April 13, 1954 M. A. RAUN ET AL 2,675,040

CONTAINER AND CLOSURE THEREFOR

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Fig. 1.

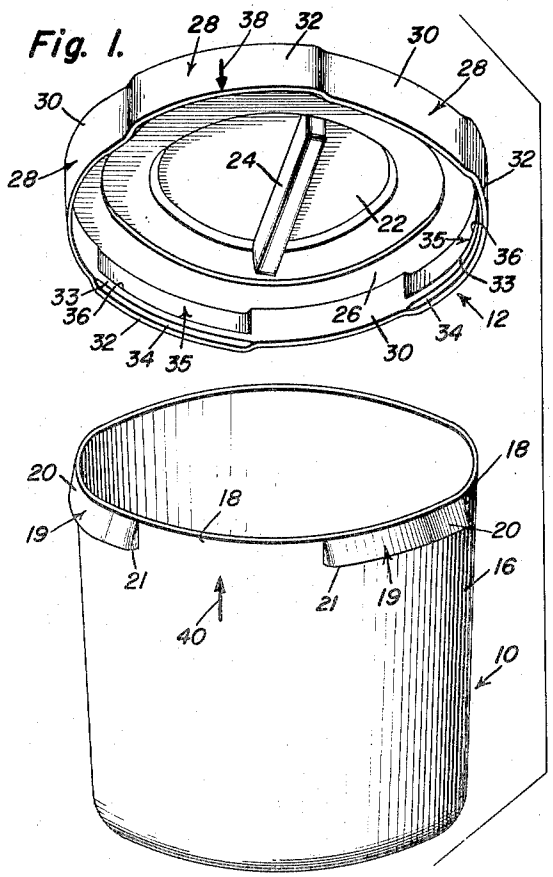


Fig. 8.

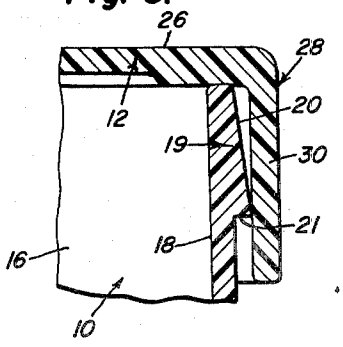


Fig. 9.

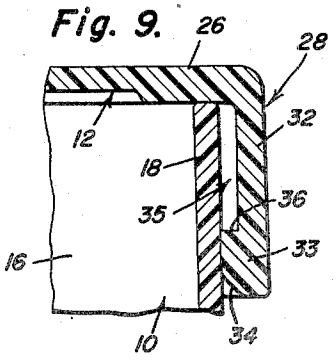
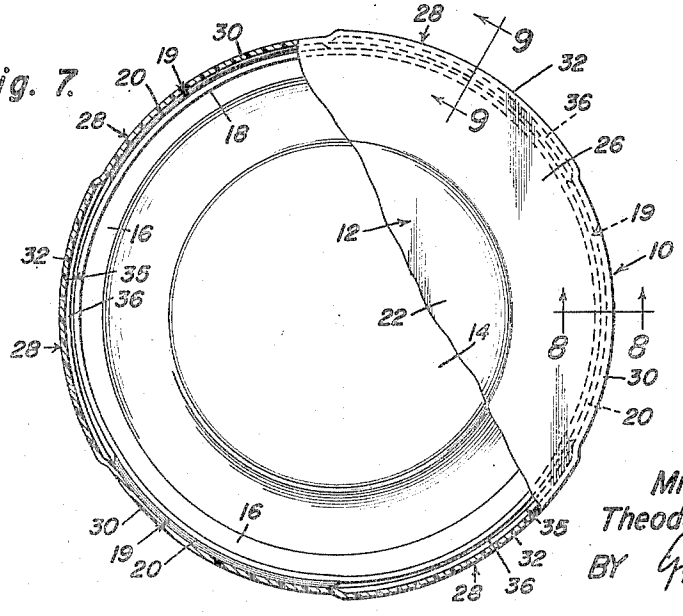


Fig. 7.



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Fig. 5.

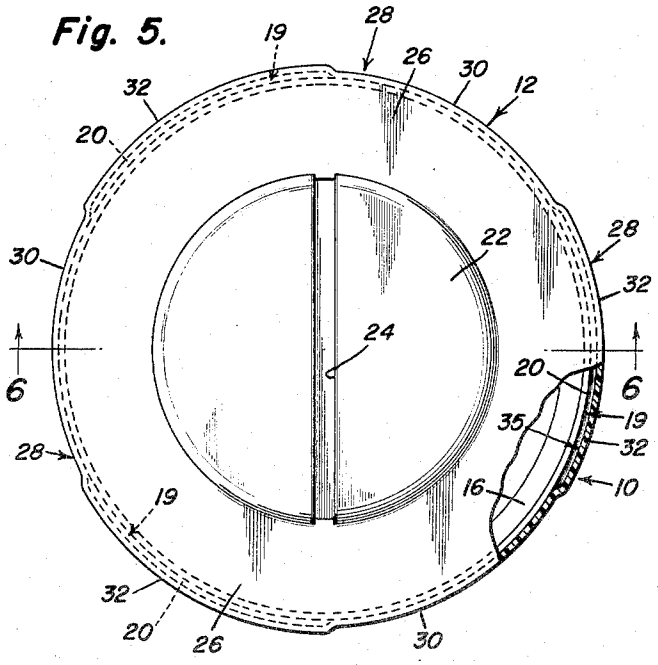


Fig. 2.

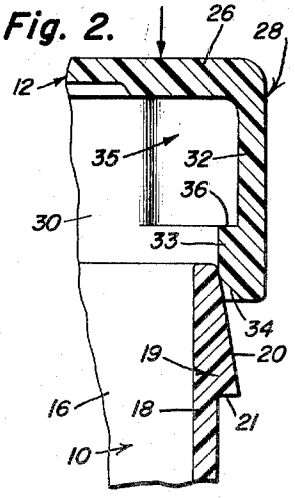


Fig. 3.

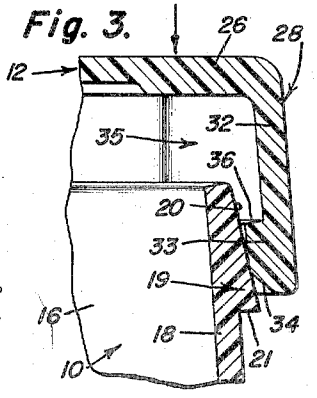


Fig. 6.

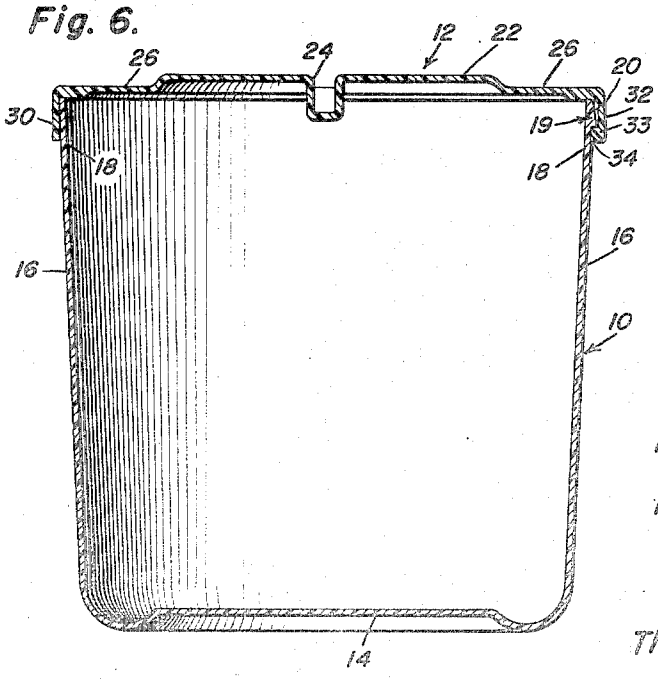
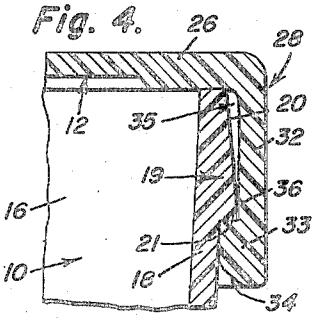


Fig. 4.



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CONTAINER AND CLOSURE THEREFOR

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Application December 23, 1952, Serial No. 327,462

3 Claims. (Cl. 150—0.5)

(Granted under Title 35, U. S. Code (1952), sec. 266)

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment to us of any royalty thereon.

The invention herein disclosed is a modification of the Bleach Container disclosed in the application of Fred B. Shaw, Jr., Serial No. 295,379 filed June 24, 1952.

This invention relates generally to a container and a closure therefor, and particularly to closures of the snap-on type. It is an object of this invention to provide a container and a closure therefor which is snapped thereon to close the container, and which is turned relative to the container to line up index points, one of which is on the container and the other on the closure, and lifted away from the container to open the container.

It is another object of the invention to provide a container and a closure therefor wherein the closure forms a positive lock with the container when it is mounted thereon.

It is a specific object of this invention to provide a container and a closure therefor wherein the parts are made of a plastic material which is moldable, flexible, and physically strong.

Other objects of the invention will become apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a perspective view of the container and closure showing the parts separated prior to mounting the closure on the container.

Fig. 2 is a fragmentary, sectional view taken through a portion of the container and the closure just prior to the closure being snapped on the container.

Fig. 3 is a view similar to Fig. 2 showing the parts during the step of snapping the closure on the container.

Fig. 4 is a view similar to Fig. 2 showing the parts after the closure has been snapped on the container.

Fig. 5 is a plan view, with portions broken away, of the container with its closure mounted thereon in locked position.

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a plan view, with portions broken away, of the container with its closure mounted thereon after the closure has been rotated relative to the container and the index lines on the parts lined up.

Fig. 8 is a sectional view taken on line 8—8 of Fig. 7.

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Fig. 9 is a sectional view taken on line 9—9 of Fig. 7.

In Fig 1, the container is indicated generally by reference numeral 10 and the closure by reference numeral 12. Container 10 comprises bottom wall 14 (see Fig. 6) and upwardly extending, conically-shaped, side wall 16. The upper end of container 10 is open, and the upper edge 18 of side wall 16 surrounds the opening and has a plurality of arcuate mounting lugs 19 spaced about its periphery. In a sense, the mounting lugs may be considered as portions of an interrupted flange. As can be best seen in Fig. 1 and Fig. 2, the mounting lugs 19 have an upwardly facing, inclined surface 20 and a downwardly facing, horizontal surface 21. Container 10 and closure 12 may be made of any suitable material, metallic or non-metallic, which is moldable, flexible and physically strong; a particularly desirable material is glass-fiber reinforced, polyester resin or its equivalent. These resins are discussed in more detail in the application of Fred B. Shaw, Jr., cited above.

The closure 12 constitutes top wall 22 which has a centrally disposed, elongated, recessed portion 24 formed therein and an offset peripheral portion 26 that merges with skirt 28, as can be best seen in Figs. 1, 5 and 7. Recessed portion 24 constitutes a gripping means which is adapted to receive an appropriate tool when the closure 12 is turned relative to the container in removing the closure off the container, as will subsequently become apparent. Skirt 28 is non-circular; it comprises a plurality of spaced arcuate portions 30 and a plurality of enlarged, intermediate, arcuate portions 32 having a larger radius than portions 30 (see particularly Figs. 1 and 5). Enlarged portions 32 have flange-like projections 33 formed at their lower edges which extend radially inwardly to a point where the inner edges of said projections define a continuous circle with the inner surfaces of portions 30 (this can best be seen in Fig. 1). Each projection 33 is parallel to top wall 22 and has a beveled edge 34 formed on its lower side for a purpose which will subsequently become apparent. As can be best seen in Fig. 1, the enlarged portions 32 and their respective projections 33 form pockets 35, which are adapted to receive mounting lugs 19 when the closure is mounted on the container.

Figs. 1 to 5 show the detailed construction of the enlarged portions 32 of the closure and the mounting lugs 19 of the container, and the manner in which they cooperate with each other in the sequence of steps of mounting the closure on the container. The closure is actually snapped

on the container in a single step, however for the sake of clarity, Figs. 2, 3 and 4, which show three views of the positions that the parts assume during the snapping on of the closure, are herein arbitrarily designated as steps. Fig. 2 shows one of the enlarged portions **32** aligned with one of the mounting lugs **19** just prior to snapping the closure **12** on the container **10**. It should be understood that all of the enlarged portions and their associated mounting lugs function in the same manner. It will be observed that beveled edges **34** of the projections **33** cooperate with the inclined surfaces **20** of the mounting lugs **19** to facilitate mounting of the closure on the container. The application of force in the direction of the unnumbered arrow shown in Fig. 2 moves the closure toward the container to the position shown in Fig. 3. It should be noted that during this movement the skirt **28** flexes outwardly, and the upper edge **18** of the container flexes inwardly, in the vicinity where the mounting lugs **19** contact the projections **33** of the enlarged portions **32**. Continued application of force in the direction of the unnumbered arrow shown in Fig. 3 causes the closure to be forced closer to the container and flexes the parts still further until the flat upper surfaces **36** of the projections **33** clear the apices formed by the inclined surfaces **20** and flat surfaces **21** of the mounting lugs **19**. At this time, the parts move to the positions shown in Figs. 4, 5 and 6, wherein each of the mounting lugs **19** is positioned within a pocket **35** formed in one of the enlarged portions **32**. In this position, the flat, upper surfaces **36** of the projections **33** contact the flat surfaces **21** of the mounting lugs **19** and thereby prevent separation of the parts by axial force. In this position the closure is considered to be "locked" on the container.

From Fig. 1 it will be observed that there is an index arrow **38** formed on the closure **12** and an index arrow **40** formed on the container **10**. It will be observed further that the index arrow **38** on the closure is positioned centrally on one of the enlarged portions **32** and the index arrow **40** on the container **10** is positioned centrally on the portion of upper edge **18** between two of the mounting lugs **19**. Since the enlarged portions **32** cooperate with the mounting lugs **19** in the steps of snapping the closure on the container, the index arrows will be out of alignment when the closure is mounted on the container in locked position (Figs. 4, 5 and 6). In order to remove the closure from the container, the closure is turned relative to the container until the index arrow **38** on the closure lines up with the index arow **40** on the container; then the closure is pulled away from and off of the container.

Fig. 7 shows the parts after the closure has been turned and the index arrows lined up prior to lifting the closure off of the container. In this figure, it will be observed that each of the mounting lugs **19** has been moved out of its associated pocket **35**. It will also be observed that both the container and closure are distorted, neither of them being circular. The distortion is due to the fact that portions **30** of the closure are positioned radially outwardly of the mounting lugs **19** of the container in this position, and that the internal radius of arcuate portions **30** when not distorted is less than the external radius of mounting lugs **19**. It necessarily follows that some distortion will result when the closure is turned relative to the container and the portions **30** of the closure are forced over the mounting lugs **19**. Fig. 8 shows the relative positions of one of the portions **30** and one of mounting lugs **19** after the closure has been turned relative to the container and the index arrows have been lined up, and Fig. 9 shows the relationship of one of the enlarged portions **32** and the upper edge **18** of the container wall **16** after the index arrows have been lined up. From Figs. 7 to 9 it will be observed that in this position, closure **12** is retained on the container **10** solely by friction and that the parts are actually in unlocked position. It will therefore be apparent that it is simply a matter of lifting the closure off the container to separate the parts and thereby uncover the container.

From the above description of the structure and operation of the container and closure it should be apparent that we have provided a structural arrangement that satisfies each of the objects of this invention. The outstanding attribute of our invention is the ease and simplicity of its operation. To close the container it is only necessary to snap the closure on the container; to open the container it is only necessary to turn the closure and lift it off the container. It should be noted in this regard that the material out of which the parts are made is important. It must be physically strong to withstand rigorous conditions of use, such as those a storage container might be subject to; it must be inert to the material which it houses, this is important particularly when certain chemicals are stored in the container; it must be sufficiently flexible to permit the complex distortion that occurs in the parts when the closure is snapped on the container; and it should be moldable for ease and economy of manufacture. As has been stated, an ideal material is a glass-fiber reinforced, polyester resin.

Having fully disclosed our invention in detail, it should not therefore be limited to the precise structure shown, for many changes may be made by those skilled in the art without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. A receptacle and closure therefor comprising a subtsantially cylindrical container formed of a resilient glass-fiber-reinforced polyester resin, a plurality of lugs substantially equally spaced about the top of said container, the lengths of the lugs being substantially the same as the lengths of the spaces between the lugs and the heights and thicknesses of the lugs being relatively small as compared to their lengths, each of said lugs having an outer surface beginning at the top of said container and sloping downwardly and outwardly at a relatively small angle to the vertical and a bottom surface lying in a plane substantially normal to the axis of said container; a cover also formed of a resilient, glass-fiber-reinforced, polyester resin, said cover comprising a flat peripheral portion merging with a dependent skirt, said skirt comprising alternating portions of smaller radius and portions of larger radius, said portions of smaller radius forming segments of a smooth cylinder having an internal radius substantially the same as the external radius of said cylindrical container, said portions of larger radius having an internal radius substantially the same as the maximum radius of said lugs, an inwardly extending flange on the bottom of each of said portions of larger radius, said flanges having substantially planar top sur-

faces lying in substantially the same plane as the bottoms of said lugs and having inner surfaces constituting segments of a cylinder of a radius substantially the same as the outer radius of said cylindrical container, said last named inner surfaces joining the inner surfaces of said portions of smaller radius to form a continuous cylindrical surface at the lower portion of said skirt whereby when said cover is in place continuous surface contact exists between said cylindrical inner surface of said skirt and the outer surface of said container, and means for rotating said cover on said container; the cover and container being sufficiently resilient to permit said flanges to be pushed down over said lugs to secure said cover in place and to permit said portions of smaller radius to ride upon said lugs on rotation of said cover, whereby said cover may be rotated until said flanges are positioned in the space between said lugs and the cover then lifted from the container.

2. An article as defined in claim 1, wherein the means for rotating said cover comprises an elongated depressed portion centrally disposed in the top wall of the cover.

3. An article as defined in claim 1 wherein said flanges include lower surfaces which are downwardly and outwardly inclined to facilitate pushing said flanges down over said lugs.

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