United States Patent [19]

Souza

[11] **3,773,233**

[45] **Nov. 20, 1973**

[54] **SELF-CLOSING DISPENSER**

[75] Inventor: **Augustine A. Souza,** San Jose, Calif.

[73] Assignee: **Phoenix Closures, Inc.,** Chicago, Ill.

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[21] Appl. No.: **101,773**

[52] **U.S. Cl.** **222/490**

[51] **Int. Cl.** **B65d 5/74**

[58] **Field of Search** 222/92, 107, 213, 222/494, 490; 137/525.1; 264/237

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Primary Examiner—Samuel F. Coleman
Assistant Examiner—Norman L. Stack, Jr.
Attorney—Diller, Brown, Ramik & Holt

[57] **ABSTRACT**

This disclosure relates to a self-closing dispenser comprising a dispenser body defining a generally elongated passage having exit and entrance end portions, the body being molded from synthetic polymeric material and including two diametrically opposite relatively rigid and immovable upstanding posts, and a pair of resilient concavely outwardly opening walls extending laterally between the posts and axially between the passage exit and entrance end portions. Due to the (1) concave configuration of the resilient walls, (2) the heavier and more rigid posts, and (3) the molding of the dispenser from heated polymeric material, the exit end portion of the dispensing passage is held intimately sealed and though openable during pressurized product flow, will because of items (1) through (3) return to its normally sealed condition.

9 Claims, 9 Drawing Figures

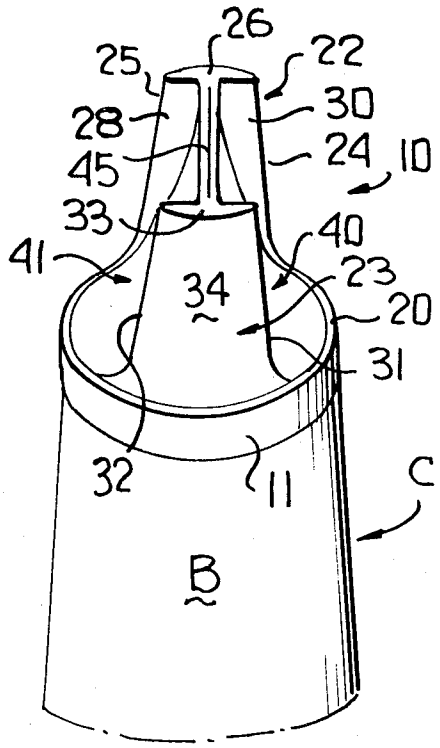


FIG.1

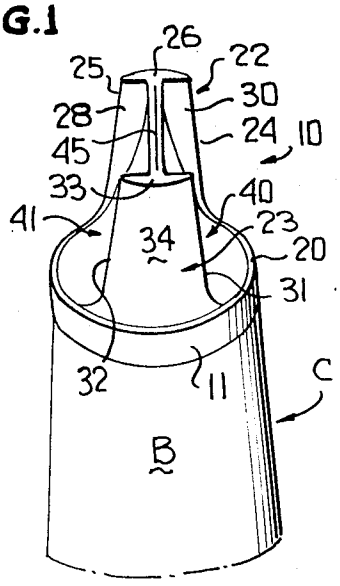


FIG.2

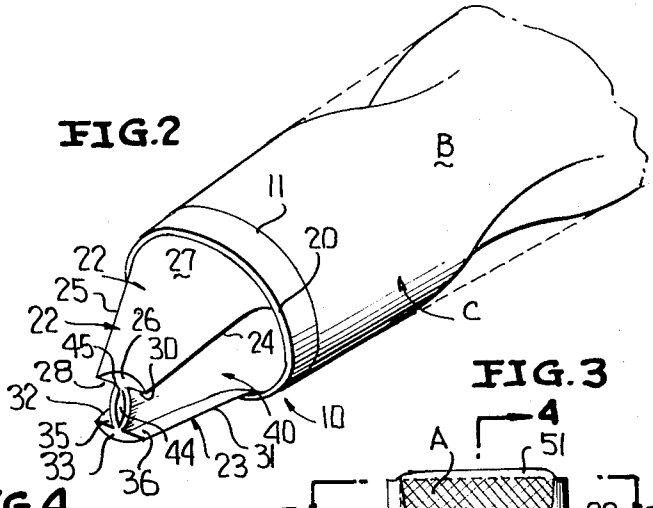


FIG.3

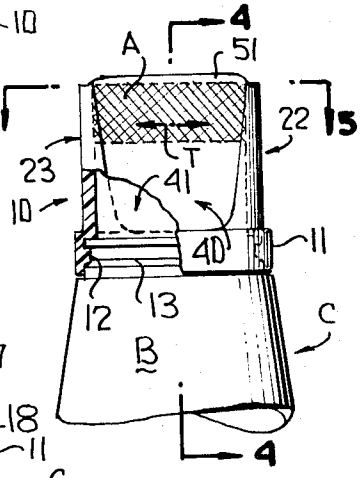


FIG.4

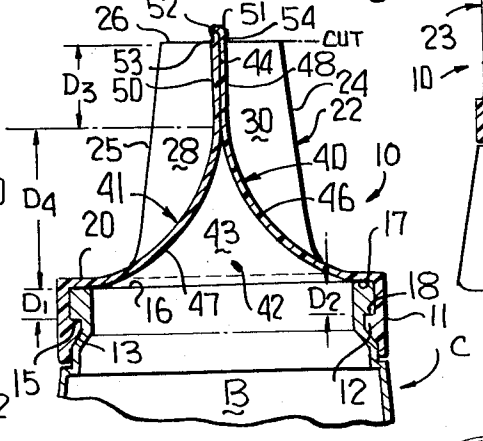


FIG.5

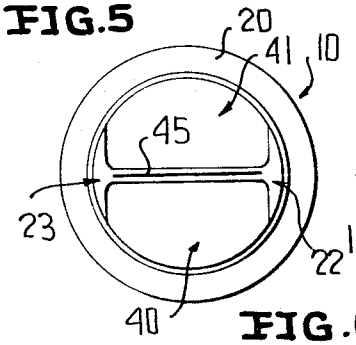


FIG.6

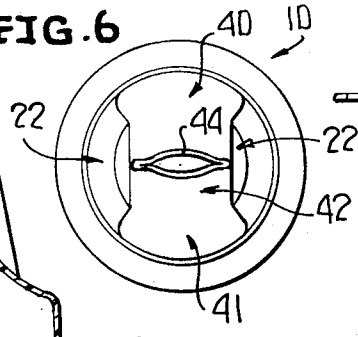


FIG.8

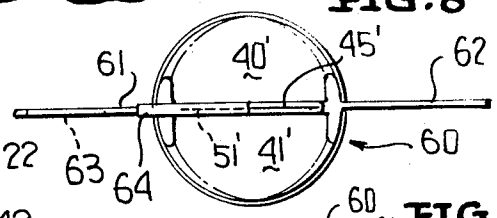


FIG.7

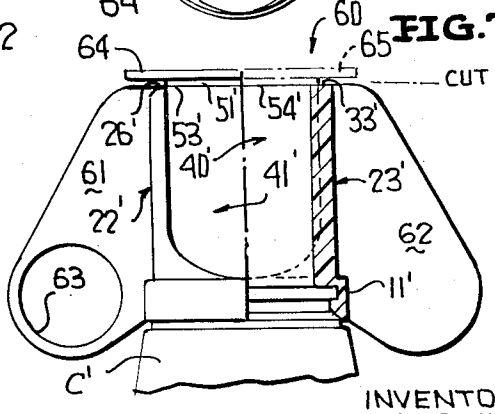
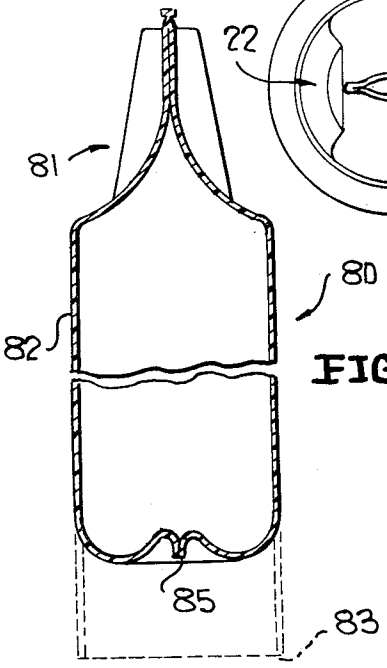


FIG.9



INVENTOR
AUGUSTINE A. SOUZA

By Dike, Bronstein, Roberts & Cushman
ATTORNEYS

SELF-CLOSING DISPENSER

The present invention is directed to a dispenser for viscous material which may be constructed in the form of a dispenser cap adapted for securement to an associated container or as an integral one-piece dispenser cap and container body. In either case the containers are constructed from resilient material such that manual pressure against the container body will collapse the wall or walls thereof resulting in the internal pressurization of the product and the dispensing thereof through a passage of the dispenser. As thus far described, such dispensers are relatively well known, and in most cases efforts are made to construct the dispensers such that upon the release of manual pressure the passage thereof will automatically close to thereafter prevent inadvertent and/or accidental product discharge until such time as manual pressure is once again intentionally applied thereto.

Unfortunately, most efforts in this area have resulted in dispensers which are either extremely complicated from a manufacturing and/or operational viewpoint or are not self-sealing or closing though professing to be so.

In accordance with this invention, a dispenser is provided having a dispenser body defining a generally elongated passage having exit and entrance end portions, the body being molded from synthetic polymeric material and including two diametrically opposite relatively rigid immovable upstanding posts, the passage being defined by a pair of resilient walls extending laterally between the posts and axially between the exit and entrance end portions, the pair of walls at the entrance end portion each being of an outwardly opening concave configuration, and the pair of walls at the exit end portion having inner planar surfaces in total contacting planar relationship whereby due to (1) the construction of the dispenser from heated thermoplastic material, (2) the more rigid nature of the posts as compared to the resilient walls, (3) the concave configuration of the resilient walls, and (4) the greater shrinkage during cooling inherent in the resilient walls as compared to the rigid posts, the passage exit end portion remains closed with the inner surfaces of the resilient walls in intimate planar contacting relationship prior to and after pressurized product flow.

A further object of this invention is to provide a novel dispenser of the type described wherein the pair of posts each have axially terminal outer end walls, the pair of resilient walls have axial terminal ends projecting axially beyond the post terminal end walls, and the resilient wall terminal ends are closed by a homogeneous molded wall portion therebetween whereby removal of the last-mentioned wall portion is required to form an opening at the passage exit end portion incident to a dispensing operation.

Still another object of this invention is to provide a novel dispenser of the type mentioned wherein at least one of the posts includes handle means for manually gripping the dispenser incident to a dispensing operation.

Another object of this invention is to provide a novel dispenser of the type aforesaid wherein the dispenser body includes a reinforced peripheral skirt having means internally thereof for securing the dispenser to a container in such a manner as to produce axial forces tending to further rigidify the pair of posts and prevent radial inward deflection during pressurized product flow.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter, and the several views illustrated in the accompanying drawing.

In the drawing:

FIG. 1 is a fragmentary perspective view of a novel self-closing dispenser constructed in accordance with this invention, and illustrates two diametrically opposite rigid and immovable upstanding posts spanned by a pair of thinner walls defining a dispensing passage having axially opposite entrance and exit end portions.

FIG. 2 is a fragmentary perspective view of the dispenser of FIG. 1, and illustrates the manner in which manual pressure applied to a container body thereof causes the opening of the passage exit end portion.

FIG. 3 is a fragmentary side elevational view of the dispenser of FIGS. 1 and 2 with a portion thereof broken away and removed for clarity, and illustrates the manner in which axial terminal ends of the resilient walls project beyond ends of the posts.

FIG. 4 is a slightly enlarged fragmentary sectional view taken generally along line 4—4 of FIG. 3, and illustrates a relatively large planar seal formed by inner wall surfaces of the resilient walls, with the latter being normally closed prior to a dispensing operation.

FIG. 5 is a top plan view of the dispenser taken generally along line 5—5 of FIG. 3 after terminal ends of the resilient walls have been removed, and illustrates the passage exit end portion terminating in a straight line slit-like normally closed opening normal to the pair of posts and in an axial plane of the dispenser.

FIG. 6 is a bottom plan view of the dispenser, and illustrates the passage in its open condition when manual pressure has been applied to the container, as illustrated in FIG. 2.

FIG. 7 is a fragmentary side elevational view of another dispenser constructed in accordance with this invention with a portion thereof broken away and removed for clarity, and illustrates each of a pair of diametrically opposite rigid upstanding posts having handle means for manually gripping the dispenser incident to a dispensing operation.

FIG. 8 is a top plan view of the dispenser of FIG. 7, and illustrates the partial removal of terminal ends of a pair of resilient walls for forming a slit-like opening of a passage of the dispenser.

FIG. 9 is an axial sectional view of another dispenser constructed in accordance with this invention, and illustrates the dispenser as including an integrally molded container body having a normally open lower end, shown in phantom outline, which is subsequently sealed after a dispensable product has been packaged therein.

A novel dispenser constructed in accordance with this invention is illustrated in FIGS. 1 through 6 of the drawing, and is generally designated by the reference numeral 10. The dispenser 10 includes a dispenser body (unnumbered) constructed from polymeric or copolymeric thermoplastic material, such as polypropylene, polyethylene or the like, and is formed by conventional injection-molding techniques. However, due to the specific design of the dispenser 10 to be described more fully hereinafter the formation of the dispenser

10 by injection-molding assures self-sealing characteristics, as will appear more apparent hereinafter.

The dispenser 10 includes a relatively rigid peripheral skirt 11 (FIGS. 3 and 4) having an inwardly directed circumferential locking bead 12 for securing the dispenser 10 upon a separately formed container C having a body B constructed from flexible, deformable and reboundable material which preferably though not necessarily is synthetic plastic and may be considered to be a conventional "squeeze-type" container. The bead 12 interlocks in an outwardly opening circumferential groove 13 of the container C. The groove 13 includes an uppermost annular shoulder 15 spaced a distance D1 from an uppermost lip 16 which is greater than the distance D2 between an undersurface 17 of the dispenser 10 and an upwardly facing annular shoulder 18 of the bead 12 prior to seating the dispenser 10 upon the container C or, stated another way, prior to interlocking the bead 12 of the dispenser 10 with the groove 13. Thus, due to the lesser dimension D2 prior to the application of the dispenser 10 upon the container C as compared to the distance D1, the peripheral skirt 11 is placed in axial tension when seated upon the container C, for a purpose which will be more apparent hereinafter.

The dispenser 10 includes an annular upwardly facing surface or shoulder 20 which merges smoothly with the peripheral skirt 11 and a pair of diametrically opposite relatively rigid immovable upstanding posts 22, 23. The post 22 includes upwardly converging side edges 24, 25 terminating at a terminal end wall 26. An exterior surface 27 of the post 22 between the side edges 24, 25 is of a generally convex configuration while a pair of inboard surfaces 28, 30 are generally uniplanar and lie in a common plane while converging downwardly toward the annular shoulder 20, as is best illustrated in FIG. 1. The post 23 likewise includes side edges 31, 32 converging upwardly and terminating at a terminal end wall 33. An outermost surface 34 of the post 23 is likewise of a generally convex configuration while inboard surfaces 35, 36 are uniplanar and in a common plane while converging downwardly in a direction toward the annular shoulder 20. as best illustrated in FIG. 2.

A pair of resilient walls 40, 41 are positioned between the posts 22, 23 and extend from the shoulder 20 upwardly toward and beyond the terminal end walls 26, 33 of the respective posts 22, 23, as is best illustrated in FIGS. 3 and 4 of the drawing. The walls 40, 41 define a dispensing passage, generally designated by the reference numeral 42 having an entrance end portion 43 and an exit end portion 44 which terminates in a straight line slit-like normally closed opening 45 (FIG. 1) which lies in an axial plane normal to the inboard walls or surfaces 28, 30 and 35, 36 of the respective posts 22, 23. The walls 40, 41 are appreciably thinner in cross section than the more rigid and immovable posts 22, 23, as is readily apparent from a comparison of FIGS. 3 and 4, and each of the walls 40, 41 preferably has a cross-sectional wall thickness which progressively thins in a direction away from the annular shoulder 20 toward the exit end portion 44 and the slit-like opening 45 of the passage 42.

In the as-molded condition of the dispenser 10, which is illustrated in FIGS. 3 and 4, the walls 40, 41 include lower portions 46, 47, respectively, adjacent the entrance end portion 43 of the passage 42 which curve concavely outwardly and merge with generally uniplanar parallel wall portions 48, 50 adjacent the exit end portion 44 of the passage 42 with inner surfaces (unnumbered) of the wall portions 48, 50 defining a planar seal or sealing area of a substantial axial length indicated by the dimension D3 in FIG. 4. Moreover, in the as-molded condition the walls 40, 41 have a common terminal end 51 which projects axially beyond the end walls 26, 33 of the respective posts 22, 23 and beyond an uppermost terminal edge 42 of the exit end portion 44. Due to the latter construction, the common portion 51 of the walls 40, 41 can be removed by scissors, a knife or the like along a plane common to the end walls 26, 33 to form the slit 45 incident to a dispensing operation. In this manner, access to a packaged product (not shown) within the container C is impossible during storage and/or shipment, and contamination thereof is completely precluded. The common wall 51 may, of course, be provided with score lines, lines of perforation, or similar weakening lines 53, 54 for removing the common wall 51 by simply manually grasping and tearing the same along the weakening lines 53, 54 thereby avoiding the use of scissors, knives or similar ancillary cutting tools.

Due to the construction of the dispenser 10 by an injection molding process or any similar processes utilizing hot thermoplastic material, the walls 40, 41 which are appreciably thinner than the posts 22, 23 shrink more rapidly and to a greater extent than the shrinkage of the more massive or thicker posts 22, 23. This differential in shrinkage sets up tensile forces T (FIG. 3) in the walls 40, 41 which tend to hold the inner surfaces (unnumbered) of the wall portions 48, 50 in intimate contacting relationship along the exit end portion 44 of the passage 42. This intimate sealing contact is also augmented by the concave configuration of the wall portions 46, 47 and, finally, due to the axial tensile forces set up in the peripheral skirt 11 due to the dimensions D1, D2 the posts 22, 23 are further rigidified and the tendency of the same to deform or deflect radially inwardly is virtually precluded. Thus, the dispenser in its normal state (FIGS. 1 and 3 through 5) is self-sealing by virtue of the four factors heretofore enumerated and the seal achieved is of a generally planar configuration having an axial length corresponding to the dimension D3 and a diametric length equal to the distance across the passage exit portion 44 substantially between the posts 22, 23, as indicated by the cross-hatched area A in FIG. 3.

Incident to a dispensing operation the common wall 51 of the walls 40, 41 is removed in the manner heretofore described, and the container body B is manually compressed, as shown in FIG. 2, resulting in the internal pressurization of the product (not shown) and the progressive movement thereof through the passage 42 and outwardly of the slit-like opening 45. During the movement of the product the walls 40, 41 progressively spread and open in an upward direction until the wall portions 48, 50 are fully open breaking the seal A and permitting the dispensing of the product through the now fully open opening 45 (FIG. 2). When a desired amount of the product has been dispensed the body B is released and inherently returns to its normal position as internal pressure decreases. Upon this decrease in internal pressure the normal tensile forces T in the walls 40, 41 as well as the additional tensile forces set up therein when the walls stretch return the walls 40,

41 to the normal position thereof (FIG. 4) with any material in the passage 42 being extruded or forced downwardly in the passage 42 for eventual return into the container C. Obviously, not all of the product between the wall portions 48, 50 can be extruded therefrom and thus the seal A which is re-established after a dispensing operation relies in part upon product dry-out or caking adjacent the slit-like opening 45 which will occur due to atmospheric contact. However, the extent of caking will be highly limited axially inwardly and downwardly from the slit-like opening 45 because of the intimate seal thereat and therefore the major portion of the product between the walls 48, 50 in the area of the seal A will be neither dried out nor caked.

Apart from the self-sealing characteristic of the dispenser 10 resulting from the specific construction heretofore described, it is to be understood that variations in the invention can be made if, for example, it is desired to dispense products of different viscosities. That is, the dispenser 10 is readily adaptable to the different degrees of squeeze-pressure required for dispensing a wide range of products of varying viscosity. This can be controlled by a variation in the thickness of the walls 40, 41, although at all times maintaining the same appreciably thinner than the posts 22, 23. In addition, the length D3 of the wall portions 48, 50 can be varied which in turn varies the axial distance D4 of the concave wall portions 46, 47. In other words, the length D3 of the exist wall portions 48, 50, the length D4 of the entrance wall portions 46, 47, and the variations in the concave configuration of the latter can be fluctuated as found necessary without departing from the present invention yet adapting the same to most any type of viscous product.

Reference is now made to FIGS. 7 and 8 of the drawing which illustrate another dispenser 60 with portions thereof constructed identically to corresponding portions of the dispenser 10 being identified by like primed reference numerals. Apart from the similarity between the dispensers 10, 60, the latter further includes a pair of integrally molded diametrically opposite manual gripping means in the form of handles 61, 62 lying in a diametric or axial plane, as is best illustrated in FIG. 8. Either or both of the handles 61, 62 may be provided with a finger-receiving opening 63.

In addition to the handles 61, 62 the common wall 51' of the walls 40', 41' includes a pair of radially outwardly directed opposite projections 64, 65 either of which can be grasped to tear the common terminal end wall 51' along the score lines 53' and 54'.

The dispenser 60 is designed particularly for use with larger size flexible or collapsible containers C' in the half pint, quart, gallon, etc., range. In this range of sizes the user tends to hold the dispenser 60 as a nozzle to direct the flow; and in doing so some product can contact the user's fingers. Thus, this is resolved by the handles 61, 62 which moreover additionally rigidify the posts 22', 23' since the same extend from the lower periphery of the skirt 11' to the upper terminal end walls 26', 33' of the respective posts 22', 23'.

While both dispensers 10, 60 are of the snap-on type, it is to be understood that the same may be provided with threads or lugs in lieu of the bead 12 and the container or containers C, C' correspondingly altered to accommodate twist-type, lug-type, threaded, etc., dispensers. Moreover, the dispenser 10 and the container C, as well as the dispenser 60 and the container C' can be formed as a single homogeneous one-piece molded unit, in the manner illustrated in FIG. 9. The dispenser 80 of FIG. 9 includes an upper end portion 81 which may be identical to either dispenser 10, 60 except the peripheral skirts 11, 11' thereof are devoid of beads, threads or the like and instead a lowermost portion 82 merely forms an integral extension of the upper end portion 81 having a normally open bottom end 83 which may be infolded and heat sealed or otherwise closed, as indicated at 85 after a product has been packaged within the dispenser 80. The dispenser 80 is preferably constructed by injection-molding the upper end portion 81 and blow-molding the lower end portion 82 by a process which will be readily apparent to those skilled in the art and may be, for example, in accordance with the apparatus and process disclosed in U.S. Pat. No. 3,100,913, in the name of Adolph J. De Matteo, issued Aug. 20, 1963, and entitled Multiple Injection Molding Apparatus.

While preferred forms and arrangements of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of parts may be made without departing from the spirit and scope of this disclosure.

I claim:

1. A dispenser comprising a dispenser body defining a generally elongated passage having exit and entrance end portions, said body being molded from synthetic polymeric material and including two diametrically opposite relatively rigid immovable upstanding posts each having first and second end portions adjacent said respective exit and entrance end portions thereby imparting rigidity to said body at diametrically opposite sides thereof, a pair of resilient walls defining said passage, said pair of walls extending laterally between said posts and axially between said exit and entrance end portions, said pair of walls at said entrance end portion each being of an outwardly opening concave configuration, said pair of walls at said exit end portion having inner planar surfaces in total contacting relationship in a common plane whereby upon the flow of a pressurized product from said entrance end portion to said exit end portion said inner planar surfaces progressively open as said resilient walls expand while upon the termination of pressurized product flow said inner plane surfaces progressively close to produce a planar seal therebetween and said pair of resilient walls are of an appreciably thinner cross-sectional thickness than said posts whereby upon cooling of said body after the molding thereof tensile forces are set up in said pair of walls which, due to the rigidity of said pair of posts, maintain said inner planar surfaces in intimate planar contacting relationship prior to and after pressurized product flow.

2. The dispenser as defined in claim 1 wherein said passage exit end portion terminates in a straight line slit-like normally closed opening normal to said pair of posts and in said common plane.

3. The dispenser as defined in claim 1 wherein said pair of resilient walls each have a cross-sectional thickness narrowing in a direction from said entrance end portion toward said exit end portion.

4. The dispenser as defined in claim 1 including a container body integrally molded with said dispenser body, said dispenser body being of an injection molded construction, and said container body being of a blow molded construction.

5. The dispenser as defined in claim 1 wherein said pair of posts each have an axially terminal outer end wall, and a pair of resilient walls project axially beyond said post terminal end walls.

6. The dispenser as defined in claim 1 wherein at least one of said posts includes handle means for manually gripping said dispenser incident to a dispensing operation.

7. The dispenser as defined in claim 1 wherein said pair of posts each have an axially terminal outer end wall, said pair of resilient walls have axial terminal ends projecting axially beyond said post terminal end walls, and said resilient wall terminal ends are closed by a homogeneous molded walls portion therebetween whereby removal of said last-mentioned wall portion is required to form an opening at said passage exit end portion.

8. A dispenser comprising a dispenser body defining a generally elongated passage having exit and entrance end portions, said body being molded from synthetic polymeric material, a pair of resilient walls defining said passage, said pair of walls extending axially between said exit and entrance end portions, said pair of walls at said entrance end portion each being of an outwardly opening concave configuration, said pair of walls at said exit end portion having inner planar surfaces in total contacting relationship in a common plane whereby upon the flow of a pressurized product from said entrance end portion to said exit end portion said inner planar surfaces progressively open as said resilient walls expand while upon the termination of pressurized product flow said inner planar surfaces progressively close to produce a planar seal therebetween and said pair of resilient walls are of an appreciably thinner cross-sectional thickness than said posts whereby upon cooling of said body after the molding thereof tensile forces are set up in said pair of walls which, due to the rigidity of said pair of posts, maintain said inner planar surfaces in intimate planar contacting relationship prior to and after pressurized product flow.

9. The dispenser as defined in claim 8 wherein said pair of resilient walls each have a cross-sectional thickness narrowing in a direction from said entrance end portion toward said exit end portion.

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