July 10, 1962 D. E. G. GLASSCO 3,043,461

FLEXIBLE PLASTIC BOTTLES

Filed May 26, 1961

FIG. 1.

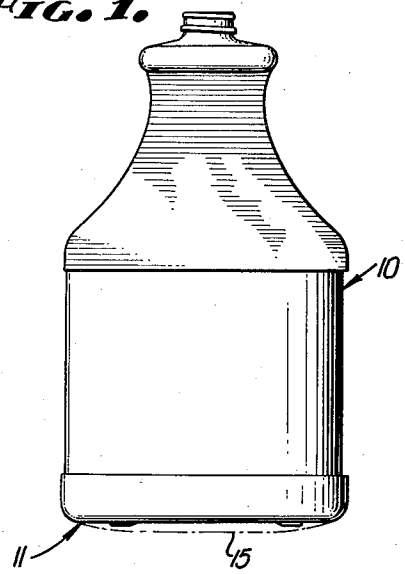


FIG. 2.

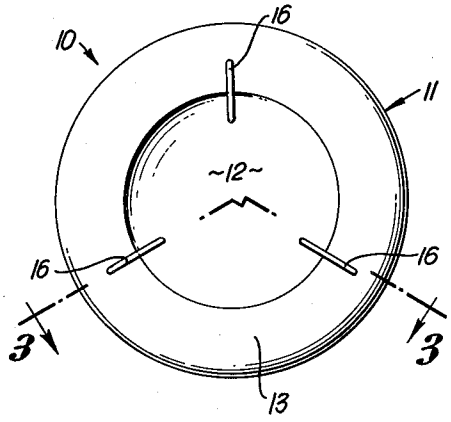


FIG. 3.

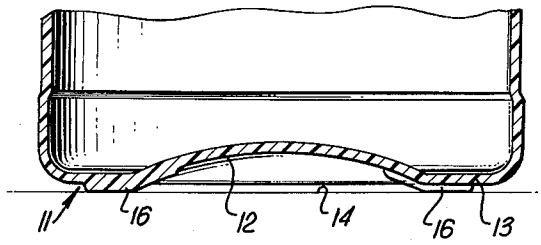


FIG. 5.

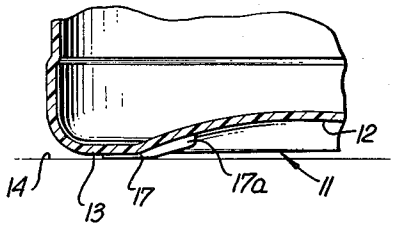


FIG. 4.

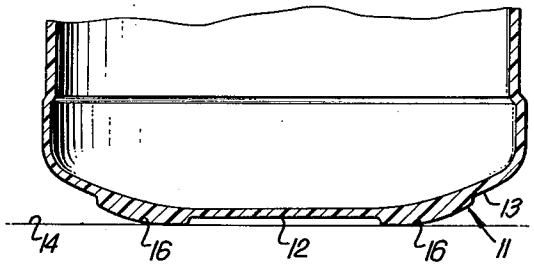


FIG. 7.

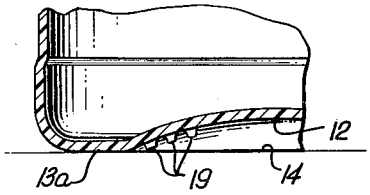
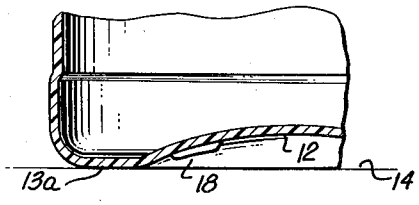


FIG. 6.



INVENTOR.

DONALD E. G. GLASSCO

BY White and Haseltine

ATTORNEYS.

United States Patent Office 3,043,461 Patented July 10, 1962

3,043,461

FLEXIBLE PLASTIC BOTTLES

Donald E. G. Glassco, Temple City, Calif., assignor to Purex Corporation, Ltd., South Gate, Calif., a corporation of California

Filed May 26, 1961, Ser. No. 113,016
7 Claims. (Cl. 215—1)

This invention has to do with improvements in plastic (e.g. polyethylene) bottles having flexible bottoms and which are useable to contain pressure-generating products such as liquid hypochlorite bleach, which may tend to bottom bulge and thereby unstabilize the bottles.

In the interests of economy in plastic costs, it may be desirable to blow mold bottles with flexible bottoms which, while meeting all strength requirements, may be flexible through thinness of the plastic or for any other reason, to the extent that pressures developed inside a bottle will tend to bulge its bottom and thus render the bottle unstable on a planar supporting surface such as a market shelf.

The present invention has for its general object to provide a simple and effective way of retaining stability of the bottle under such bulged or abnormally deflected condition of its bottom. Particularly contemplated is a solution which adds no appreciable costs or manufacturing problems in production of the bottles.

Structurally the invention contemplates providing the bottom with a central area having a bulge resistant upward recess or cavitation normally above the supporting surface, and normally non-functional supporting means associated with that area but operable to engage the supporting surface to support and stabilize the bottle when and as internal pressure bulges the cavitated area.

For this purpose, the flexible cavitated area is provided at the inside of the normal supporting portion of the bottom, with downwardly projecting means which normally clear the supporting surface but come into engagement therewith as pressure deflects or bulges downwardly the central area of the bottom. In the interests of economizing and simplifying such projecting means, the latter may be formed as integrally molded projections in circularly spaced relation such as to be brought down by the bottom deflection, into stable engagement with the supporting surface. As will appear, while under bulged conditions, the functional portions of such projections are at the inside of the normal supporting portion of the bottom. The projections may serve partially or entirely as such normal supporting portion, or they may be disposed entirely at the inside thereof.

The invention will be more fully understood from the following detailed description of certain illustrative embodiments shown by the accompanying drawing, in which:

FIG. 1 is an elevation showing an illustrative bottle, the bottom structures of which embodies an invention;

FIG. 2 is a bottom view of FIG. 1;

FIG. 3 is an enlarged fragmentary cross-section taken in the broken plane of line 3—3 in FIG. 2;

FIG. 4 is a view similar to FIG. 3 showing the container bottom in bulged condition; and

FIGS. 5, 6 and 7 are fragmentary sectional views illustrating variational forms of the invention.

First in reference to FIGS. 1 and 2, it will be understood that the invention is applicable to stabilizing flexible bottom plastic containers or bottles having any of various configurations, and that the particular bottle shown is illustrative only. The bottle **10** may be assumed to have been blow molded of linear polyethylene or other plastic material, and to be used for such purposes as the packaging of liquid hypochlorite bleach which on occasions may develop in the capped bottle, pressures sufficient to deflect or bulge downwardly the bottom **11** of the bottle. Here the bottom is shown to have a centrally cavitated area **12** surrounded by that portion of the bottom, generally indicated at **13**, which normally rests on a supporting surface **14**. Upon the development of internal pressures, the bottom may tend to bulge as to the degree depicted by the broken line **15** in FIG. 1 or to the solid line configuration appearing in FIG. 4. In the absence of the provisions contemplated by the invention for stabilizing the bottle, the latter would tend to rock and become easily displaced from a shelf or the like when the bottom is in bulged condition.

According to the embodiment of the invention shown in FIGS. 2 to 4, the bottom **11** is provided with circularly and equiangularly spaced projections **16**, here shown to be in the nature of integrally molded ribs, typically three in number, extending internally from the bearing portion **13** and within the cavitated area **12**. As here illustrated, the projections **16** may also occupy portions of the area **13** so that normally, as well as in its bottom bulged condition, the bottle is supported on the projections.

Referring to FIG. 4, as the bottle develops internal pressure, the bottom may bulge down to the condition illustrated, whereupon the inner extents of the projections **16**, which normally are non-functional, are deflected down into bearing and supporting engagement with the surface **14**, thus affording stabilized, i.e. anti-rocking, support for the container and its bottom in bulged condition.

As illustrated in FIGS. 5 to 7, the supporting ribs or projections may be variationally formed and located, and yet serve essentially the same supporting functions. As illustrated in FIG. 5, if desired, and depending upon the nature and extent of the bottom flexure, ribs **17**, corresponding to the previously described projections **16**, may be formed with progressively thickened, and if desired, widened inner extents at **17***a*. Instead of the projections being located to normally support the bottle, suitably formed and disposed projections may be positioned entirely at the inside of the normal bearing area indicated at **13***a* in FIGS. 6 and 7 so that the bottle normally rests on a continuously circular bottom surface at **13***a*, about the cavitated area **12**. Here the supporting projections are disposed at the inside of the supporting area **13***a*, and remain non-functional until the bottom is bulged. Thus as shown in FIG. 6, the projections may take the form of short ribs **18** extending radially at the inside of the bottom surface **13***a*, and be so disposed as to clear the supporting surface **14** until brought down into engagement therewith upon deflection of the cavitated area **12**. Instead of having elongated rib formations, the projections may be molded as one or more lug or button-like protrusions as indicated at **19** in FIG. 7.

What is claimed is:

1. A plastic bottle having a flexible bottom containing a centrally and upwardly recessed area at the outside of which the bottom has normal bearing on a planar supporting surface, said recessed area being displaceable downwardly by pressure inside the bottle below the normal bearing portion of the bottom at said outside of the recessed area, and means formed integrally with the bottom about and radially spaced from the central portion of said recessed area; said means normally projecting downwardly within said area an extent above said normal bearing portion of the bottom but below any bottom surface within said central portion so that upon said downward displacement of the recessed area said means is brought into engagement with said supporting surface to stabilize the bottle.

2. A bottle according to claim 1, in which said means comprise circularly spaced projections.

3. A bottle according to claim 1, in which said means comprise projections located proximate the inside of said normal bearing portion of the bottle at equi-angularly spaced intervals circularly of the bottom.

4. A bottle according to claim 1, in which said means comprise circularly spaced ribs extending radially inwardly from said normal bearing portion of the bottom and the bottoms of the ribs normally have clearance above the supporting surface.

5. A bottle according to claim 4, in which the bottle normally is supported by the ribs on said surface.

6. A bottle according to claim 1, in which said bottom has a normal annular bearing surface and said means is located at the inside of said bearing surface.

7. A bottle according to claim 6, in which said means comprise circularly spaced projections normally positioned above and at the inside of said annular bearing surface.

References Cited in the file of this patent

UNITED STATES PATENTS

2,099,055	Ferngren	Nov. 16, 1937
2,787,397	Radford	Apr. 2, 1957

FOREIGN PATENTS

856,958	Great Britain	Dec. 21, 1960