

Oct. 28, 1969

R. S. BOWLES

3,474,927

PLASTIC CONTAINER WITH INTERNAL REINFORCING STRUCTURE

Filed Feb. 23, 1968

2 Sheets-Sheet 1

Fig. 1

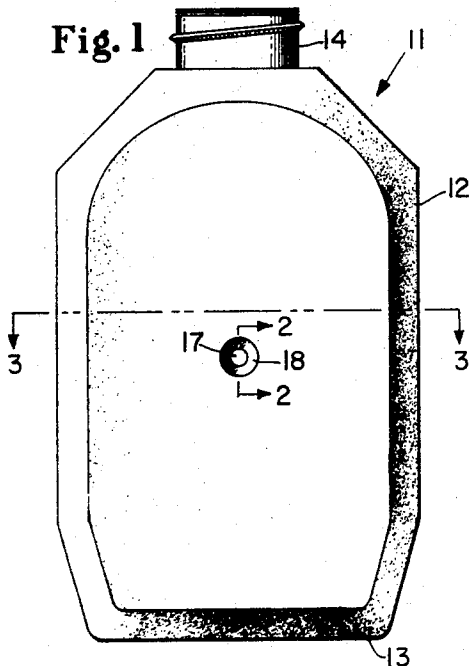


Fig. 5

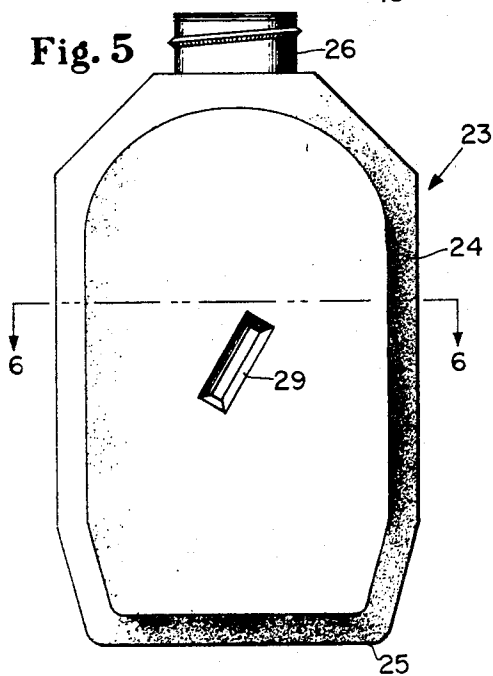


Fig. 3

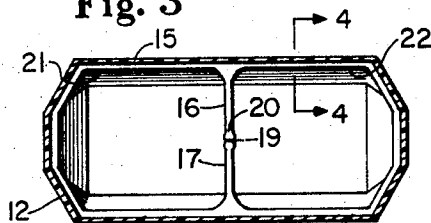


Fig. 4

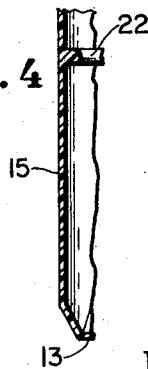


Fig. 2

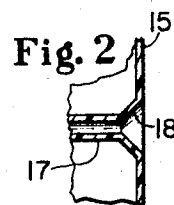


Fig. 6

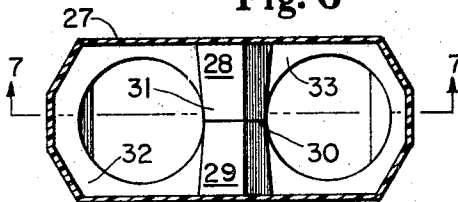
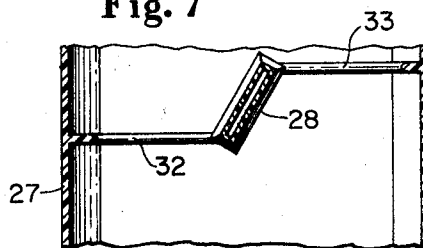


Fig. 7



INVENTOR.

Richard S. Bowles

BY

Fredrick H. Braun

ATTORNEY

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R. S. BOWLES

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Fig. 8

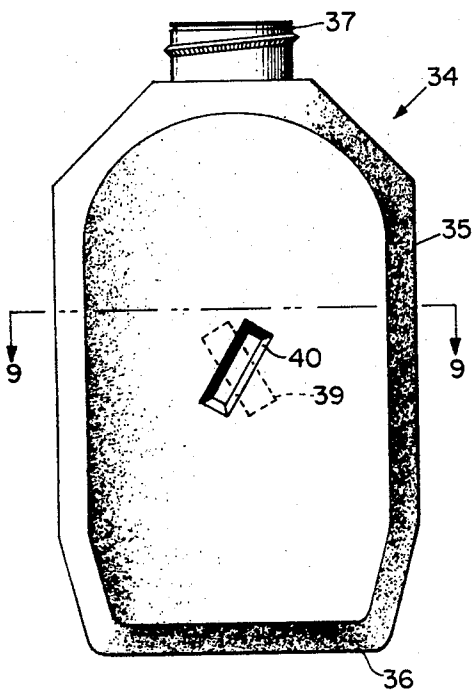


Fig. 9

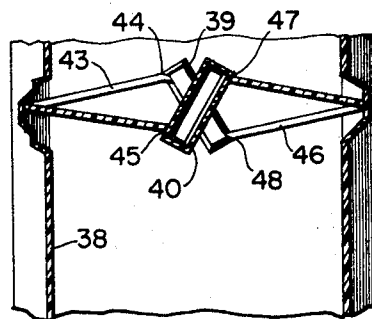
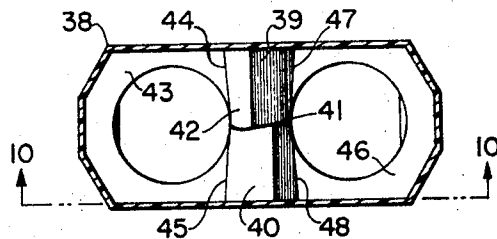


Fig. 10

INVENTOR.

Richard S. Bowles

BY *Frederick H. Braun*

ATTORNEY

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3,474,927

PLASTIC CONTAINER WITH INTERNAL REINFORCING STRUCTURE

Richard S. Bowles, Wyoming, Ohio, assignor to The Procter & Gamble Company, Cincinnati, Ohio, a corporation of Ohio

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4 Claims

ABSTRACT OF THE DISCLOSURE

A thin-walled container of plastic material has inwardly projecting members which preferably are joined at their inner ends to provide a reinforcing strut extending entirely across a central portion of the bottle. In a preferred embodiment, a rib extends inwardly at the strut on the inside surface of the bottle. This internal structure adds substantially to the flexural strength of the bottle wall so that it cannot be easily deformed.

RELATED APPLICATION

The subject matter disclosed and claimed in the instant application may be manufactured by the method and apparatus described and claimed in the copending application of Richard S. Bowles and Charles W. Hurst, Ser. No. 707,768, filed Feb. 13, 1968, said application being entitled Blow-molding of Plastic Containers With Internal Reinforcing Structure. The application of Bowles and Hurst is commonly owned by and is assigned to the assignee of the present application.

BACKGROUND OF THE INVENTION

The invention is in the field of blow-molded plastic containers or bottles of the kind commonly used commercially for packaging many types of liquid products including, among others, liquid detergents, liquid fabric softeners, liquid bleaches and the like. Conventional plastic bottles presently in use for the commercial packaging and sale of such products are characterized by relatively thin walls which are easily deformed and flexed when grasped by the consumer. Thus when a consumer holds the bottle to remove its cap, it is not uncommon for the side walls to be deflected inwardly. The unexpected decrease in interior volume causes the bottle to "burb" with the result that some of the liquid product is expelled and runs down on the exterior bottle surfaces. This phenomenon has been experienced by most persons who have handled and manipulated bottles of this kind when they are substantially full of product. The resultant mess that accompanies this undesirable phenomenon is difficult to avoid unless it is anticipated and the bottle is handled with a great deal of care particularly when it is full or nearly full.

The principal object of the present invention is to overcome the above-stated difficulties.

Another object of the invention is the provision of an internal reinforcing structure for thin-walled plastic bottles which will substantially reduce if not entirely eliminate wall deflection to a point where the phenomenon of burping and/or undesired discharge of product is substantially reduced and preferably eliminated.

Still another object of the invention is the provision of an internal reinforcing structure for bottles of this kind which will incorporate a shelf or baffle in the bottle to prevent undissolved product components from settling out entirely on the bottom and also to provide a mixing baffle which is useful when shaking the contents of the bottle.

Another object of the invention is to provide the aforesaid advantages with a minimum of additional complica-

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tion in the bottle structure itself as well as in the manufacturing methods that are used in blow molding bottles of this character.

SUMMARY OF THE INVENTION

The nature and substance of the invention can be briefly summarized as relating to a plastic container which comprises a bottle having a body with relatively thin side walls. A pair of internal hollow reinforcing members are provided which project inwardly from opposite sides on the inside of the body. In a preferred structure, the inwardly projecting members are fused at their inner ends to form a strut. Ribs are preferably formed integrally with the walls of the body and the inwardly projecting members. The reinforcing ribs are continuous and project inwards towards the center of the bottle. Preferably, each rib extends from the juncture of the inwardly projecting member on one side of the bottle to the juncture of the inwardly projecting member on the other side of the bottle.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter regarded as forming the present invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is an elevation of a bottle which incorporates the present invention.

FIGURE 2 is a fragmentary cross-section showing the joinder of the inwardly projecting member with the side wall taken on the line 2—2 of FIGURE 1.

FIGURE 3 is a cross-section through the center of the bottle showing the strut and internal rib structure taken on the line 3—3 of FIGURE 1.

FIGURE 4 is a fragmentary cross-section showing the integral rib structure taken on the line 4—4 of FIGURE 3.

FIGURE 5 is an elevation of a bottle similar to FIGURE 1 in which a modified strut and rib structure has been provided.

FIGURE 6 is a cross-section showing the modified strut and rib structure of the bottle of FIGURE 5 taken on the line 6—6 of FIGURE 5.

FIGURE 7 is a fragmentary cross-section of the strut and rib structure of the bottle of FIGURE 5 taken on the line 7—7 of FIGURE 6.

FIGURE 8 is an elevation of a bottle having a further internal modification of the strut and rib structure.

FIGURE 9 is a cross-section showing the internal strut and rib structure taken on the line 9—9 of FIGURE 8.

FIGURE 10 is a fragmentary cross-section of the internal strut and rib structure of the bottle of FIGURE 8 taken on the line 10—10 of FIGURE 9.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention can be adapted to any conventional thin-walled plastic bottle as made by the well-known blow-molding process. The blow-molding process can be modified to produce the internal reinforcing structure as, for example, by using the teachings of the aforesaid application of Bowles and Hurst. The material for making the bottle can be any commercial plastic resin such as polyethylene, polypropylene, or the like well-known materials. The shape of the bottle is entirely immaterial, the shape selected for the present description having been taken purely for convenience.

In FIGURES 1—4 there is illustrated a bottle 11 which includes a hollow body 12 having a base 13 at the bottom

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and a threaded finish 14 at the top. The body 12 is composed of relatively thin and flexible side walls 15, the configuration of which can be varied as desired so long as it is feasible for manufacture by the blow-mold method.

A hollow inwardly projecting member 16 extends from one side of the body 12 and an opposed similar hollow member 17 extends inwardly from the other side. The members 16 and 17 are each preferably tapered. That is, in a preferred form the members 16 and 17 are shaped in the form of a truncated cone since this has been found to be a most convenient way of incorporating such members in this configuration. As illustrated in FIGURE 2, the inner end of the member 17 has a beveled portion 18 where it joins the side wall 15 of the bottle. A similar beveled portion (not shown) is also provided at the joiner of the hollow inwardly projecting member 16 with the side wall 15.

In the preferred embodiment, the inner ends of the projecting members 16 and 17 are fused as at 19 (FIGURE 3). That is, by fusing the ends of the members 16 and 17 in this manner, a continuous reinforcing strut 20 is formed. This is preferred since it will prevent any substantial inward (or outward) deflection of the side walls 15 in the immediate area of joiner of members 16 and 17 either inadvertently or otherwise.

In some cases it may be desired to provide a predetermined amount of side-wall inward deflection for the bottle. For example, it might be desired to limit or control the amount of product discharged through a well-known "snip-top" cap. This can be controlled by extending the inwardly projecting members 16 and 17 such that their ends are spaced apart at a desired pre-determined distance. In most cases, however, it is preferred to fuse the ends of members 16 and 17 in order to provide a continuous strut 20.

As best seen in FIGURES 3 and 4, a reinforcing rib is provided which extends from the juncture of the members 16 and 17 with the side wall 15 of the bottle. The rib 21 extends from the members 16 and 17 and is continuous around the internal surface of the bottle wall 15 on one side of the strut 20. Similarly, the rib 22 extends in the other direction and encircles the inner face of the wall 15 on the other side of the strut 20. In each case, the ribs 21 and 22 are integral with the wall 15 of the bottle as well as the members 16 and 17. The ribs 21 and 22 give the bottle additional reinforcing structure as will be apparent. In some cases the ribs may not be continuous and extend entirely around the inner surface of the bottle from one end of the strut 20 to the other end. That is, the length of each rib can be controlled and limited if this is desired for any particular bottle structure. Preferably, however, and in most cases, the ribs are extended entirely around from one end of the strut to the other end as described heretofore and as illustrated in FIGURE 3.

Another embodiment of the invention is shown in FIGURES 5, 6 and 7 in which a modified internal strut and rib structure is formed. The bottle itself is indicated by the reference numeral 23 and includes a body 24, a lower base 25, and a threaded finish 26. The side walls of the body 24 are represented by the reference numeral 27.

An inwardly projecting hollow reinforcing member 28 extends from one side of the body 24 and a similar hollow inwardly projecting member 29 extends from the other side. The members 28 and 29 are joined at their inner ends 30 as by fusing in a preferred embodiment so that a continuous strut 31 is formed. As in the previous embodiment, the fused face 30 can be eliminated if limited side wall deflection is desired.

The members 28 and 29 are each configured in the form of a hollow truncated pyramid having four converging walls as best illustrated in FIGURES 5 and 7. In the illustrated embodiment, the members 28 and 29 are aligned such that their innermost faces have a common plane at the fused face 30. The edges at the inner

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ends of the members 28 and 29 are coterminous. A rib 32 extends from one side of the strut 31 and encircles the inner face of the wall 27 and a similar rib 33 is formed on the opposite side of the strut 31 and similarly encircles the inner face of the wall 27. The ribs 32 and 33 are integral with the side wall 27 as well as the members 28 and 29 which combine to form the strut 31 in the preferred embodiment.

Still another embodiment of the invention is illustrated in FIGURES 8-10. This latter form of the invention is related to the embodiment of FIGURES 5-7 previously described. In the embodiment of FIGURES 8-10, an internal reinforcing structure is provided for a bottle 34 having a body 35 and a base 36 as well as a threaded finish 37. A relatively thin side wall 38 is formed in the manufacture of the body 35 of the bottle.

Inwardly projecting hollow reinforcing members 39 and 40 are formed integrally with the side wall 38 as best illustrated in FIGURE 9. Members 39 and 40 are joined at the fused face 41 in the preferred form of the invention to provide a continuous reinforcing strut 42. It will be noted in this embodiment that the inwardly extending members 39 and 40 are formed in the shape of a hollow truncated pyramid as in the previous embodiment. However, as illustrated in FIGURE 8, the members 39 and 40 are not contiguous at their inner ends although they are geometrically congruent to one another.

As a consequence of the non-alignment of the members 39 and 40, a reinforcing rib of volute form is blown integral with the interior surface of the bottle. As best shown in FIGURES 9 and 10, the rib 43 extends from an edge 44 of the member 39 around the inside of the side wall 38 of the bottle and extends to and is joined with the edge 45 of the member 40. Thus it will be noted that the configuration of the rib 43 is in the form of a volute surface since it has been found that the reinforcing rib can be most readily produced in the illustrated shape when practicing the method of the previously cited application of Bowles and Hurst. Similarly, the rib 46 is joined to the edge 47 of the member 39 at one end and is continuously formed around the inside of the wall 38 of the bottle such that its other end is joined to the edge 48 of the member 40. The resultant internal structure formed by this configuration is somewhat more complex and yet it provides all of the advantages of the other embodiments heretofore described.

While particular embodiments of the invention have been illustrated and described it will be obvious to those skilled in the art that various changes and modifications can be made without departing from the spirit and scope of the invention and it is intended that all such changes and modifications are within the scope of this invention.

What is claimed as new is:

1. A reinforced container comprising a bottle having a body with relatively thin and smooth side walls, a pair of integral hollow members projecting inwardly from opposite sides of said body, said inwardly projecting members being fused together at their inner ends to form a continuous reinforcing strut from one side of the body of the bottle to the other side, an internal reinforcing rib extending laterally around the entire periphery of the inner surface of said wall, said rib being joined to said reinforcing strut at each of its junctures with the wall on opposite sides of the bottle, said rib being of said cross section and formed integrally with the wall of said bottle without any inward deformation of the continuous smooth outside surface of said side walls.

2. A reinforced container as claimed in claim 1 wherein the inwardly projecting members from opposite sides of the body of the bottle are in the form of hollow truncated cones with the smaller diameter of each of said truncated cones forming the fused inner ends of each of said members.

3. A reinforced container as claimed in claim 1 wherein the inwardly projecting members from opposite sides of

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the body of the bottle are each in the form of a hollow truncated pyramid with the smaller ends of each of said truncated pyramids forming the fused inner ends of each of said members, said smaller ends being substantially coincident.

4. A reinforced container as claimed in claim 1 wherein the inwardly projecting members form opposite sides of the body of the bottle are each in the form of a hollow truncated pyramid with the smaller ends of each of said truncated pyramids forming the fused inner ends of each of said members, said smaller ends being substantially non-coincident, and the portion of the rib extending in

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each direction from the reinforcing strut being of volute configuration.

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WILLIAM T. DIXSON, JR., Primary Examiner

U.S. Cl. X.R.

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