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BOTTLE CLOSURE

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Fig. 1

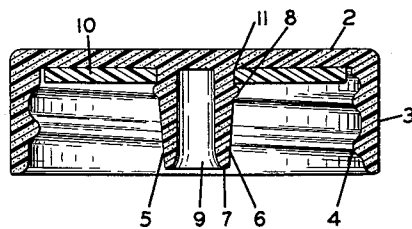
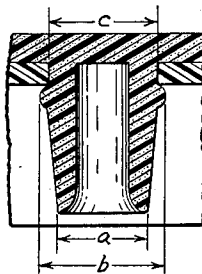


Fig. 2



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BOTTLE CLOSURE

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2 Claims. (Cl. 215—40)

This invention relates to a bottle closure and is concerned more particularly with a molded type bottle closure having a polyethylene sealing liner disposed therein.

Molded bottle closures are customarily used on containers for preparations such as nail polish and other liquid and semiliquid preparations. Nail polish which includes a solvent which deleteriously affects most sealing liner compositions may be satisfactorily sealed with a liner formed of a solid polymer of ethylene. Closures lined with polyethylene have been made heretofore and are disclosed in Dorough Patent 2,238,681.

One of the problems which has confronted the manufacturer producing this type of closure is that of securing the solid polyethylene liner to the molded body of the closure to prevent separation of the two components during shipment of the closures in bulk to the place of use, and also during use when the sealing liner may adhere to the lip of the container and be removed from the inside of the closure body when the closure is unscrewed from the bottle to which it is applied. As is well known, polyethylene liner materials cannot be secured readily to molded closures by the use of conventional adhesives, principally because of the inability of most adhesives to wet the waxy surface of the polyethylene material.

While viscous adhesives have been developed for this purpose, they tend to "string" when the adhesive applicator head is withdrawn from inside the closure, and this tends to contaminate the screw threads and sometimes the lower edge and outer side wall of the closure. The problem of "stringing" is particularly acute with applicator type closures which include a well which projects from the center of the inner head surface of the closure and receives the stem of an applicator brush. An adhesive applicator head of annular configuration must be used to deposit the adhesive in the space between the well and the screw-threaded side wall of the closure, and it is difficult with the viscous adhesives to avoid serious contamination of the wall of the well portion resulting from stringing of the adhesive as the applicator head is withdrawn. The cost of the adhesive and its application, as well as the higher cost of inspection and the reworking of those closures which do not pass inspection because of contamination of the closure body by adhesive, militate against the use of adhesive assembly where solid polyethylene liners are used.

An object of the invention, therefore, is to provide a molded bottle closure of the well type having a solid polyethylene sealing liner positioned in the closure between the wall of the well and the side wall of the closure and held therein by interengagement between the sealing liner and a projection on the wall of the well, the liner thus being secured against dislodgment during transportation and normal use.

Molded plastic bottle closures for nail polishes and the like must be mass-produced at low cost in order to be competitive with other types of closures; and, accordingly, it is essential that the combination be so constructed

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that assembly of the sealing liner with the closure may be effected rapidly so as not to be too costly.

It is an object of the present invention to provide a structure including a molded closure having a well and a solid polyethylene sealing liner, with the parts being so proportioned that the sealing liner may be rapidly assembled with the closure body on a mass production basis with automatic assembly machines.

Other objects of the invention will be apparent from consideration of the following description of a preferred embodiment of the invention in conjunction with the attached drawing, in which:

Figure 1 is an enlarged cross-sectional view showing a well type molded closure with a solid polyethylene liner received therein, and

Figure 2 is a detailed sectional view to a further enlarged scale illustrating the relationship between the dimensions of parts of the closure body and the liner.

Referring to Figure 1, there is shown a bottle closure which comprises a molded body having a head portion 2, a side wall portion 3 projecting from the periphery of the head portion, and a screw-threaded projection 4 on the inner surface of the side wall portion. An applicator well 5 projects from the center of the head portion 2 within the confines of the side wall portion 3 and has a tapered outer surface 6 which leads from the upper edge 7 thereof to a generally annular liner-retaining projection 8 directed from the well 5 toward the side wall portion 3 and spaced above the head portion 2. The well 5 is provided with a central opening 9 which may receive the stem of a small brush or other applicator device.

A ring type sealing liner 10 of solid polyethylene material is received within the closure and is held in position against dislodgment by the liner-retaining projection 8. It will be observed by reference to Figure 1 that the outer diameter of the ring sealing liner 10 is less than the minimum diameter of the side wall portion 3 at the screw thread projections 4. The inner diameter of the ring sealing liner is preferably somewhat less, generally in the order of .003" to .005" less, than the outer diameter 11 of the well 5 in the area between the head portion 2 and the liner-retaining projection 8. This insures that the liner will rest against the wall of the well behind the liner-retaining projection 8.

In order to facilitate rapid assembly of the sealing liner with the closure and to permit the use of a solid polyethylene liner which in the thicknesses customarily used in lining closures is not susceptible to stretching to any substantial extent under the application of small forces, preferred practice is to provide the tapered portion 6 on the well and to so proportion the same that the diameter *a* as shown in Figure 2 will be less than the diameter *c* shown in that view, the dimension *c* indicating the diameter of the central opening in the annular sealing liner 10. This permits the sealing liner to be dropped into the closure and over the top portion at least of the well 5, the liner being guided along the tapered surface 6. The diameter of the liner-retaining projection 8, which dimension has been indicated at *b* in Figure 2, is greater than the maximum inner diameter *c* of the sealing liner, so that when the liner has been forced over the projection it will remain in its inserted position, being held against dislodgment by the liner-retaining projection. Because of the nature of the solid polyethylene material which is not as yieldable as gum rubber, for example, it is necessary to so proportion the inner diameter of the ring sealing liner and the outer diameter of the liner-retaining projection that rapid assembly may be effected without the necessity of applying forces of such magnitude as would possibly damage or break a relatively fragile molded closure. For most practical purposes, the liner-retaining projection 8 will be acceptable if it projects radially outwardly a dis-

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tance of .003" to .006" from the wall of the well. in other words, the maximum outer diameter of the liner-retaining projection 8 will be from .006" to .012" greater than the diameter of the well in the area thereabove where the seated liner is positioned.

As shown in Figure 2, preferred practice is to provide the liner-retaining projection 8 in such position on the side wall of the well that when the sealing liner is positioned thereover no substantial axial movement of the liner with respect to the well will be permitted. A tolerance of .010" to .015" is generally provided, however, to insure that in all instances the liner will be disposed fully above the liner-retaining projection. The liner-retaining projection is rounded throughout to facilitate molding of the closure body and also to avoid damage to the liner and to permit rapid assembly by forcing the liner over the liner-retaining projection. While the liner-retaining projection has been indicated as completely annular, it may be segmented if desired, for it will perform the same function if so constructed. By use of the term "generally annular" in reference to the liner-retaining projection, it is intended to comprehend such modifications. As a typical illustration of the dimensions of a satisfactory closure, reference is made to a 33-millimeter bottle closure for application to a standard screw-finished bottle neck. The diameter *a* of the molded closure body may be .251", the diameter *b* .312", and the diameter of the wall of the well above the liner-retaining projection may be .300". The sealing liner of solid polyethylene may be .040" to .050" thick, have an outer diameter of 1.166" to 1.176", and an inner diameter of about .295" prior to assembly with the closure body or about .005" less than the .300" diameter of the well surface which it will engage when assembled, and about .017" less than the diameter of the liner-retention projection over which it is forced during assembly.

I claim:

1. A bottle closure comprising: a molded body having

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a head portion, a side wall portion projecting from the periphery of the head portion, a screw-thread projection on the inner surface of the side wall portion, an applicator well projecting from the center of the head portion within the confines of said side wall portion, a tapered outer surface on said well leading from the outer edge thereof to a generally annular liner-retaining projection of generally semicylindrical shape projecting radially from said well toward said side wall portion and spaced above said head portion and over which an annular sealing liner may be pressed axially of said well, and a ring type sealing liner of solid polyethylene snap-fitted within said closure over and held in position against dislodgment by said liner-retaining projection, the outer diameter of said ring sealing liner being less than the minimum diameter of said side wall portion at said screw-threaded projection and the inner diameter of said ring sealing liner being less than the maximum outer diameter of said liner-retaining projection and greater than the minimum outer diameter of said tapered outer surface of said well portion.

2. A bottle closure in accordance with claim 1 in which the liner-retaining projection extends from the wall of the well about .003" to .006".

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