

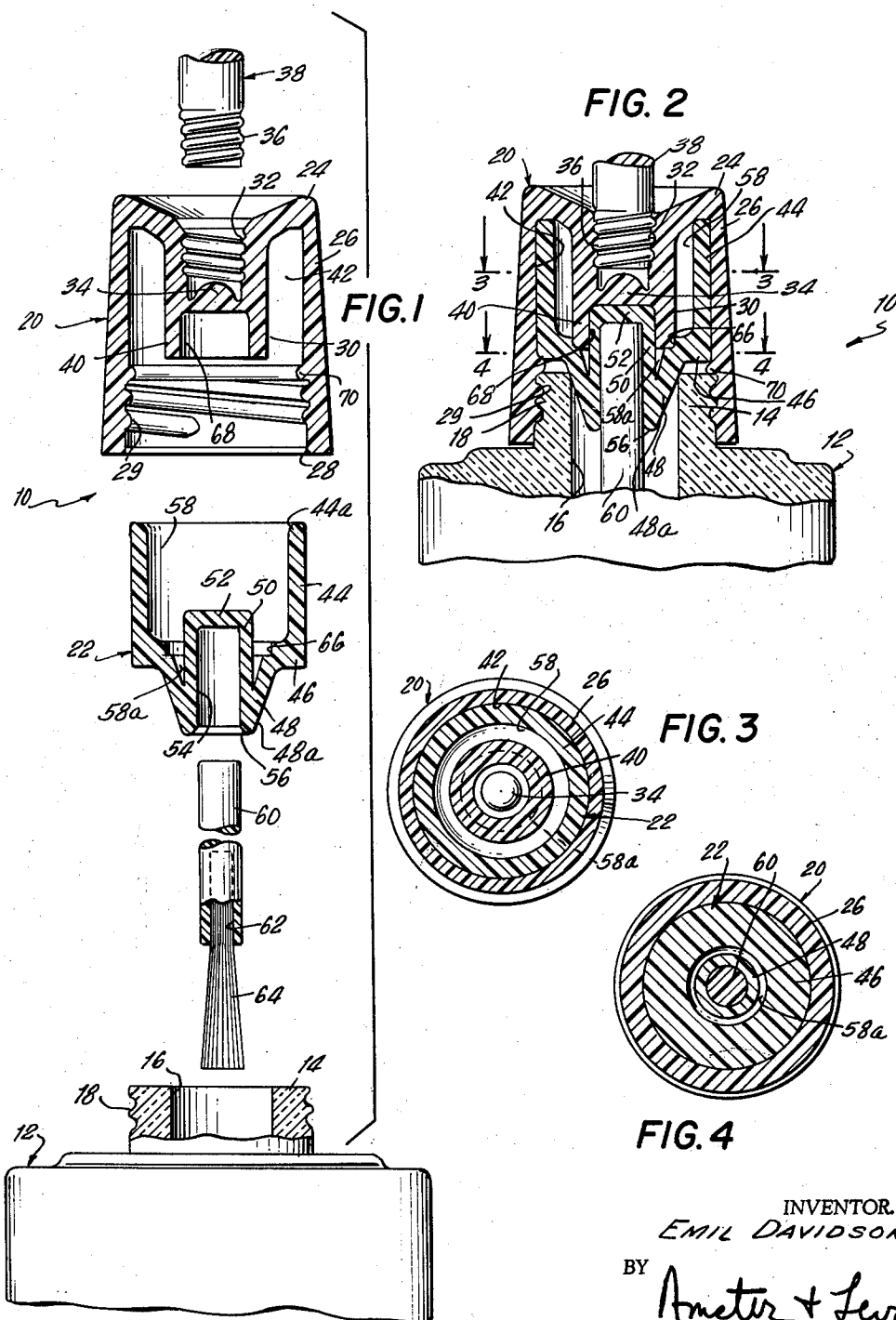
June 15, 1965

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3,189,169

CLOSURE FOR CONTAINERS

Filed June 14, 1962



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CLOSURE FOR CONTAINERS

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Filed June 14, 1962, Ser. No. 202,518

5 Claims. (Cl. 206—15.2)

The present invention relates generally to closures for containers, and in particular to a combined closure and sealing assembly for a bottle including an internal wand or applicator, such as is employed in the packaging of various types of cosmetic preparations, including without limitation, nail polish, rouge, mascara, and the like.

In my application Serial No. 225,621 filed September 24, 1962, which is a continuation-in-part of application Serial No. 110,674, filed May 17, 1961, now abandoned, and application Serial No. 177,519, filed March 15, 1962, now abandoned, there is disclosed a composite closure which includes an outer rigid cap of metal or plastic which may have the desired appearance and properties to impart the "dress" to the closure and an insert or liner of a resilient material, such as polyethylene, which is constructed to provide the necessary fluid-tight seal to the neck of the container or closure and which includes threads for joining the closure to a container. This composite structure exhibits the required rigidity for closing the neck opening, yet has the internal resiliency required to provide a fluid-tight seal. In the several illustrative embodiments illustrated in said copending application, the cap of the composite closure is fabricated of a relatively rigid plastic or metal and has wall thicknesses of substantially uniform section to provide the desired external appearance for the closure, while the insert is fabricated of a resilient or yieldable material and is provided with a depending internally threaded skirt and a sealing gland to provide the necessary fluid-tight threaded closure of the externally threaded neck of the bottle.

Practical experience with this type of composite closure has indicated that it would be advantageous to provide the internal threads for the closure on the outer cap since this would make the dimensional tolerances between the cap and insert less critical, yet exhibit the numerous advantages of the composite closure. It is important to provide an inner seal which effectively provides sealing function in response to the tightening of the closure on the container. Such function may be advantageously provided by a hollow conical member of resilient material inserted and held into the neck of the container. However, such a structure is available only by the use of a two-piece closure.

Broadly, it is an object of the present invention to provide an improved composite closure of the aforesaid general construction. Specifically, it is within the contemplation of the present invention to provide a combined closure and sealing assembly wherein the composite properties of a two-part closure will be realized in a structure which for all external intents and purposes physically resembles a conventional internally threaded cap.

In accordance with an illustrative embodiment demonstrating objects and features of the present invention, there is provided a combined closure and sealing assembly for a bottle which includes a neck having external threads. The assembly comprises a cap including a top wall and a depending substantially cylindrical body wall terminating in an open end. Internal threads are provided on the body wall extending inwardly from the open end and terminating at an intermediate location spaced from the top wall. The internal threads are dimensioned to engage the external threads on the neck. A first substantially cylindrical socket-forming wall depends from the top wall

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and terminates substantially at the intermediate location, with the first socket-forming wall cooperating with the body wall to form a first socket therebetween extending inwardly of the intermediate location. An insert of yieldable material is provided which includes a substantially cylindrical mounting wall, a base wall at one end of the mounting wall, a frusto-conical sealing member depending from the base wall, and a second substantially cylindrical socket-forming wall disposed concentrically of the first socket-forming wall and extending within the sealing member to form a second socket. An applicator is provided which includes a rod received within the second socket to mount the applicator on the insert coaxially of the sealing member such that the applicator depends from said sealing member for insertion into the bottle when the cap is engaged with the neck. The insert and the cap cooperate to form an internal volume extending at least partially within said sealing member for imparting resiliency thereto such that the frusto-conical surface of said sealing member accommodate to the neck and provide a seal thereagainst. The mounting wall of the insert is force fitted within the first socket to provide a substantially unitary assembly of the cap and insert, with the sealing member being disposed concentrically of and in confronting spaced relation to the internal threads.

The above brief description, as well as further objects, features and advantages of the present invention will be more fully appreciated by reference to the following detailed description of an illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is an exploded view, partially sectioned, showing the cap and insert of a combined closure and sealing assembly demonstrating features of the present invention;

FIG. 2 is a vertical section of the combined closure and sealing assembly shown engaged on the neck of a bottle;

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2; and

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 2.

Referring now specifically to the drawings, and in particular to FIGS. 1 and 2, there is shown a combined closure and sealing assembly, generally designated by the reference numeral 10, which is adapted to be engaged on a bottle or container 12 including a neck 14 which bounds a dispensing opening 16 and is provided with external threads 18. The bottle or container 12 may take any convenient form, although the same has been illustrated as being of glass and particularly adapted to receive a cosmetic preparation, such as nail polish. However, it will be appreciated that the invention will find application as a closure for different types of containers and dispensers, including semi-rigid squeeze bottles, deformable tubes and the like.

The combined closure and sealing assembly 10 in this illustrative embodiment is in two parts and includes a cap 20 fabricated of a rigid material and an insert 22 fabricated of a flexible and yieldable material which may be assembled with the cap by a force fit requiring virtual destruction of the assembly 10 to remove the insert 22 from the cap 20.

Specifically, the cap 20 may be molded from a relatively rigid synthetic plastic material such as polystyrene, urea-resin and the like and is formed with walls of substantially uniform thickness which precludes shrinkage during the molding operation and assures that the cap will have the desired outer appearance. The cap 20 includes a top wall 24 and a depending substantially cylindrical body wall 26 which is of gradually increasing cross-section and terminates in an open end 28. The body wall 26 is provided with internal threads 29 which extend inwardly from the open end 28 and terminate at an inter-

mediate location spaced from the top wall 24. The internal threads 29 are of a pitch to threadedly engage the external threads 18 on the neck 14 of the container or bottle 12. Depending from the top wall 24 internally of and concentrically of the body wall 26 is a socket-forming wall 30. In this illustrative embodiment, the socket-forming wall 30 is formed with an upwardly-opening, internally-threaded socket 32 which terminates in a base wall 34 and opens through the top wall 24 of the cap 20. The threaded socket 32 receives the threaded mounting section 36 of a plume 38 of the type conventionally provided for the cap or closure of a nail polish container. The purpose of the plume 38 is to facilitate the easy grasping of the removable closure assembly which carries a brush for use in the application of nail polish.

The socket-forming wall 30 includes a depending annular extension 40 which projects below the base wall 34 of the socket and provides a continuation of the socket-forming wall 30. The depending annular extension 40, which serves as an abutment as will subsequently be described, terminates inwardly of the internal threads 29, with the socket-forming wall 30 and the extension 40 cooperating with the coextensive portion of the body wall 26 to define an annular socket or cavity 42 therebetween.

The insert or liner 22 is fabricated of a resilient and yieldable moldable elastomeric material, such as polyethylene, polypropylene, or like relatively resilient and readily molded plastic materials. The liner or insert 22, which is of thin wall construction, includes a cylindrical mounting member or wall 44 which is dimensioned to be accommodated with a force fit within the annular socket 42 in the cap 20. Specifically, the outer diameter of the upstanding cylindrical mounting wall or member 44 is dimensioned in relation to the outer diameter of the socket or cavity 42 defined by the inner surface of the cylindrical body wall 26 to provide for a degree of radial compression of the mounting member 44, and a corresponding tight or friction fit between the insert 22 and the cap 20, when assembled as shown in FIG. 2.

One end of the mounting wall 44 is free and slightly relieved away, as indicate in 44a, to facilitate insertion thereof into the annular socket or cavity 42 in the cap 20. At its other end, the mounting wall 44 merges with a base wall 46 which provides an abutment shoulder, for a purpose to be subsequently described. At its inner end, the base wall or abutment shoulder 46 carries a depending frusto-conical sealing member 48 which merges at its larger diameter end with the abutment shoulder 46. The sealing member provides a conical sealing surface 48a which is disposed in spaced confronting relation to the internal threads 29 on the cap 20 (see FIG. 2).

Extending inwardly from the free smaller-diameter end of the sealing member 48, is a substantially cylindrical second socket-forming wall 50 which is disposed concentrically of the first socket-forming wall 30 (see FIG. 2). The second socket-forming wall 50 includes a base wall 52 remote from the free end of the sealing member 48 and provides a downwardly opening socket 54 which is relieved away at its entry end or mouth 56. The thin-walled sections of the insert 22 provide a hollow or cavity 58 internally thereof which includes an annular extension 58a of progressively decreasing cross section coextensive with a portion of the frusto-conical sealing member 48 to afford a high order of resiliency for the sealing surfaces 48a when engaged within the dispensing opening 16 in the neck 14 of the bottle 12. It will be appreciated that the sealing member or means 48, due to its resiliency or flexibility, is capable of accommodating to any irregularities which may exist in the bounding walls of the dispensing opening 16 to assure a fluid-tight seal between the assembly 10 and the bottle 12 when the internal cap threads 29 are engaged with the external neck threads 18.

The assembly 10 further includes a wand or applicator rod 60 which is formed at its lower end with a bristle-

receiving bore 62 which receives a group of bristles making up a brush 64. The upper end of the wand or applicator rod 60 is of a diameter to be force fitted into the socket 54 in the insert 22. If required, an adhesive may be employed to enhance the securement of the applicator rod 60 within the socket 54 of the insert 22. When mounted, the applicator depends coaxially of the sealing member 48 such that the applicator will extend into the bottle 12 upon engagement of the cap 10 about the neck 14 of the bottle 12.

Abutment means are provided on the insert 22 and on the cap 20 for interlocking the assembly of the insert 22, the applicator rod 60, and the cap 20 (see FIG. 2). This interlocking supplements the respective force fits between the applicator rod 60 and its socket 54 and the mounting member 44 and its socket 42. Specifically, the base wall 46 is formed internally thereof between the cavity 58 and the extension 58a with an annular seat 66 which is dimensioned to receive the depending annular extension or abutment 40 of the socket-forming wall 30 upon assembling of the insert 22 within the cap 20. Further, the second socket-forming wall 50 is dimensioned to be accommodated within a circular seat 68 defined by the depending annular extension 40 on the base wall 34 of the cap 20. Still further, the base wall 46 serves as an annular abutment shoulder which is pressed fitted past an inwardly projecting annular abutment flange 70 on the cap 20 at the intermediate location between the internal cap threads 29 and the socket or cavity 42. In making the actual assembly, when the abutment shoulder 46 is force fitted past the annular flange 70 on the cap 20 in response to the insertion of the mounting member 44 into the socket 42, the mounting member 44 is radially compressed. Such radial compression forces are transmitted to the several interengaged and cooperating abutments such as to rigidify the assembly. The dimensional tolerances in the actual assembly are held close enough to require a virtual destruction of the combined closure and sealing assembly 10 after insertion of the applicator rod 60 into the socket 54 and insertion of the mounting member 44 of the insert 22 into the socket 42 thereby rendering the assembly unitary for all practical intents and purposes.

In accordance with the invention, it will be appreciated that the primary sealing force between the closure and the neck of the bottle or container is provided between the external threads on the neck of the container and the internal threads on the cap. It is relatively simple in accordance with standard molding techniques to provide for the necessary threaded interengagement between the cap and the container at this location. Of course the cap is fabricated of a rigid plastic material to provide for the requisite structural strength. Due to the substantially uniform section of the walls thereof the cap will have the desired external appearance and not be subject to the difficulties of different rates of residual shrinkage which occur incident to a molding of heavier and thin sections in the same part. On the other hand, the resilient sealing member due to its yieldable and flexible characteristics, can accommodate to irregularities in the neck of a bottle and provides the necessary seal between the closure and bottle. Further, the assembly of the applicator, insert, and cap merely requires the subassembly of the applicator and insert followed by the insertion of the mounting member of the insert into the corresponding socket or cavity formed in the cap; and once the mounting member is driven into place, with the use of a relatively simple jig or fixture, the three-part assembly becomes unitary, yet exhibits the composite properties of the flexible insert and of the relatively rigid cap.

A latitude of modification and substitution is intended in the foregoing disclosure and in some instances certain features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly

and in a manner consistent with the spirit and scope of the disclosure.

What I claim is:

1. A combined closure and sealing assembly for a bottle including a neck having external threads comprising a relatively rigid cap including a top wall and a depending substantially cylindrical body wall terminating in an open end, internal threads on said body wall extending inwardly from said open end and terminating at an intermediate location spaced from said top wall, said internal threads being dimensioned to engage said external threads on said neck, a substantially cylindrical first socket-forming wall depending from said top wall and terminating substantially at said intermediate location, said first socket-forming wall cooperating with said body wall to form a first socket therebetween extending inwardly of said intermediate location, an insert of yieldable and flexible material including a substantially cylindrical mounting wall, a base wall at one end of said mounting wall, a frustro-conical sealing member depending from said base wall, and a substantially cylindrical second socket-forming wall disposed concentrically of said first socket-forming wall and extending within said sealing member to form a second socket, and an applicator including a rod received within said second socket and mounting said applicator on said insert coaxially of said sealing member such that said applicator depends from said sealing member for insertion into said bottle when said cap is engaged with said neck, said insert and said cap cooperating to form an internal volume extending at least partially within said sealing member for imparting resiliency thereto such that the frustro-conical surfaces of said sealing member accommodate to said neck and provide a seal thereagainst, said mounting wall of said insert being force fitted within said first socket to provide a substantially unitary assembly of said cap and insert with said sealing member being disposed concentrically of and in confronting spaced relation to said internal threads.

2. A combined closure and sealing assembly for a bottle including a neck having external threads comprising a relatively rigid cap including a top wall and a depending substantially cylindrical body wall terminating in an open end, internal threads on said body wall extending inwardly from said open end and terminating at an intermediate location spaced from said top wall, said internal threads being dimensioned to engage said external threads on said neck, a substantially cylindrical first socket-forming wall depending from said top wall and terminating substantially at said intermediate location, said first socket-forming wall cooperating with said body wall to form a first annular socket therebetween extending inwardly of said intermediate location, an insert of yieldable and flexible material including a substantially cylindrical mounting wall, a base wall at one end of said mounting wall, a frustro-conical sealing member depending from said base wall, and a substantially cylindrical second socket-forming wall disposed concentrically of said first socket-forming wall and extending within said sealing member to form a second circular socket, an applicator including a rod received within said second socket and mounting said applicator on said insert coaxially of said sealing member such that said applicator depends from said sealing member for insertion into said bottle when said cap is engaged with said neck, said insert and said cap cooperating to form an internal volume extending at least partially within said sealing member for imparting resiliency thereto such that the frustro-conical surfaces of said sealing member accommodate to said neck and provide a seal thereagainst, said mounting wall of said insert being force fitted within said first socket to provide a substantially unitary assembly of said cap and insert with

said sealing member being disposed concentrically of and in confronting spaced relation to said internal threads, and abutment means on said insert and on said cap for interlocking the assembly of said insert and said cap.

3. A combined closure and sealing assembly according to claim 2 wherein said abutment means includes an abutment shoulder on said base wall and an annular abutment flange on said body wall inwardly of said intermediate location, said abutment shoulder being engaged with said abutment flange.

4. A combined closure and sealing assembly according to claim 2 wherein said abutment means includes a seat formed on the terminal end of said first socket-forming wall, said second socket-forming wall being received within said seat.

5. A combined closure and sealing assembly for a bottle including a neck having external threads comprising a cap including a top wall and a depending substantially cylindrical body wall terminating in an open end, internal threads on said body wall extending inwardly from said open end and terminating at an intermediate location spaced from said top wall, said internal threads being dimensioned to engage said external threads on said neck, a substantially cylindrical first socket-forming wall depending from said top wall and terminating substantially at said intermediate location, said first socket-forming wall cooperating with said body wall to form a first socket therebetween extending inwardly of said intermediate location, an insert of yieldable material including a substantially cylindrical mounting wall, a base wall at one end of said mounting wall, a frustro-conical sealing member depending from said base wall, and a substantially cylindrical second socket-forming wall disposed concentrically of said first socket-forming wall, said second socket-forming wall extending within said sealing member to form a second socket and being joined at one end to said sealing member, an applicator including a rod received within said second socket and mounting said applicator on said insert coaxially of said sealing member such that said applicator depends from said sealing member for insertion into said bottle when said cap is engaged with said neck, said insert and said cap cooperating to form an internal volume extending at least partially within said sealing member for imparting resiliency thereto such that the frustro-conical surfaces of said sealing member accommodate to said neck and provide a seal thereagainst, said mounting wall of said insert being fitted within said first socket to provide a substantially unitary assembly of said cap and insert with said sealing member being disposed concentrically of and in confronting spaced relation to said internal threads, an abutment shoulder on said base wall, an annular abutment flange on said body wall at said intermediate location engaging said abutment shoulder, and a seat formed on said first socket-forming wall, said annular seat receiving and engaging said second socket-forming wall.

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