

Sept. 5, 1961

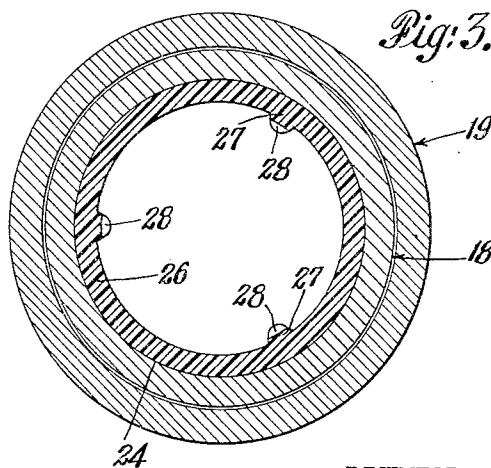
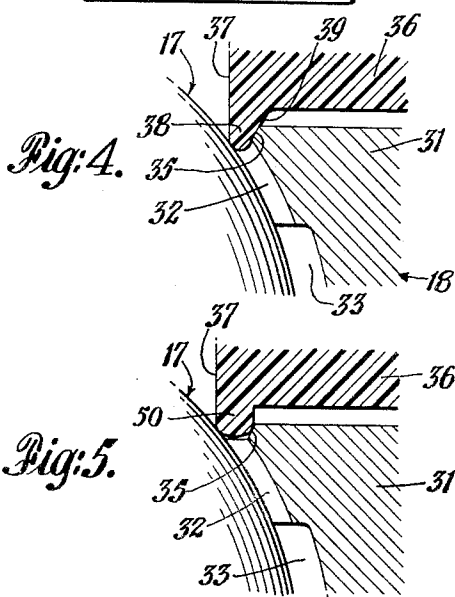
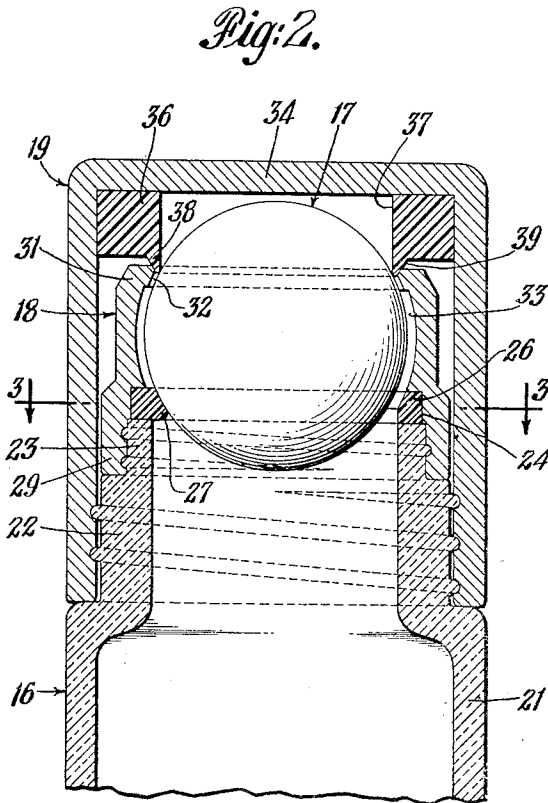
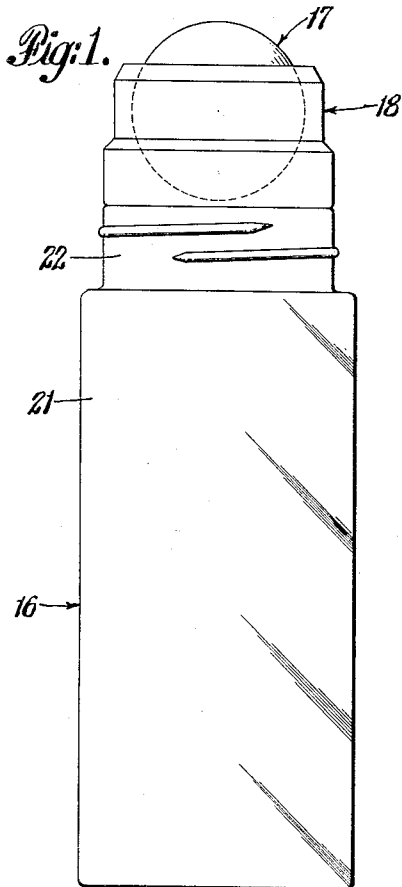
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2,998,616

BALL APPLICATOR DISPENSERS

Filed Oct. 21, 1957

2 Sheets-Sheet 1



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*Fig. 6.*

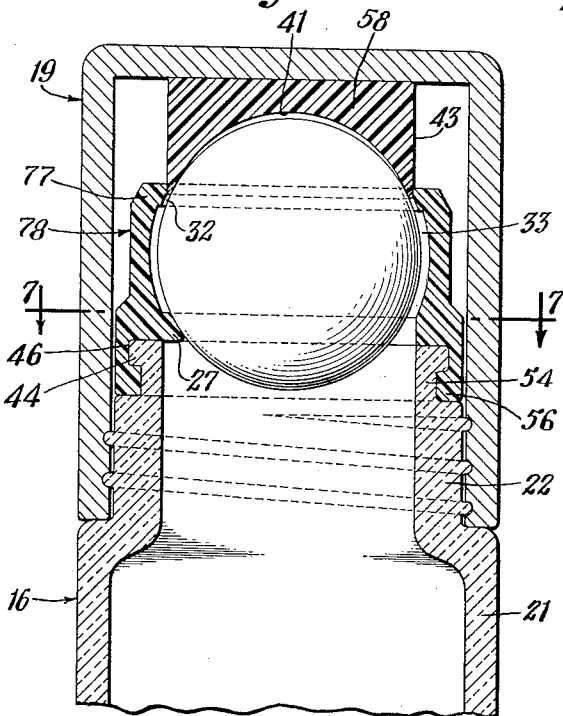


*Fig. 7.*

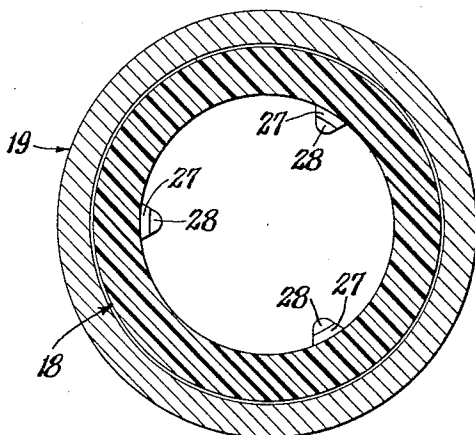


*Fig. 8.*

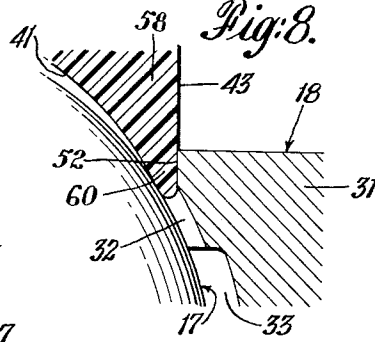


*Fig. 9.*

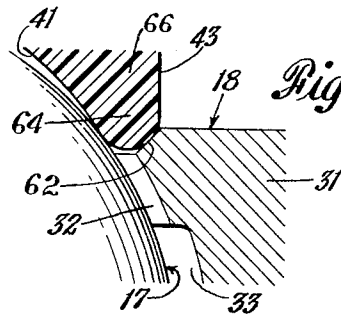


*Fig. 10.*

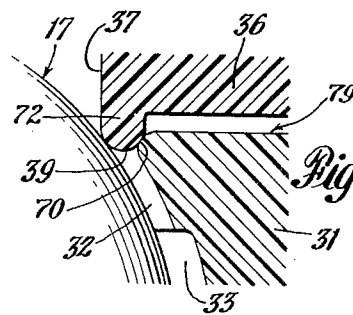
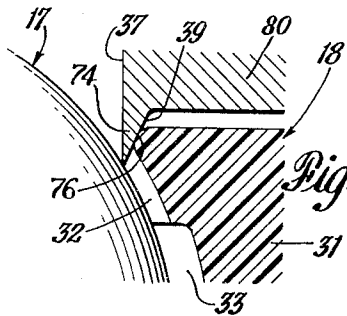


*Fig. 11.*



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## BALL APPLICATOR DISPENSERS

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1 Claim. (Cl. 15—572)

The present invention relates to fluid dispensing containers and more particularly to ball-top containers for dispensing liquid, pasty or creamy fluids such as deodorants, lotions and the like.

An object of the invention has been to provide a simple, easily fabricated dispenser for deodorants, lotions or other flowable substances which is constructed with a revolvable-ball dispensing valve adapted to be pressed against and rolled over the surface to which the flowable substance is to be applied.

Another object of the invention has been to provide a dispenser of the above type which will not leak, and which will substantially prevent any evaporation of the dispenser's contents.

Still another object of the invention is the provision of a liquid dispensing package characterized by a ball type applicator for rolling the liquid contents of said package upon a selected surface.

A further object of the invention has been to provide a dispenser of the above type which will be ready for instant use at all times.

Other and further objects, features and advantages of the invention will appear from the following description.

In accordance with the invention, these objects are achieved by providing a container, such as a bottle, having an open end, a generally spherical ball adapted to fit partially within the open end of the container, means for rotatably supporting the ball partially within the open end of the container, a ring detachably connected at one extremity thereof to the container adjacent the open end of the container, the ring having another, outer extremity provided with an annular bearing portion encompassing an outer minor portion of the ball to retain the ball against movement outwardly of the open end of the container, the bearing portion of the ring defining an annular fluid-discharge space between the ball and the ring, and a hollow cap detachably connected to the container over the open end thereof, the cap having a closed end provided with an annular skirt depending from an inner surface of the closed end, the skirt, when the cap is secured to the container, being adapted to project partially within the annular space between the ball and the ring to prevent leakage of the fluid within the container past the ball. The supporting means for the ball comprises a plurality of bearing surfaces or lugs located within the open end of the container and may be formed integrally with the container or with the ring.

The invention will now be described in greater detail with reference to the appended drawings wherein:

FIG. 1 is an elevational view of a fluid dispenser constructed in accordance with the invention and having the cap removed from the applying end, and the container ready for use;

FIG. 2 is an enlarged vertical sectional view of the applying end of the dispenser and having the cap shown in place in sealed position;

FIG. 3 is a horizontal section taken on the line 3—3 of FIG. 2 of the ring and ball retaining means, the ball applicator being omitted for clarity;

FIG. 4 is an enlarged fragmentary sectional view of the sealing means of the dispenser;

FIG. 5 is an enlarged fragmentary sectional view, similar to that illustrated in FIG. 4, and showing the sealing means of another embodiment of the dispenser;

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FIG. 6 is an enlarged vertical sectional view of the applying end of another embodiment of the dispenser;

FIG. 7 is a horizontal section of the ring and ball retaining means taken on the line 7—7 of FIG. 6, the ball applicator being omitted for clarity;

FIG. 8 is an enlarged fragmentary section illustrating the sealing means of an embodiment similar to that illustrated in FIG. 6;

FIG. 9 is an enlarged fragmentary section, illustrating the sealing means of a still further embodiment of the dispenser;

FIG. 10 is an enlarged fragmentary section illustrating the sealing means provided by a still further embodiment of the dispenser;

FIG. 11 is an enlarged fragmentary section illustrating the sealing means of still another embodiment of the dispenser.

In the drawings and throughout the specification, like reference numerals are employed to designate similar parts.

Referring now to the drawings, and more particularly to FIGS. 1—3 thereof, the dispenser comprises generally a container or bottle portion 16 having an open end and forming a main reservoir for a fluid such as a liquid, cream or paste deodorant, hand or face lotion, hair tonic or the like, a substantially spherical ball applicator denoted generally by the numeral 17, an annular ball-retaining ring denoted generally by the numeral 18 and a cap denoted generally by the numeral 19 for sealing the applying end of the dispenser. The container 16 may be formed of glass, metal, various synthetic resins or any other suitable material, and may be given any desired shape, but is preferably provided with a generally cylindrical portion 21 adjacent the open end thereof. The open end of the container is preferably formed as a reduced diameter neck having constricted neck portions 22 and 23 (FIG. 2). The larger diameter neck portion 22 may be threaded externally for co-operation with internal threads adjacent an open end of the hollow sealing cap 19. The smaller diameter neck portion 23 may be similarly threaded exteriorly for cooperation with threads on an internal surface of the ring 18 adjacent the lower extremity thereof.

The ring 18 may be provided with a recessed groove 24 for the reception of a washer 26. The washer is provided with spaced, inwardly extending projections or lugs 27, each having a ball supporting surface 28 arranged to support the ball 17 for rotation in any direction about its center. The lugs 27 serve to retain the ball 17 from lateral motion and also to retain the same at the desired position partially within the open end of the container 16. As shown in FIG. 3, there may be three evenly spaced lugs 27 but obviously any other suitable number of lugs may be provided. The washer may be formed of any suitable material, for example, resilient synthetic resin as shown, other resilient materials such as natural or synthetic rubber or rigid materials as metal, wood, glass, hard rubber or plastic. The ball 17, which may be formed of glass, plastic or other suitable rigid materials, the dimensions of which can be accurately controlled, is supported on the bearing supporting surfaces 28, but preferably does not come into contact with any other portion of the container 16 or the ring 18. As illustrated in FIGS. 1 and 2, the annular ring 18 is provided with an enlarged lower clamping portion 29 which may be interiorly threaded for connection with the exteriorly threaded neck portion 23. The outside diameter of the clamping portion 29 is preferably approximately equal to that of the larger neck portion 22. In the embodiment illustrated in FIG. 2, the ring 18 is preferably formed of a rigid material such as certain synthetic resins, for exam-

ple, styrene, melamine, phenol-formaldehyde resins and the like.

The ring 18 is also provided with an annular bearing portion 31 located above the center of the ball and defining an annular fluid-discharge space 32 between the ball 17 and the ring 18. The width of the space 32 between the ball 17 and the bearing portion 31 should be sufficiently great that the fluid on the surface of the ball 17 as the same is rotated is not wiped off by contact with the adjacent surfaces of the bearing portion 31. However, the space 32 is preferably sufficiently small that the ball 17 will be retained substantially in position when the container is inverted. For example, a width of about 0.025 inch for the space 32 has been found to result in a structure which may be used to dispense a fairly creamy deodorant fluid having a viscosity of about 1000 centipoises. It is to be understood, of course, that the width of the space 32 would be dependent upon the nature of the fluid being dispensed. The surface of the outer extremity of the bearing portion 31 adjacent the ball 17 is provided with a bearing surface 35 which is preferably in the form of a bevel but, as will hereinafter be shown, may also take the form of a curved surface.

Portions of the interior surface of the annular ring 18 are recessed to provide a secondary reservoir 33 wherein fluid may be retained by capillary attraction, thereby preventing drying of a thin film of fluid on the surfaces of the ball 17 adjacent the ring 18 which would prevent subsequent rotation of the ball. Such an arrangement is illustrated in U.S. Patent No. 2,749,566 to R. H. Thomas.

The cap 19 has a closed end 34 which is provided on an interior surface thereof with a depending sealing member 36 which may be, as illustrated in FIG. 2, in the form of an annulus having an external diameter approximating the internal diameter of the cap 19 and secured to the closed end 34 by suitable means such as by the use of adhesives or the like. The sealing member 36 is provided with a centrally located aperture 37 for reception therein of an outer minor portion of the ball 17 when the cap 19 is connected to the container in a sealing position. A skirt 38, depending from the member 36 and extending circumferentially about the aperture 37, has an interior surface substantially continuous with the surface of the aperture 37 and an exterior sealing surface 39 adapted for sealing engagement with the bearing surface 35 on the annular ring 18.

In the embodiment illustrated in FIG. 2, the sealing member 36 and skirt 38, formed integrally therewith, are constructed of a resiliently deformable material such as natural or synthetic rubber, a resilient synthetic resin or the like.

In operation, the cap 19 is removed from the container, the container inverted, and the ball 17 placed on the skin and rolled thereover whereby a film of fluid is transferred from the main reservoir of the container to the secondary reservoir 33, thence to the skin by the rotating ball 17. To seal the dispenser, the cap 19 is attached to the container. When the cap is turned down to the maximum extent possible, the skirt 38 is partially projected into the annular fluid discharge space 32 and into contact with the ball 17 and the bearing surface 35 of the ring 18. The skirt 38, being constructed of a resilient material is slightly deformed so that effective sealing contacts are made by the skirt with the ball and the ring. The dimensions and profile of the skirt may be selected to give maximum sealing area in the closed cap position. Of course, the optimum configurations of the skirt 38 and the bearing surface 35 are dependent upon the nature of the material from which the skirt 38 is constructed. As illustrated in FIGS. 2 and 4, the skirt 38 may have a cross-section, taken radially of the cap, of a generally substantially triangular shape. An alternative form of the skirt 38 is illustrated in FIG. 5 wherein the skirt 50 has an elevational cross-section of a generally U shape.

An alternative construction of the invention is illustrated in FIG. 6 wherein the bearing portion 77 is formed of a resiliently deformable material. If desired, the ring 78 may be formed entirely of such material, as illustrated, in which event the smaller diameter neck portion may be provided with a radially extending peripheral flange 44. The clamping portion 56 of the ring is provided with an annular groove 46 for cooperation with the flange 44 when the resilient ring is snapped onto the neck portion 54. As illustrated, the lugs may be formed integrally with the ring since the latter is resilient and the ball may be forcibly inserted through an open end into the interior of the ring. FIG. 7 illustrates one convenient construction of the ball-supporting lugs. In the embodiment of FIG. 6, the cap 19 is provided with a sealing member 58 of generally cylindrical form having a side wall 43 and provided, at the lower extremity thereof, with a concavity 41 having a radius of curvature somewhat smaller than that of the ball 17. The extremity of the sealing member 58 thereby forms the skirt 38 which serves the same purpose as in the embodiment of FIGS. 2, 4 and 5.

In operation, the dispenser of FIG. 6 is sealed by entry of the skirt 38 into the discharge space 32, the consequent deformation of both skirt 38 and the bearing portion 31 and the establishment of sealing contact between the skirt and the bearing portion on the one hand and skirt and the ball on the other.

In another embodiment, the sealing means of which is illustrated in FIG. 8, the bearing portion 31 of the ring 18 is formed of rigid material and is provided with a vertical bearing surface 52 for cooperation with the side wall 43 of the resilient sealing member 58. In this embodiment, the extremity of the skirt 60 is made sufficiently small to enable the skirt to be projected partially within the space 32 and to effect sealing contacts with the ball and with the bearing surface 52.

In the embodiment illustrated in FIG. 9 wherein the bearing portion 31 of the ring 18 is of rigid material and the skirt 64 is of resilient material, the radius of the skirt 64 is somewhat greater to enable a sealing contact to be effected between the skirt and the bearing surface 62 which, in this embodiment, takes the form of a bevel inclined at an angle to the side wall 43. As illustrated in FIGS. 8 and 9, an outer minor portion of the ball 17, in the closed position of the cap 19, projects into the concavity 41 of the sealing member 58 and 66 respectively, but due to the smaller radius of the concavity 41, the ball is prevented from contacting the surface of the concavity except at the skirt 60 and 64 respectively.

Still another dispenser sealing means is illustrated in FIG. 10 wherein both the ring 79 and the sealing member 36 are formed of resilient material, as in the embodiment of FIG. 6, but the sealing member 36 takes the form of a centrally apertured annulus similar to the embodiment of FIG. 2. The skirt 72 has a generally U-shaped vertical section adapted to effect sealing contacts with the ball 17 and the bearing surface 70 of the ring 18.

Yet another dispenser sealing means is illustrated in FIG. 11 wherein the sealing member 80 is formed of rigid material instead of the relatively resiliently deformable material of the previously described embodiments. As illustrated, the skirt 74 may form a dependent projection from a centrally apertured sealing member 80, as in the embodiment of FIG. 2. Alternatively, the rigid sealing member 80 could also take the form illustrated in FIGS. 8 and 9, in which event, the inner surface of the skirt 74, adjacent the ball 17, is preferably provided with a circumferential sealing surface curved to fit the ball. In either case, the dimensions of the contacting surfaces of the ball and the skirt must be held to close tolerance to insure against leakage. Glass components with ground contacting surfaces are especially useful in this construction of the dispenser. The action

of the rigid skirt upon the deformable bearing surface 76 effects a tight seal between these two elements.

It will be evident from the foregoing description that, although the general principle of the sealing means of the invention, i.e., the obstruction of the fluid discharge space 32 by means of a skirt 38 projecting partially therein and effecting sealing contacts with the ball 17 and the ring 18, remains unaltered throughout the various embodiments illustrated and described, the specific configurations and materials of construction of the skirt and the various sealing surfaces engageable therewith may be varied for the sake of economy, availability and ease of fabrication of materials or the nature of the fluid being dispensed.

While the invention has been described in specific embodiments and in connection with specific uses, it should be understood that it is not limited thereto, and obviously modifications thereof will occur to those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

A fluid dispensing device, comprising a container having an open end, a spherical ball partially within said open end whereby a portion of said ball may be contacted with the contents of said container, means for rotatably supporting said ball partially within said open end, said means comprising a bearing surface disposed within said open end and rotatably supporting said ball by contact with an inner minor portion thereof, a ring having one extremity thereof attached to said container adjacent said

open end thereof and another extremity thereof provided with an annular bearing portion encompassing an outer minor portion of said ball and retaining the same against movement outwardly of said open end, said bearing portion being spaced from said ball and defining therewith an annular fluid-discharge space of substantially constant and predetermined width between said ring and said ball, and a hollow sealing cap adapted for engagement with said container and provided with a closed end having an annular resilient skirt depending from the inner surface of said closed end, said skirt having a generally triangular radial cross-section adapted to project partially into said annular space and to be resiliently deformed into annular band sealing contact with the ball and sealing contact with the bearing portion when said cap is in sealing engagement with said container whereby said skirt closes said annular space and thereby prevents escape of fluid from said dispenser.

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