May 12, 1970 M. KESSLER 3,511,420

PUSH-PULL DISPENSING CAP WITH DOUBLE SEAL

Filed June 29, 1967

FIG. 1.

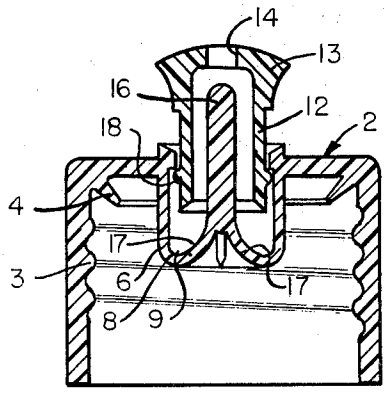
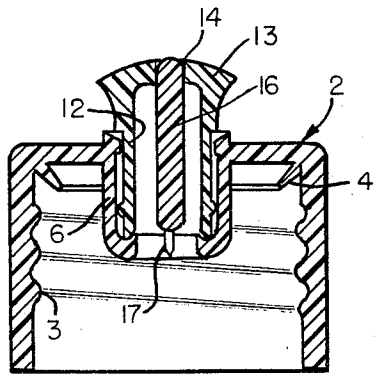


FIG. 2.



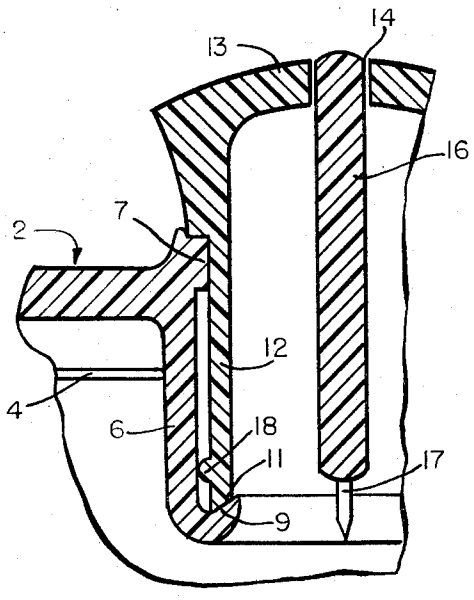
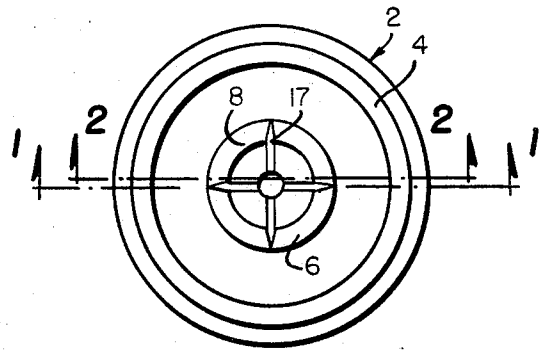


FIG. 3.

FIG. 4.



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PUSH-PULL DISPENSING CAP WITH DOUBLE SEAL

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U.S. Cl. 222—525 1 Claim

ABSTRACT OF THE DISCLOSURE

A push-pull dispensing and closure cap for containers of liquids, such as detergents, the cap having a fixed central axial closure post which closes a hole in an axially slidable outer dispensing spout when the spout is pushed toward the cap; the spout has a cylindrical lower sleeve which slides telescopically in a slightly larger diameter sleeve fixed to the cap and in the lowermost or closed position makes a tight abutting seal between the lower portion of the said cylindrical sleeve and a lower portion of said larger diameter sleeve, which seal prevents leakage of fluid between the two sleeves.

This invention relates to a dispensing closure for use with bottles of liquid material which is dispensed in small quantities during use, such as liquid detergents, cleaning fluid, shampoo, and so forth. These materials are often sold in bottles, which may be glass but which may be plastic squeeze bottles, and in use, a small quantity of the contained liquid is supplied as by inverting the bottle or also by squeezing it, in the case of plastic squeeze bottles. A common type of dispensing closure for this purpose is embodied in a cap, usually made of plastic, which may be screwed or otherwise affixed to the bottle, and which has an axially slidable spout with a central hole or dispensing aperture, this spout being sealed by a fixed center post when the slidable spout is pressed down toward the cap, and which is freed from this center post by axial motion of the pouring spout away from the cap to permit the contents of the bottle to be dispensed through the central aperture. A cap of this general type is shown in U.S. Pat. No. 3,201,013. One problem which has arisen in caps of this type is that although the central aperture can be readily and effectively sealed by the fixed post, the rest of the pouring spout which necessarily constitutes a sleeve which telescopically slides within a slightly larger sleeve to provide the above-described axial motion, is subject to leakage between the two sleeves, especially in the case of squeeze bottles, which are readily deformed by pressure on the sides of the bottle.

It is a primary object of the present invention to provide a novel yet simple structure which produces an effective seal between the two telescoping cylinders in the closed position of the dispensing spout.

Another problem resides in the fact that the fluids which are dispensed are often rather viscous and tend not to flow freely; it is therefore essential that the spout construction be such as to provide a good flow path between the interior of the container and the aperture of the pouring spout, in order that the rate of flow shall be satisfactory. This is accomplished in the present invention by providing a smooth flow channel in the dispensing spout, with only a minimum amount of unavoidable obstruction in this channel due to the necessity of supporting the center post.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawing, in which:

FIG. 1 is a sectional view taken on line 1—1 of FIG. 4;

FIG. 2 is a sectional view taken on line 2—2 of FIG. 4;

FIG. 3 is an enlarged view of a portion of FIG. 2, in order to show more clearly the details of the seal; and

FIG. 4 is a bottom elevation view of the cap of the invention.

The cap **2**, preferably of molded plastic, is shown provided with internal threads **3** for screwing the cap onto a correspondingly threaded neck of a bottle or container which may be either glass or the common type of plastic squeeze bottle. The cap **2** is preferably provided with a flexible sealing ring **4** which engages the lip of the neck of the container to which the cap is attached, although any other type of sealing arrangement may be employed. The central portion of the cap has integrally molded therewith a downwardly protruding cylinder **6** having sufficiently thick walls to maintain a reasonable amount of rigidity, and provided at the top thereof with an internal flanged portion **7** of slightly smaller internal diameter than the main diameter of the cylindrical portion **6**. The bottom portion of cylinder **6** is provided with an inwardly turned flange **8** having a sloping upper surface **9** adapted to form a seal with a correspondingly shaped bottom portion **11** of a cylinder **12** of smaller diameter than cylinder **6** and adapted to slide telescopingly within cylinder **6**. Cylinder **12** is the lower portion of the pouring spout **13** which is provided with a central aperture **14** through which the liquid to be dispensed emerges when the pouring spout **13** is in the position shown in FIG. 1. In the closed position shown in FIGS. 2 and 3, the aperture **14** is closed by central post **16** which is supported from the bottom of the cap cylinder **6** by means of struts **17** shown as four in number, as this number of struts has been found to give adequate support without significantly obstructing the flow of fluid, although it will be apparent that a different number of struts could also be used. The struts **17** are preferably not horizontal, but slope upwardly from their point of connection to the inner flange **8**, which has the advantage of providing less interference with the flow of liquid through the dispensing spout, and also tends to maintain the inner flange **8** and surface **9** rigid and dimensionally stable so as to provide a good sealing fit between surfaces **11** and **19**. An annularly projecting ring **18** is provided near the lower portion of inner cylinder **12** to take up the clearance between the two cylinders, and thereby the combination of flanges **7** and **18** provide a smooth sliding fit between the two cylinders without wobbling. These two flanges also aid to some extent in minimizing leakage from the interior of the container to the space between the two telescoping cylinders; however, the dimensional accuracy to which these parts can be molded in practice is not such that this by itself provides adequate sealing in all cases, this being accomplished between the abutting surfaces **8** and **9**, which are not so sensitive to minor variations in dimensional tolerances due to the geometrical configuration employed. The same is true of the closing fit between the post **16** and aperture **14**, it being only necessary that the diameter of the aperture be correct for the size of the post employed, and any slight lateral deviation will be accommodated due to the flexibility of the post **16**. The present structure therefore makes it possible to obtain a reliable and leak-proof fit at both regions where leakage normally tends to occur, without requiring a high degree of dimensional accuracy which is difficult or impossible to obtain with the plastic materials employed. At the same time, no very intricate molding operations are required, which are also difficult to perform and tend to result in a large number of rejects.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be

made in construction and arrangement within the scope of the invention as defined in the appended claims.

I claim:

1. A plastic cap for a liquid container, said cap having a cylindrical side portion and a top portion extending across one end of said cylindrical side portion, said cap comprising

(a) fastening means for fastening the cap to a pouring neck portion of a liquid container;

(b) sealing means for sealing the cap in a liquid-tight manner to the neck of a container to which the cap is fastened;

(c) a hollow tubular member extending from the top of the cap and providing fluid communication from the inside of the cap to the outside;

(d) an internal reentrant flange at the bottom of said tubular member; said flange having an upper surface sloping upwardly from the interior wall of said tubular member toward the central axis of the tubular member;

(e) a central post within said hollow member and coaxial therewith;

(f) strut means supporting said central post within said hollow member, said strut means permitting flow of liquid through said hollow member;

(g) a cap-like pouring spout comprising a cylindrical element and a top portion, said cylindrical element being telescopically axially slidable within said tubular member and said top portion having a central pouring aperture;

(h) the bottom rim of said cylindrical element having a sloping surface seating against the upwardly sloping surface of sad reentrant flange to form a liquid-tight bottom seal in the lowest position of said pouring spout;

(i) said central post closing said central pouring aperture in said lowest position of said pouring spout;

(j) said pouring spout being axially slidable within said hollow tubular member to another position in which said central aperture is free from said central post to permit liquid flow therethrough;

(k) each of said strut members being fixed at one end to said internal reentrant flange and at the other end to said central post;

(l) each of said strut members sloping upwardly from said internal reentrant flange to a point of junction with the bottom of said post.

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