United States Patent

Taylor

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[54] **PLASITC CONTAINER WITH THREADED MOUTH STRENGTHENING CLOSURE MEANS**

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[73] Assignee: **Sanford Research Company**

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[52] **U.S. Cl.** .....**215/43 A,** 150/0.5, 215/1 C, 215/31, 215/48, 220/39 R

[51] **Int. Cl.** **B65d 41/04**

[58] **Field of Search**.....215/43 A, 43 R, 1 C, 31, 48, 215/41; 150/0.5, 8; 220/39, 42 C

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[57] **ABSTRACT**

A blow molded plastic container such as a bottle or a jar having a threaded thin walled mouth portion is provided with an internally threaded closure and a reinforcing means for strengthening and backing the mouth portion of the container. The reinforcing means in said closure includes an insert or backing member which can have a tapered or frusto-conical outer surface for backing or strengthening the mouth portion of the bottle or jar adjacent the lip when the closure is screwed over the bottle or jar mouth. The insert or backing member can be an integral part of the closure. Alternatively the insert or backing member can be part of a disc insert for the closure, the backing member being a downwardly extending circular flange. In either event the backing member is spaced inwardly from the closure threads a proper distance to tightly receive the threaded mouth wall between the backing member and the closure threads against accidental dislodgement. The closure can also be provided with a surface for engaging the lip of the mouth of the jar for sealing the jar.

12 Claims, 8 Drawing Figures

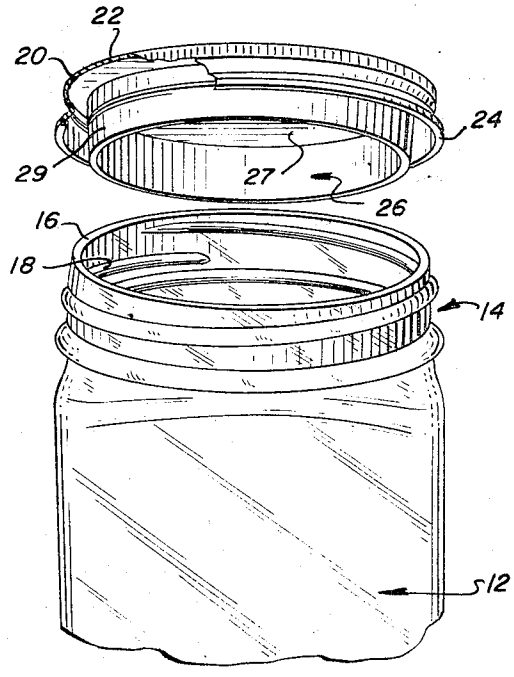

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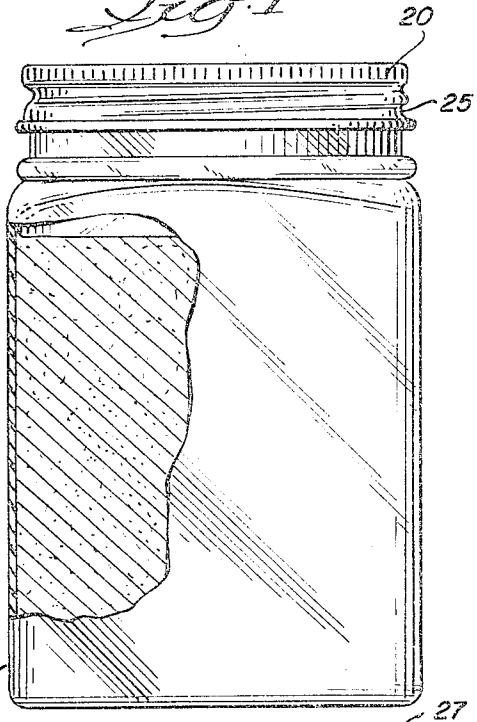
Fig. 1



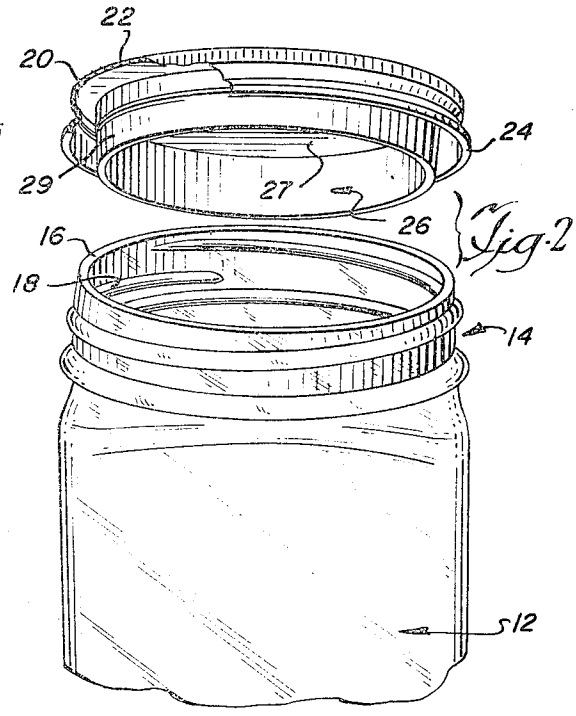


Fig. 2

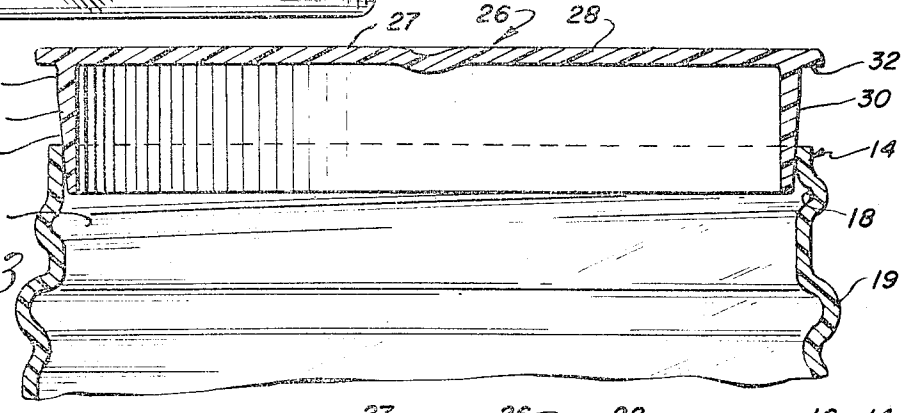


Fig. 3

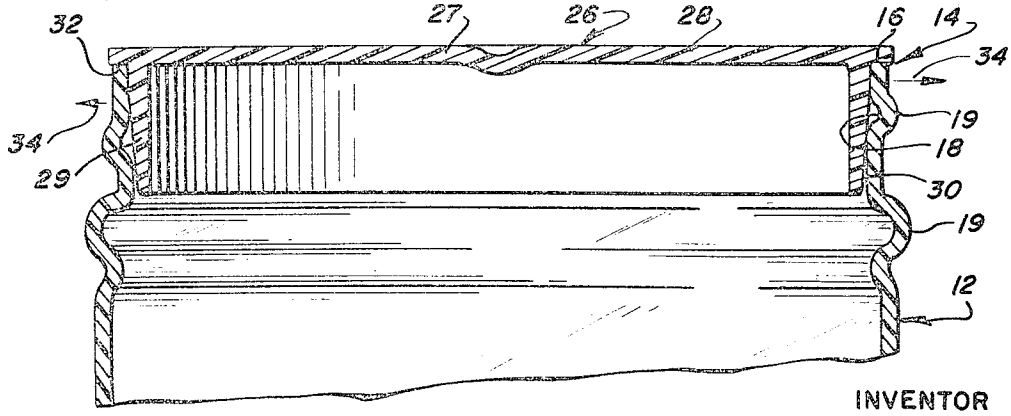


Fig. 4

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Fig. 5

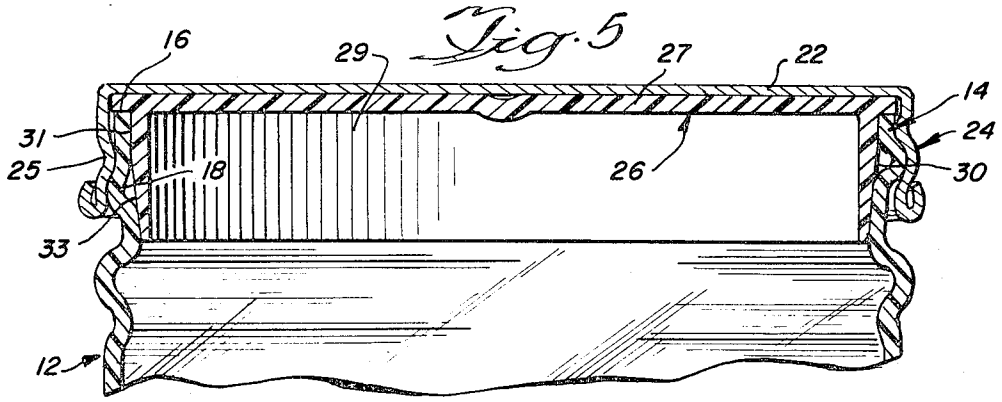
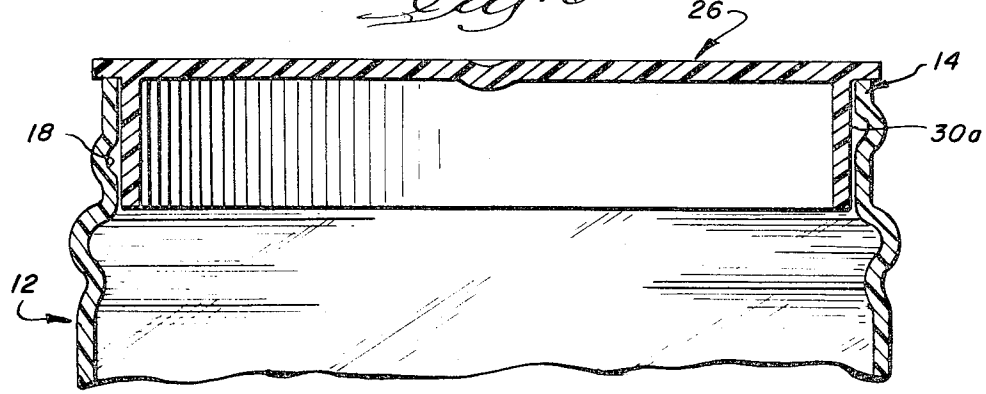


Fig. 6



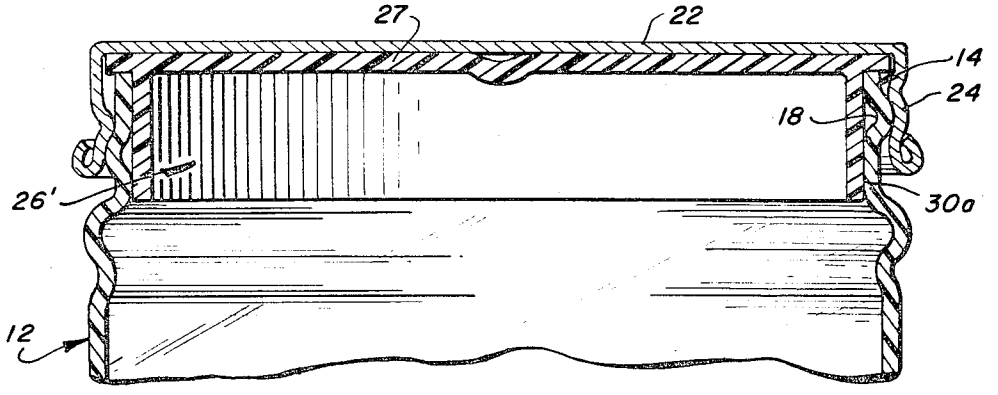


Fig. 7

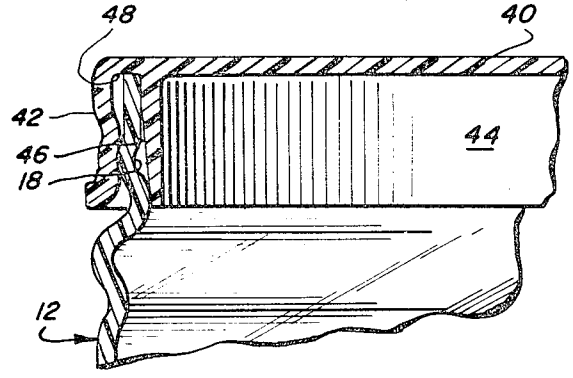


Fig. 8

PLASITC CONTAINER WITH THREADED MOUTH STRENGTHENING CLOSURE MEANS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to reinforcing means for the threaded mouth portions of thin walled plastic containers and in particular to closure devices having backing members for reinforcing the threaded thin wall portion at the open part of a thin walled container.

2. Description of the Prior Art

Available blow molded plastic containers, such as bottles or jars, usually have a mouth portion with hollow threads for receiving a closure. However such containers have been deficient in that the threads are not strong enough to withstand forces normally encountered in use of the container. The hollow threads are of necessity quite wide and the mouth wall is usually quite thin because of the requirement of blow molding and usually the container will have only a single spiral (360°) thread around the neck. Such threads are not adequate to withstand excessive twisting or shock forces transmitted to the mouth through impact. Excessive twisting easily overtorques the hollow threads and can cam the container mouth wall inwardly permitting leakage or spillage, and in some cases can even destroy the container wall at the threads. Dropping the container often collapses the neck portion of the container, dislodging the closure from the threads, again causing spillage.

The known prior art related to the use of caps or closures for glass or metal containers wherein the caps or closures are provided with inserts which project down into the open mouth of the containers for sealing purposes only. None of the prior art attempted to use the insert to back or reinforce the threads of the thin wall of a blow molded container.

SUMMARY OF THE INVENTION

The present invention provides a reinforcement for a thin walled hollow threaded mouth portion of a flexible container. The reinforcement for an internally threaded closure having threads cooperating with the thin walled threads of the container and having a system for holding the upper edge portion of the container threads spreading outwardly against dislodgement from the threads of the closure. While this invention is susceptible of embodiment in many different forms there are shown in the drawings and will herein be described in detail certain forms of the invention and modifications thereof with the understanding that the present disclosure is to considered as an exemplification of the principles of the invention and is not intended to limit the invention to the forms and modifications illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side view of a plastic container closed by one form of a closure of this invention;

FIG. 2 is a fragmentary perspective view of the closure exploded from the top of the container (of FIG. 1);

FIG. 3 is an enlarged partial section through the mouth portion of the container of FIGS. 1 and 2 and an insert portion of the closure showing the insert entering the mouth of the container;

FIG. 4 is an enlarged partial section as in FIG. 3 showing the insert in a position sealing the lip of the container;

FIG. 5 is an enlarged partial section as in FIG. 4 but showing the remainder of the closure in position closing and sealing the mouth of the container;

FIG. 6 is an enlarged partial section as in FIG. 4 through the container mouth showing another form of the insert;

FIG. 7 is an enlarged partial section as in FIG. 6 but including the remainder of the closure in position closing and sealing the mouth of the container; and

FIG. 8 is an enlarged partial section through a mouth portion of the container showing still another form of closure in position closing and sealing the container.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the preferred forms the reinforcing means which retains the threads of the container mouth and closure in engagement against stresses of impact shock and which prevents over-tightening of the closure is a backing member which backs the container mouth wall at the inner surface thereof and reinforces the mouth wall against radial inward movement which may otherwise permit dislodgement of the mouth wall from the lid threads. In one preferred form, the backing member defines a restricted entry channel for the container mouth wall to support the mouth wall between the closure threads and the backing member so that the wall cannot be cammed inwardly by over-tightening of the closure. The backing means is contained within the closure and defines a cylindrical or frusto-conical surface spaced inwardly from the closure threads a proper distance to receive the mouth wall between the cylindrical or frusto-conical surface and the closure threads. In another preferred form the backing member is a circular flange depending downwardly within the closure.

Referring to FIGS. 1 through 5 there is illustrated a plastic container having a body portion 12 and an externally threaded cylindrical thin walled mouth portion 14 terminating in an axially facing lip 16. The container is formed by blow molding resilient plastic material such as polyethylene, polypropylene and the like and has generally uniform wall thickness throughout the body portion 12 and the threaded mouth portion 14. The mouth portion 14 has a molded helical indentation 18 formed in the inner surface of the neck of the container which forms the inner back surface of the external thread 19, defining a spiral or helical thread commonly known as a "hollow" thread which does not have any extra thickness in the mouth portion and, therefore, the thread does not materially strengthen said mouth portion. Such uniform wall thickness throughout the body portion and threaded mouth portion of a container is conventional in blow molded plastic jars.

The closure for the container includes a stamped or otherwise formed sheet metal lid 20 having a top wall 22 and an internally threaded circular or cylindrical depending wall 24 with internal threads 25 formed in said wall 24. The threads 25 are properly sized for receiving the external thread 19 of the mouth portion 14 of the container. An insert or backing member 26 which in the illustrated form is a resilient plastic molded part, is provided in the closure 20 with disc portion 27 having

an upper surface 28 being flat for lying against the inner surface of top wall 22 of the closure. The diameter of the disc 27 is generally coextensive with the bottom or inner surface of top wall 22 and is preferably at least slightly larger than the smallest internal diameter of the internally threaded wall 24 of the closure 20 so that the disc insert 26 does not freely fall from within closure 20. The insert 26 includes a depending flange 29 having an exterior surface spaced inwardly slightly from the outer edge of disc portion 27. The flange 29 has a two portion outer surface 30, one portion being a circular cylindrical surface 31 which joins with the disc 27 thereby forming an overhanging lip sealing surface 32 on the disc 27 extending peripherally of the flange 29. The second portion of the surface 30 is a tapered outer surface 33 which merges at its largest diameter with the cylindrical surface 31.

With particular reference to FIGS. 3–5, it will be seen that insert or backing member 26 can be inserted via flange 29 in the open mouth of container 12 (FIG. 3) with the tapered surface 33 engaging with the inner surface of the lip 16 of the mouth 14 of the container 12. As the insert 26 is driven downward within the mouth of the container 12 the tapered outer surface 33 cams against the inner surface of mouth 14 to urge the lip portion 16 of the mouth 14 radially outwardly until the cylindrical surface 31 rests in the mouth 14 for backing and reinforcing said lip portion and mouth of the container. The over-hanging lip sealing surface 32 of the insert rests against the axial lip 16 of the mouth of the container to provide an axial backing also. With the insert 26 positioned within mouth 14, the closure 20 is threaded onto the thread 19 on the mouth of the container 12 to the position shown in FIG. 5. The insert 26 in the mouth portion of the container 12 reinforces and rigidifies the thread 19 and the mouth portion 14. The threads 25 of the wall 24 of the closure create an inward compressive force on the threads 19 of the container, but the flange 29 of the insert 26 prevents the lip and threads 19 of the mouth 14 of the container from collapsing and releasing the sealing of the container. The clamping of the wall of mouth 14 between the flange 29 and the wall 24 of the closure not only provides the threaded connection with the ability to resist inward movement of the wall of the mouth due to over-tightening of the closure, but also provides the threaded connection with the ability to prevent dislodgement of the closure during the shock deformation created by dropping the sealed container.

The embodiment of FIGS. 3–5 employs one of the optimum conditions wherein the insert flange is shaped to hold the upper edge portion of the mouth of the container in outwardly spread position. In this way the upper edge portion can not collapse. This embodiment as well as the later described embodiments provide a structure which can be used very effectively in automatic capping equipment where the containers are automatically filled and the container is then capped by means of an automatic capping machine. Such capping equipment can easily over-tighten and strip the threads on a container but with the new reinforcing insert of the invention caps are readily applied without stripping or other failures.

One of the frequent uses of containers of this type is for paste for use in schools. The containers are frequently dropped which heretofore generally resulted in the mouth of the container collapsing, permitting the cap to pop off or loosen. The contents were either spilled or dried out as a result of the seal being broken. With the new reinforcing insert, the threads of the container are backed and the closure is positively sealed thereon preventing dislodgement due to over-tightening or due to the shock distortion caused by dropping or administering a sharp blow to the container.

Once the closure is tightened on the mouth of the container the lip 16 of mouth portion 14 engages the lip sealing surface 32 of the insert 26 to further seal the jar against leakage. The abutment of lip surface 16 of the container against surface 32 of the insert with the backing flange 26 in position produces an axial compressive force between the threads and the disc portion of the insert 26 which when combined with the radial reinforcement created by the flange 29 effectively locks the closure on the container without fear of collapsing the threads of the container by over-tightening or without fear of accidental dislodgement caused by dropping the sealed container.

The form of insert or backing member 26 shown in FIGS. 6 and 7 is the same as that in FIGS. 3–5 except that the tapered surface 30 on the exterior surface of the flange 29 is replaced by a cylindrical surface 30*a*. It has been found that even with the cylindrical surface 30*a* sufficient reinforcing of the mouth portion 14 of the container 12 between flange 29 and wall 24 is achieved. That is, the cylindrical surface 30*a* on the flange 29 has an outside radial dimension fairly matching the inside dimension of the mouth 14 of the container. The only limitation being that the spacing between the inside diameter of the mouth of the container and the outside diameter of the cylindrical surface 30*a* of the insert should be less than the radial height of the thread on the mouth of the container such that with the insert 26 in position in the container and with the closure threaded down onto the mouth of the container as the lip 16 bears against the lip 32 and the mouth of the container is cammed radially inward under the radial compressive forces of the threads 25, the inner surface of the mouth will engage with the flange of the insert and prevent the mouth and thread from collapsing the insert will reinforce and back the mouth of the container to prevent dislodgement and disengagement of the closure from the container.

Turning now to FIG. 8, the closure illustrated is a one-piece integral molded resilient plastic member and includes a top wall 40, an outer interiorly threaded flange 42 and an inner flange 44 which has an outer two portion tapered surface 46 and 47 and a lip sealing surface 48. It will be apparent that the closure shown in FIG. 8 operates in the same manner as that shown in FIGS. 3–5 and gives the same reinforcing action to strengthen the threaded connection when the closure is threaded onto the top of the container.

It has been found that the integral concept of FIG. 8 has particular practical application in smaller containers and closures where the closure and insert can be readily molded in one piece. For larger sizes it becomes uneconomical or less practical to mold the closure and insert together and in that case they are made separate and assembled prior to use. When made separate the material of the closure and insert can be different.

It is to be understood that closures having a spout or other opening formed in the flat disc portion which spout or opening would register with an opening in the flat wall of the insert would be within the context of this invention. Likewise, although the description is directed toward plastic containers it is within the invention to use the reinforcing insert concept on any container having thin walled threaded portions or readily collapsible threaded portions. Many other applications of the principle of this invention will become apparent after the concept is understood in the art and it is contemplated that these applications will be within the scope of the invention as claimed.

I claim:

1. A container and closure combination in which the container has a thin walled round hollow-threaded mouth portion with generally uniform wall thickness throughout the threaded portion, closure means having internal threads sized for threading onto the threaded mouth of the container and means carried by said closure means for reinforcing the threads on the mouth of the container to prevent collapsing of said threads during application of said closure and during deformation of said container upon impact.

2. The combination of claim 1 wherein said reinforcing means comprises means backing the container mouth wall at the inner surface thereof for backing the mouth wall against radial inward movement and dislodgement of the mouth threads from the closure threads due to impact or over-tightening of the closure.

3. The combination of claim 2 wherein said reinforcing means comprises means contained within said closure means.

4. The combination of claim 2 wherein said reinforcing means comprises means defining a cylindrical surface within the closure spaced inwardly from the closure threads a proper distance to receive the mouth wall between the cylindrical surface and the closure threads.

5. The combination of claim 2 wherein said reinforcing means comprises means defining a frusto-conical surface within the closure spaced inwardly from the closure threads a proper distance to receive the mouth wall between the frusto-conical surface and the lid threads, a portion of said frusto-conical surface wedging the mouth wall outwardly and tightly within the closure threads as the closure is threaded onto the mouth.

6. The combination of claim 2 wherein said reinforcing means comprises a cylindrical flange depending from the top wall of said closure means and spaced radially inwardly from said closure threads a distance sufficient to tightly receive the container mouth wall therebetween.

7. The combination of claim 6 wherein said reinforcing means includes a resilient plastic circular disk insert resting in said closure and lying against the closure top surface and being integral with said cylindrical flange at the top edge of said flange.

8. The combination of claim 6 wherein said closure and cylindrical flange are an integral one-piece molded resilient plastic member.

9. A closure for a blow molded container having a thin wall relatively flexible externally threaded round mouth having a lip portion, said closure comprising a circular shaped central portion, with a cylindrically shaped downwardly depending wall portion having internal threads of matching configuration to the external threads on the container mouth, and a cylindrically shaped depending flange spaced inwardly from said depending wall for receiving the threaded mouth wall between said depending flange and said depending wall, said depending flange being inserted into the open end of said container with the outer wall of said depending flange being positioned in thread backing relationship with respect to said threads, and said depending wall surrounding said mouth wall and being threaded onto the threads of said mouth wall, whereby the compressive forces of the threads of said closure against the thread of said mouth wall will compress the mouth wall of the container inwardly against the depending flange with the circular central portion of the closure seated against the lip portion of the mouth whereby the container is sealed and accidental disengagement of the closure from the container by impact is prevented.

10. The closure of claim 9 wherein said depending flange is formed integral with and depends from the circular central portion of the closure.

11. The closure of claim 9 wherein said depending flange is integral with and depends from a disk insert received within said closure with the upper surface of the disk seating against and generally co-extensive with a portion of the lower surface of the circular central portion of the closure.

12. The closure of claim 9 wherein said depending flange has an inwardly downwardly tapered frusto-conical outer surface for wedging and sealing against the inner surface of the mouth as the closure is threaded onto the container.

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