panel. In forming the depressed central portion, a shoulder 34 is formed on the underside which forms with the inner peripheral surface of the skirt 35, an annular gasket channel or groove 36. A gasket 37, of the same design as that described in conjunction with FIGS. 1-3 may be provided in the channel. A gasket of the type described in the patent to Zipper No. 2,841,304 is particularly well suited for this application. The lower margin of the skirt 35 is rolled at its lower edge into a curled end 38 to clamp a cut ring gasket 39 in the manner described in conjunction with the embodiment of FIGS. 1-3.

The container 31 is provided with a finish portion 40 having threads 41 and 42 around the outer surface. The threads 41 and 42 may be of any desired type capable of removably receiving a cap once the slip-on cap of the present invention has been removed. For example, threads 41 and 42 may be shaped to accommodate a cap carrying a dispensing nozzle such as a baby bottle nipple or the like. A sealing ring portion 43 is formed on the lower part of finish 40 below the threads and is provided with a cylindrical portion 44 of a diameter equal to or greater than the major diameter of the threads 41 and 42. A cylindrical portion of reduced diameter 45 on the sealing ring 43 joins the cylindrical portion 44 through a frusto-conical surface 46 which converges in a direction away from the threads 41 and 42.

When the deep slip-on cap 32 is pressed onto the container finish 40 in the manner described above with respect to the cap 12, a hermetic seal is established as the rim of the finish engages the gasket 37. Simultaneously and in a similar manner, a hermetic seal is formed by engagement of the cut ring gasket 39 with the sealing ring 43 on the container finish 40. The ring is squeezed between the skirt 35 and the cylindrical surface 44 of the sealing ring 43, such action occurring in the last stages of cap travel thereby permitting the maximum amount of air to escape from the head space of the container.

As the cut ring is wedged between the circumferential surface 44 of the sealing ring 43 and the skirt 35, the cap is forced to the home or seated position on the container finish, a portion of the cut ring extrudes radially and axially into engagement with the frusto-conical surface 46 to exert a wedge-type locking action holding the cap to the container. The development of forces along the frusto-conical surface serves to continuously urge the cap downwardly on the container finish while simultaneously adding to the total length of the sealing surface.

4

Obviously, in the event of failure of either seal in the above described caps, the vacuum within the container is not lost which in the single seal cap would permit air to enter the container causing deterioration of the contents. Accordingly, the deep slip-on cap will stand an extraordinary amount of abusive handling without loss of the container seal. In addition, due to the disposition of the elastomeric side seal between the container finish and the container cap, an effective protective cushion is formed to absorb any blows or impacts applied to the container cap. The added benefit of delaying the hermetic seal until the final increment of cap travel is also beneficial to obtain maximum vacuum and prevent pumping.

Upon a consideration of the foregoing, it will become obvious to those skilled in the art that various modifications may be made without departing from the invention embodied herein. Accordingly, any such limitations should be imposed as are clearly indicated by the spirit and scope of the appended claims.

I claim:

1. A deep slip-on cap particularly adapted for use in capping containers having screw-type thread means adjacent a rim portion and a sealing rim disposed below said thread means, said deep slip-on cap including a top panel having an annular skirt portion around the marginal edges thereof, said annular skirt portion being of long axial length and adapted to overly said thread means in spaced relation thereto, said skirt portion having the lower marginal edge curled inwardly to define an annular groove opening inwardly and upwardly towards said top panel, an endless gasket of generally rectangular cross sectional configuration fluid tightly clamped in said annular groove and adapted for engagement with said sealing ring on said container to seal said cap around the lower marginal edge of said skirt while simultaneously assisting in retaining said cap on said container, and an annular layer of plastomeric material disposed adjacent the intersection of said top panel with said skirt, said annular plastomeric layer being adapted to receive the rim of said container to seal the container contents from said screw-type thread means whereby said thread means will be maintained in a clean condition for subsequent use.

2. In combination a container having an open mouth formed by an annular sealing rim, thread means formed below said annular sealing rim and being adapted for co-operation with a closure, a continuous sealing ring disposed below said thread means, a deep slip-on cap received over said mouth and being applied to said container with press-on type application, said cap having a top panel delineated at its peripheral margin by a depending annular skirt portion, said skirt portion having an annular groove opening radially towards the center of said sealing ring and clampingly receiving an annular gasket, said gasket extending radially into engagement with said sealing ring fluid-tightly to seal the lower margin of said skirt portion to said container while simultaneously holding said cap on said container, and an annular gasket disposed between said rim and said cap above said thread means thereby to isolate said thread means from the container contents while said annular gasket isolates said thread means from the ambient.

3. The combination of claim 2 wherein said annular gasket is squeezed between said skirt and said sealing ring, and said annular gasket is lesser in diameter than said sealing ring.

4. In combination, a container and closure for press-on application to said container, said container having a relatively wide annular mouth formed by an annular rim, thread means formed below said rim and a continuous sealing ring formed on said container below said thread means, said continuous sealing ring having a portion thereof frusto-conical contour, said cap including a top panel overlying said mouth and having an annular skirt depending from the marginal edge of said top panel and overlying said thread means in spaced relation thereto, an

5

annular groove formed in said skirt and opening inwardly and upwardly towards said top panel, an endless gasket clamped in said annular groove and disposed in sealing engagement with said sealing ring on said container thereby to seal said cap around the lower marginal edge of said skirt, said endless gasket sealingly engaging said frusto-conical portion thereby continuously to urge said cap downwardly on said finish, and a seal interposed between the rim of said container and said top panel adjacent said skirt portion to establish a second seal with the rim of said container thereby precluding the container contents from reaching said thread means.

5. The container and closure cap defined in claim 4 wherein a circumferential portion of said sealing ring is greater in diameter than the major diameter of said thread means to reduce interference with said endless gasket on cap application.

6. In combination a container having an open mouth formed by an annular sealing rim, thread means formed below said annular sealing rim and being adapted for cooperation with a closure, a continuous sealing ring disposed below said thread means, said continuous sealing ring including a cylindrical circumferential surface having one end adjacent said thread means and the other end adjoining a frusto-conical surface, a deep slip-on cap received over said mouth and being applied to said container with press-on type application, said cap having a top panel delineated at its peripheral margin by a depending annular skirt portion, said skirt portion having an annular groove opening radially towards the center of said sealing ring and clampingly receiving an annular gasket, said gasket extending radially into engagement with said cylindrical and frusto-conical surfaces on said sealing ring to seal the lower margin of said skirt portion to said container while simultaneously urging said cap downwardly on said container, and an annular gasket disposed between said rim and said cap above said thread means thereby to isolate said thread means from the container contents while said annular gasket isolates said thread means from the ambient.

6

7. In combination a container and a deep slip-on cap, said container having screw-type thread means disposed adjacent a rim portion and a sealing rim disposed below said thread means, said sealing rim including a circumferential portion of cylindrical shape merging with a frusto-conical portion converging in a direction away from said thread means, said deep slip-on cap including a top panel having an annular skirt portion of substantial axial dimension around the marginal edges thereof, said annular skirt portion having the lower marginal edge curled inwardly to define an annular groove opening inwardly and upwardly towards said top panel, an endless gasket of generally rectangular cross sectional configuration clamped in said annular groove and disposed in engagement with said cylindrical and frusto-conical surfaces on said sealing ring on said container to seal said cap around the lower marginal edge of said skirt while simultaneously urging said cap downwardly on said container, and an annular layer of elastomeric material disposed adjacent the intersection of said top panel with said skirt, said annular elastomeric layer being adapted to co-operate with the rim of said container to seal the container contents from said screw-type thread means whereby said thread means will be maintained in a clean condition for subsequent use.

8. The container and deep slip-on cap of claim 1 wherein said cylindrical surface on said sealing ring is at least equal in diameter to the major diameter of said thread means.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

35	2,365,737	12/1944	White	215—40
	2,523,930	9/1950	Unke	138—96
	2,841,304	7/1958	Zipper	215—40

JOSEPH R. LECLAIR, *Primary Examiner.*

40 D. F. NORTON, *Assistant Examiner.*