March 23, 1965 W. R. FRANK 3,174,175

BALL APPLICATOR FITMENT

Filed Dec. 11, 1962

Fig. 1

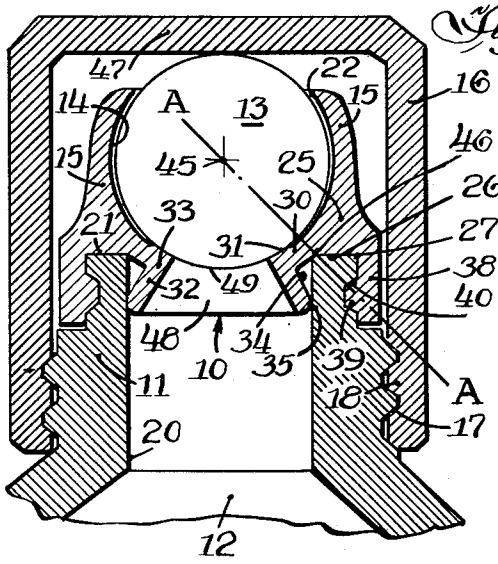


Fig. 2

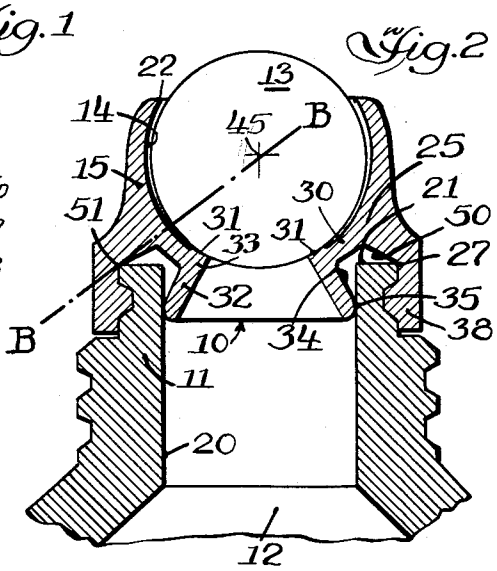


Fig. 3

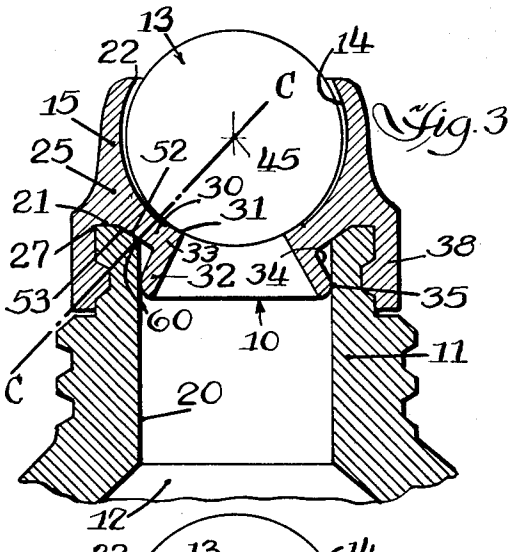


Fig. 4

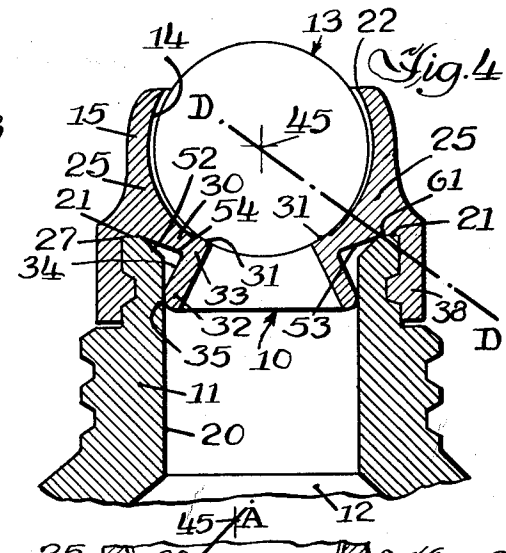


Fig. 5

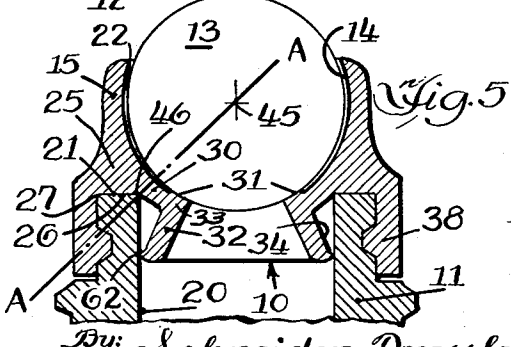
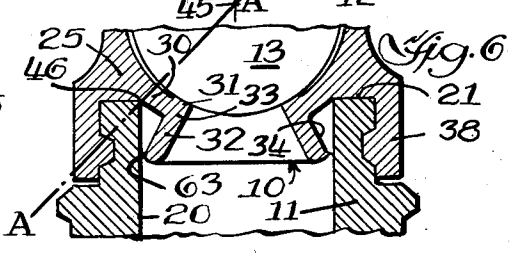


Fig. 6



Inventor,
Walter R. Frank,
By: Schneider, Dressler, Goldsmith & Clement, Attys

United States Patent Office 3,174,175 Patented Mar. 23, 1965

3,174,175

BALL APPLICATOR FITMENT

Walter R. Frank, Elmhurst, Ill., assignor to W. R. Frank Packaging Engineers, Inc., a corporation of Illinois

Filed Dec. 11, 1962, Ser. No. 243,820
6 Claims. (Cl. 15—572)

This invention relates to a ball applicator fitment such as may be used with a bottle of so-called "roll-on" deodorant lotion. The fitment is employed with (*a*) a container to which it may be secured, (*b*) an applicator ball rotatably confined by the fitment, and (*c*) a container cap adapted to press down against the applicator ball when the cap is secured to the container.

The fitment of this invention includes (1) a ball support member defining a generally spherically shaped cavity in which the applicator ball is rotatably confined and which has an opening at its upper end; (2) a generally outwardly directed shoulder having a bottom face for conforming contact with at least the outer perimeter of the terminal face of the container neck; (3) and annular ring directed generally inwardly from the shoulder to continue the cavity in the ball support member and provide a ball sealing surface at its inner edge portion; (4) means for securing the fitment to the container; and (5) a flange extending downwardly from the inner portion of the annular ring, with the upper portion of the flange being spaced from the container neck and the lower portion having conforming contact with the neck.

It is essential that the area of the ball sealing surface with which the applicator ball is in contact when it is pressed down by the container cap, as the cap is secured to the container, be located at least in substantial part within any and all lines running from the center of the ball through the innermost points of contact between the terminal face of the container neck and the bottom face of the outwardly directed shoulder. It is this feature that results, as will be explained below, in the "knee action" of the downwardly extending flange as its bottom portion is pressed against the inner surface of the container neck when the container cap presses down upon the applicator ball.

The fitment of the invention is an improvement over the fitments disclosed in U.S. Patent No. 1,977,414, issued to Testa on October 16, 1934, and No. 2,823,403, issued to Whitney on February 18, 1958. With the fitments of the prior art, the lotion or other liquid contained in the bottle to which the fitment is secured may leak into the space around the outer surface of the fitment which is in contact with the inner surface of the container neck, thus tending to decrease the efficacy of the seal at that point between the fitment and the container neck.

The present invention overcomes this difficulty by providing a "knee action" in the flange that extends downwardly inside the container neck. In the preferred form this flange is normally urged against the container neck, and may be provided with a knife edge or feather edge to increase its efficiency still further.

If desired, the upper portion of the ball support member through which the applicator ball is inserted into the cavity in which it is rotatably confined, the annular ring that extends inwardly from the ball support member and outwardly directed shoulder, and the downwardly extending flange may be made from a resilient material that further increases the effectiveness of the ball-to-fitment and fitment-to-container neck seals. In fact, if desired, the entire fitment may be made of resilient material.

The ball applicator fitment of this invention is further described in connection with the accompanying drawings, in which:

FIGURE 1 is a cross sectional view of one embodiment of the ball applicator fitment of this invention in place upon a container, together with the applicator ball and container cap associated therewith;

FIGURE 2 is a cross sectional view of a second embodiment of the ball applicator fitment of this invention in place upon the container, and containing the applicator ball with which it is associated;

FIGURE 3 is a similar cross sectional view of a third embodiment of the ball applicator fitment of this invention, secured to a container having a tapered mouth;

FIGURE 4 is a similar view of a fourth embodiment of the ball applicator fitment of this invention, secured to the same type container

FIGURE 5 is a similar view of the ball applicator fitment of FIGURE 1, with a variation in the shape of the outer surface of the downwardly depending flange that extends into the container mouth; and

FIGURE 6 is a fragmentary cross sectional view of the ball applicator fitment of FIGURE 1, with another variation in the form of the outer surface of the downwardly depending flange that extends into the container mouth.

In FIGURE 1, ball applicator fitment **10** is shown in place upon container neck **11** of a container **12** of a type employed with so-called "roll-on" deodorant lotion.

Applicator ball **13** is shown in place within cavity **14** which is defined by upper walls or ball support member **15** of fitment **10**. Container cap **16** is shown threaded into place upon container neck **11**, by means of threads **17** in neck **11** and corresponding threads **18** in the bottom of the inside wall of the container cap.

Container neck **11** defines outlet bore **20**. Neck **11** terminates in radially outwardly directed terminal face **21**.

Cavity **14** has the general shape of a portion of a sphere. At its upper end, it terminates in and communicates with opening **22**. Opening **22** has a diameter smaller than that of applicator ball **13**, but large enough that the applicator ball may be conveniently snapped into place in cavity **14** by pressing it down through opening **22**.

As a result of the structure just described, ball support member **15** is adapted to rotatably confine applicator ball **13** within cavity **14**.

The upstanding walls of ball support member **15** merge into generally outwardly directed shoulder **25**, which extends below walls **15**. Outwardly directed shoulder **25** has bottom face **26** for conforming contact with at least outer perimeter **27** of terminal face **21** of container neck **11**.

Annular ring **30** extends generally inwardly from shoulder **25**. Its upper surface defines a continuation of generally spherically shaped cavity **14** in ball support member **15**. The upper surface of annular ring **30** includes a ball sealing surface **31** for conforming contact with applicator ball **13**. The inner diameter of annular ring **30** is smaller than the diameter of applicator ball **13**, and hence ball sealing surface **31** supports ball **13** in place within cavity **14**. As seen, ball sealing surface **31** has continuous conforming contact with ball **13** for substantially 360° around the ball. The outermost diameter of ball sealing surface **31** is, as shown, smaller than the diameter of container neck **11**.

Flange **32** extends downwardly from inner portion **33** of annular ring **30**. The upper portion **34** of the outer surface of flange **32** is spaced at all points from the container neck **11** when fitment **10** is installed in place upon the container. The lower portion **35** of the outer surface of flange **32** has substantially continuous conforming contact with neck **11** for 360° around the neck when the fitment is installed in place upon the container. As is shown in the drawing, the area of said conforming contact with the container neck lies on a radial line extending from the center of applicator ball **13** through the central portion of said continuous ball sealing surface.

Securing wall **38** extends downwardly from outwardly

directed shoulder 25, and is provided with inwardly extending rib 39 at its lower portion. Rib 39 is adapted to form a snap fit with groove 40 in the outer wall of the upper portion of container neck 11. The action between rib 39 and groove 40 thus secures fitment 10 to container 12 when the former is snapped into place upon the container.

In the embodiment shown in FIGURE 1, the area of ball sealing surface 31 with which applicator ball 13 is in contact when pressed down by container cap 16 when the latter is secured to container neck 11 is located entirely within any and all lines such as A–A which may be drawn from the center 45 of ball 13 through the innermost points of contact 46 between terminal face 21 of container neck 11 and bottom face 26 of outwardly directed shoulder 25.

In use, it is seen that when container cap 16 is screwed upon container neck 11, upper wall 47 of the cap presses down upon applicator ball 13, which in turn presses against ball sealing surface 31. This pressure upon ball sealing surface 31 causes the "knee" formed by inwardly directed annular ring 30 and downwardly extending flange 32 to tend to rotate downward and outward. This tendency to rotate, in turn, increases the pressure between conforming surface 35 of flange 32 and mouth 20 of container neck 11.

When the pressures just described are exerted, it is seen that a secure seal is obtained for the contents of container 12. The sealing surfaces include container mouth 20, inner surface 48 of downwardly extending flange 32 and bottom surface 49 of applicator ball 13.

When container cap 16 is removed from container 12, the seal between applicator ball 13 and sealing surface 31 may be broken by rotating the applicator ball. At the same time, the seal between lower surface 35 of flange 32 and mouth 20 of container neck 11 continues.

If all of surface 31 were outside line A–A in FIGURE 1, as is often the case in prior art devices, the pressure of ball 13 against surface 31 would tend to cause flange 32 to flare away from mouth 20 and permit the lotion or other liquid contained in bottle 12 to leak into the space around outer surface 35 of flange 32.

In the ball applicator fitment of this invention, this decrease in the efficacy of the seal between flange 32 of the fitment and container mouth 20 is avoided by locating at least a substantial part of sealing surface 31 within line A–A. As a result, and because of the spacing between container mouth 20 and upper portion 34 of the wall of flange 32, some "knee action" inevitably results which tends to force surface 35 more tightly against the wall of container mouth 20 whenever applicator ball 13 is pressed down against sealing surface 31.

The degree of "knee action" is increased if a major part of sealing surface 31 lies inside line A–A, and is made greatest if the entire portion of the area of sealing surface 31 lies within line A–A, as in the embodiments shown in the drawing.

The "knee action" of downwardly extending flange 32 is greater in the embodiment of this invention shown in FIGURE 2 than in the embodiment of FIGURE 1. In the embodiment of FIGURE 2, outwardly directed shoulder 25 is provided with a bottom face 50 which has conforming contact only with outer perimeter 27 of terminal face 21 of container neck 11. Bottom face 50 is spaced from terminal face 20 inwardly of perimeter 27 when the fitment 10 is installed in place on container 12.

It will be seen from FIGURE 2 that this structure and positioning of bottom face 50 of outwardly directed shoulder 25 produces a still higher arch for the "knee" which is formed by inwardly directed annular ring 30 and downwardly depending flange 32.

In the embodiment being described, the entire area of ball sealing surface 31 lies within line B–B, drawn from center 45 of applicator ball 13 through innermost points of contact 51 between terminal face 21 of container neck 11 and bottom face 50 of outwardly directed shoulder 25.

If desired, the pressure of contact between surface 35 of downwardly extending flange 32 and the wall of container mouth 20 can be increased in any of the embodiments shown in the drawing by constructing flange 32 in such manner as to normally urge or press surface 35 into conforming contacts with the wall of mouth 20.

In the embodiments shown in FIGURES 3 and 4, the wall of container mouth or outlet bore 20 and radially outwardly directed terminal face 21 of container neck 11 are joined by tapering annular shoulder 52.

In FIGURE 3, bottom face 53 of outwardly extending shoulder 25 is in conforming contact not only with outer perimeter 27, but also all of terminal face 21 and of tapered annular shoulder 52. In FIGURE 4, however, bottom face 54 contacts only outer perimeter 27 and terminal face 21, and is spaced from tapered annular shoulder 52.

As will be seen, the "knee action" of annular ring 30 and downwardly extending flange 32 as ball 13 presses against sealing surface 31 will be greater in the embodiment of FIGURE 4 than in FIGURE 3. The space between the "knee" on the one hand, and the wall of container mouth 20 and tapered annular shoulder 52 on the other hand, is greater in FIGURE 4.

Similarly, although sealing face 31 is in both cases located within any line drawn from the center of ball 13 through the innermost points of contact between the terminal face and the tapered annular shoulder of the container neck, the distance within that line is greater for FIGURE 4 than for FIGURE 3.

In FIGURE 3, sealing surface 31 lies entirely within line C—C, drawn through center 45 of ball 13 and the innermost points of contact 60 between tapered annular shoulder 52 and bottom face 53 of shoulder 25. In FIGURE 4, sealing surface 31 lies entirely within line D—D, drawn through center 45 of ball 13 and the innermost points of contact 61 between bottom face 54 of shoulder 25 and terminal face 21 of connector neck 11.

As bottom portion 35 of the outermost surface of downwardly extending flange 32 is pressed more tightly against container neck 20 in FIGURES 1 through 4 by pressure of ball 13 upon sealing surface 31, it will be caused to move downward slightly in response to that pressure. This downward movement may be utilized to produce a "squeegee" action upon the wall of container mouth 20, to clean off from that wall lotion or other matter contained in bottle 12 that might otherwise tend to seep up through the contact between surface 35 and container mouth 20.

The embodiment of FIGURE 5 includes knife edge 62 on the outer surface 35 of the lower portion of flange 32, as a means of improving the "squeegee" action just described. In the embodiment of FIGURE 6, a feather edge 63 is provided for a similar purpose.

If desired, the upper portion of walls 15 may be formed of resilient material in order to increase the ease of insertion of applicator ball 13 within cavity 15. Likewise, annular ring 30 and downwardly extending flange 32 may be formed of resilient material to improve the "knee action" resulting from use of the ball applicator fitment of this invention.

If desired, the entire fitment may be made of relatively resilient material, and the thickness of outwardly extending wall 25 will prevent any substantial deforming of downwardly extending wall 38 to reduce the security of attachment provided by the snap fit between rib 39 and groove 40.

The above detailed discussion of this invention has been given for clarity of understanding only. No unnecessary limitations should be understood therefrom, since modifications will be obvious to those skilled in the art.

I claim:

1. A ball applicator fitment for use with a container with a dispensing opening defined by a neck having an outlet bore and a radially outwardly directed terminal

face, an applicator ball, and a container cap adapted to press down against the ball when secured to the container, which comprises: a ball support member defining a cavity having the general shape of a portion of a sphere, said support member having an opening at its upper end communicating with said cavity, said opening having a diameter smaller than the diameter of said ball, said ball support member being adapted to rotatably confine said ball within said cavity; a generally outwardly directed shoulder extending from said support member, said shoulder having a bottom face for conforming contact with at least the outer perimeter of said terminal face of the container neck; a continuous annular ring directed generally inwardly from said shoulder, the upper surface of said annular ring defining a continuation of the generally spherically shaped cavity in said ball receiving support member, said upper surface including a ball sealing surface for continuous conforming contact with said ball for substantially 360° around the ball, the inner diameter of said annular ring being smaller than the diameter of said ball; a flange extending downwardly and outwardly from the inner portion of said annular ring, the upper portion of the outer surface of said flange being spaced at all points from the container neck when the fitment is installed in place upon the container, the lower portion of said surface having substantially continuous conforming contact with said neck for 360° around the neck, the area of said conforming contact with the container neck lying on a radial line extending from the center of the ball through the central portion of said continuous ball sealing surface; and means extending downwardly from said outwardly directed shoulder for securing the fitment to the container.

2. The ball applicator fitment of claim 1 in which the area of said ball sealing surface with which the applicator ball is in contact, when pressed down by the container cap when the latter is secured to the container, is located entirely within any and all lines drawn from the center of the ball through the innermost points of contact between said terminal face of the container neck and the bottom face of said outwardly directed shoulder.

3. The ball applicator fitment of claim 1 in which the bottom face of the generally outwardly directed shoulder has conforming contact solely with the outer perimeter of the terminal face of the container neck, and said bottom face is spaced from said terminal face inwardly of said perimeter when the fitment is installed in place upon the container.

4. The ball applicator fitment of claim 1 in which the lower portion of the outer surface of said flange forms a knife edge in conforming contact with said container neck.

5. The ball applicator fitment of claim 1 in which the lower portion of the outer surface of said flange forms a feather edge in conforming contact with said container neck.

6. The ball applicator fitment of claim 1 in which the outermost diameter of said ball sealing surface is smaller than the diameter of said container neck.

References Cited by the Examiner

UNITED STATES PATENTS

2,700,784	2/55	De Brock	15—572
2,823,403	2/58	Whitney	15—572
2,975,466	3/61	Fillmore	15—572

WALTER A. SCHEEL, *Primary Examiner.*