United States Patent

Hazard

[15] **3,651,992**

[45] **Mar. 28, 1972**

[54] TAMPER-PROOF CLOSURE

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[73] Assignee: **Polytop Corporation,** Slatersville, R.I.

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[52] **U.S. Cl.**.....**222/153,** 215/42, 220/27, 220/315

[51] **Int. Cl.**.....**B67b 5/00,** B67d 5/32

[58] **Field of Search**.....220/38.5, 27, 31 S, 31 R; 215/7, 41, 42, 46; 222/541, 517, 153, 536

[56] **References Cited**

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2,793,795 5/1957 Wilson et al.....222/536

Primary Examiner—George T. Hall

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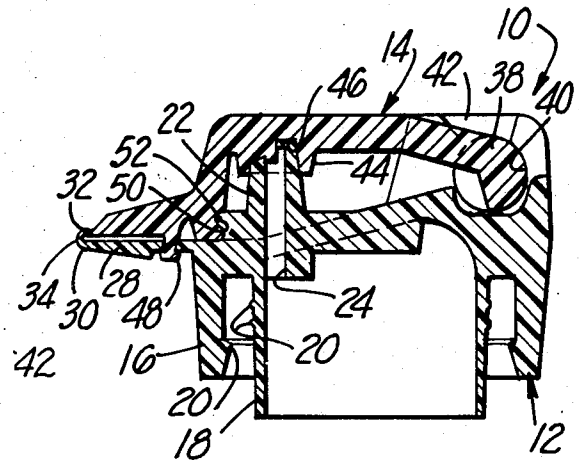
[57] **ABSTRACT**

A tamper-proof closure is disclosed which includes an integrally formed top and lid. The top and the lid are initially connected together by a severable member and by cooperating bearing and trunnion means in such a manner that the lid closes off a dispensing opening in the top. The severable member is capable of being broken so that thereafter the lid may be rotated with respect to the top between open and closed positions.

7 Claims, 10 Drawing Figures



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SHEET 1 OF 2

FIG. 1.

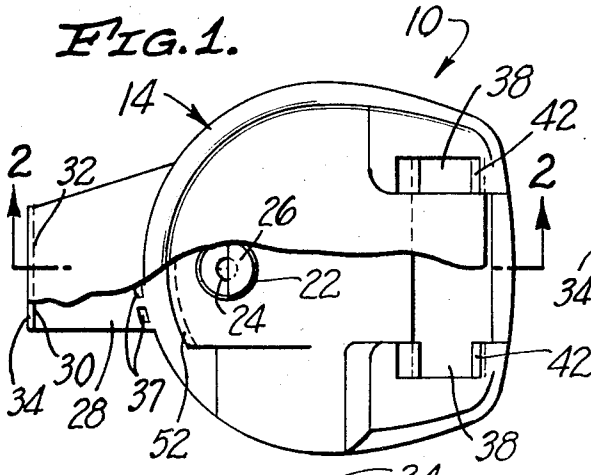

FIG. 2.

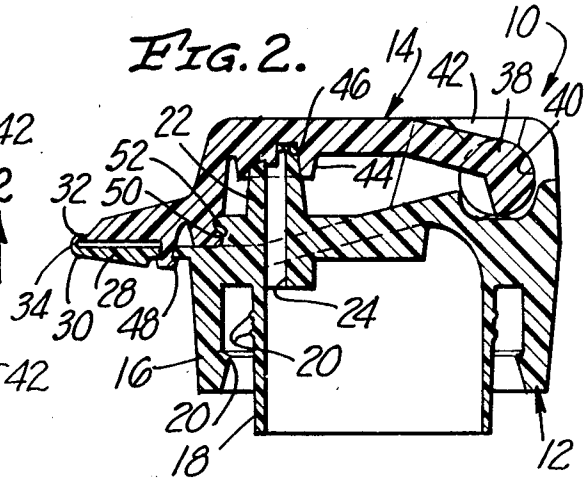

FIG. 3.

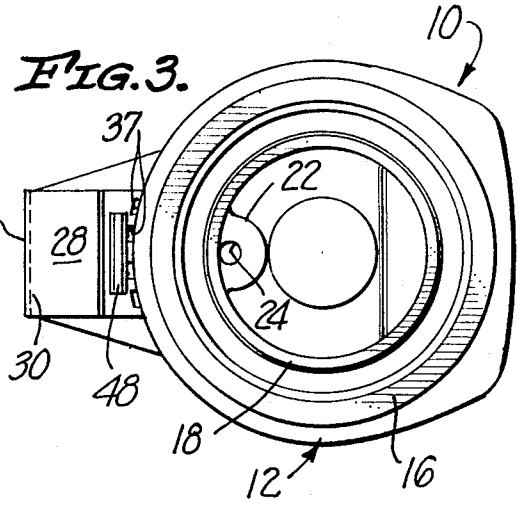

FIG. 4.

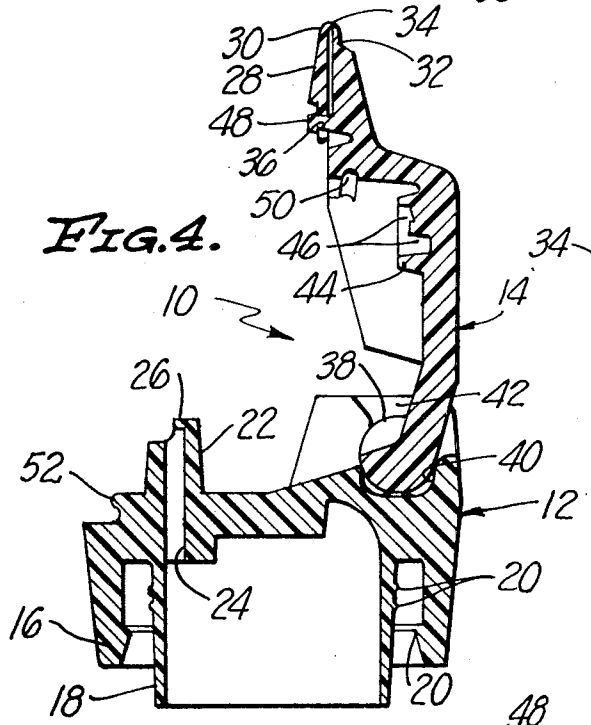

FIG. 5.

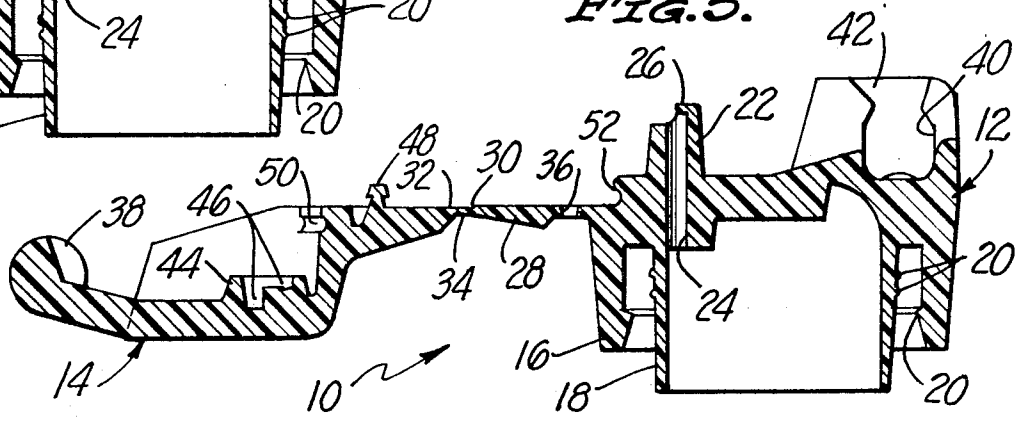

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FIG. 6.

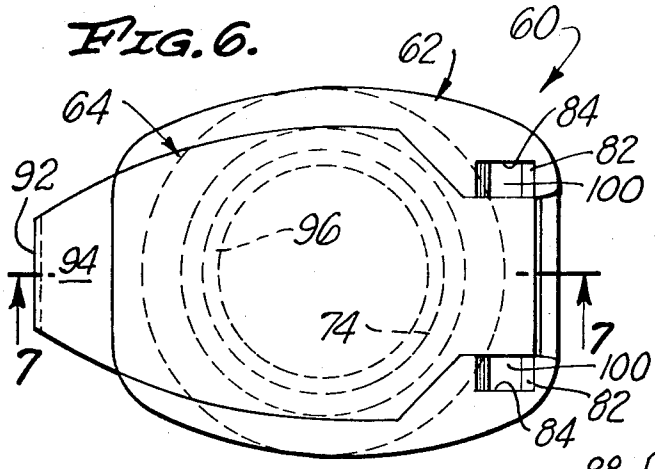


FIG. 9.

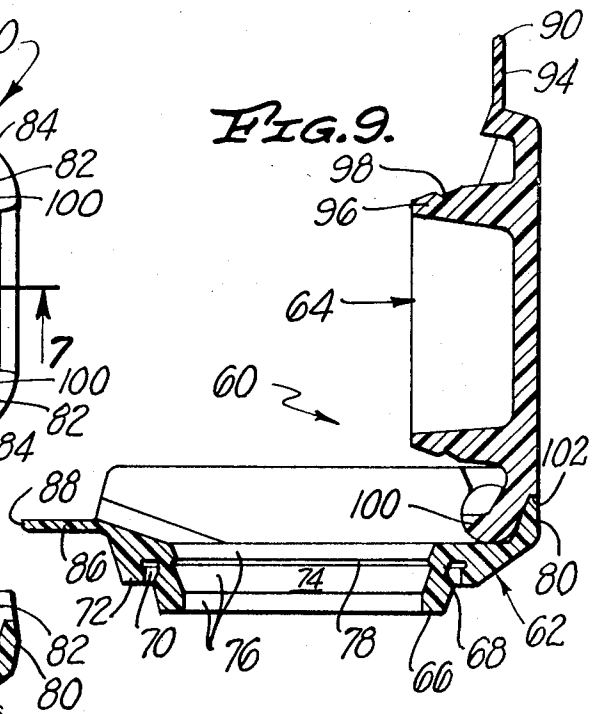


FIG. 7.

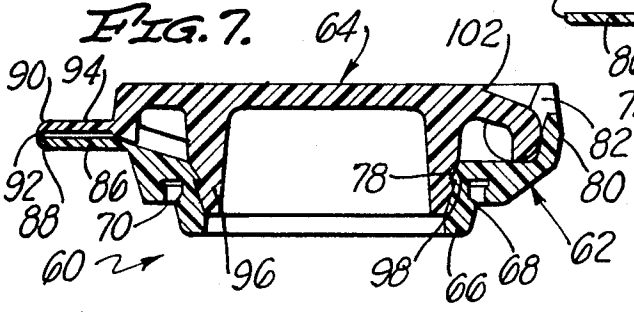


FIG. 10.

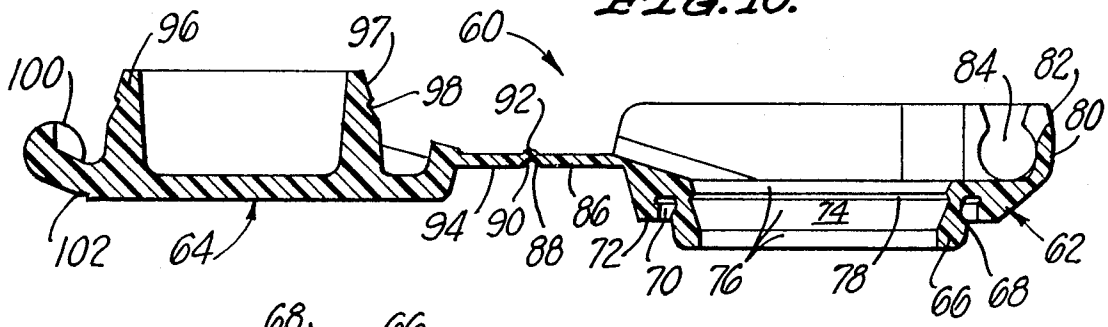
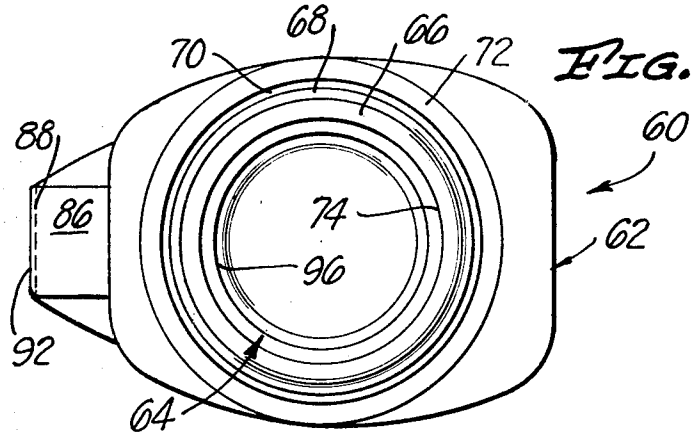


FIG. 8.



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TAMPER-PROOF CLOSURE

CROSS-REFERENCE TO RELATED APPLICATIONS

None.

BACKGROUND OF THE INVENTION

Many closures for bottles and other related containers are constructed in such a manner that it is impossible for a customer of goods sold in such a container to determine whether or not the container has previously been opened. A number of different types of structures have been developed for the purpose of indicating to the ultimate user or customer whether or not a container has been opened. It is considered that it would be impractical to attempt to discuss in this specification all of the different types of structures for this purpose which have been developed and used.

It is also considered that there is a need for new and improved tamper-proof closures which show whether or not these closures have previously been opened and closed. In this field there is a need for closures of this type which may be easily and conveniently installed on existing containers at comparatively nominal cost, which are relatively inexpensive to manufacture and which are easy to use.

SUMMARY OF THE INVENTION

An object of the present invention is to provide new and improved tamper-proof closures which satisfy these needs. Thus, objectives of this invention are to provide tamper-proof closures which can be manufactured for a comparatively nominal cost, which can be easily and conveniently installed on conventional containers in established manner, which may be easily opened when used and which provide a clear-cut indication as to the prior use of these closures.

In accordance with this invention these objectives are achieved by providing tamper-proof closures, each of which includes a closure top and a lid formed integrally with one another. The top includes means adapted to connect the closure to an appropriate container and a dispensing opening. As formed the top and the lid are connected by a deformable or flexible web so that the lid may be moved with respect to the top in order to engage cooperating bearing and trunnion means on the lid and the top. When such means are engaged, a severable area connecting the lid and the top may thereafter be broken by rotating the lid and thereafter the lid may be pivoted between open and closed positions exposing and covering said dispensing opening.

BRIEF DESCRIPTION OF THE DRAWINGS

The actual details of this invention, as well as the manners in which the invention achieves the foregoing and related objectives will be apparent from a detailed consideration of the remainder of this specification, the appended claims and the accompanying drawings in which:

FIG. 1 is a top plan view of one embodiment or form of a tamper-proof closure of this invention, part of the lid of this closure being broken away so as to permit the illustration of portions of the closure top of this closure;

FIG. 2 is a cross-sectional view taken at line 2—2 of FIG. 1;

FIG. 3 is a bottom plan view of the closure illustrated in the preceding figure;

FIG. 4 is a cross-sectional view corresponding to FIG. 2 with the lid of the closure in an open position;

FIG. 5 is a cross-sectional view corresponding to FIG. 2 showing the lid and closure top of the closure shown in FIG. 1. These parts appear in cross section after they have been formed by known techniques, but prior to the lid and closure top portions of this closure being assembled in an operative position;

FIG. 6 is a top plan view of a presently preferred embodiment or form of a tamper-proof closure of this invention;

FIG. 7 is a cross-sectional view taken at line 7—7 of FIG. 6;

FIG. 8 is a bottom plan view of the closure illustrated in FIG. 6;

FIG. 9 is a cross-sectional view corresponding to FIG. 7 showing the lid of the closure in an open position; and

FIG. 10 is a cross-sectional view corresponding to FIG. 7 showing the lid and closure top of the closure shown in FIG. 6 as these parts appear in cross-section after they have been formed by known techniques, but prior to the lid and closure top portions of the closure being assembled in an operative position.

The accompanying drawings are primarily intended to illustrate for explanatory purposes presently preferred embodiments or forms of a tamper-proof closure of this invention. Through the exercise of routine engineering skill it is possible to utilize the inventive features of the particular tamper-proof closures illustrated in other differently appearing closures which utilize the same mode or method of construction or operation as the illustrated closures.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

in FIGS. 1 to 5 of the drawings there is shown a complete tamper-proof closure 10 of the present invention which includes a closure top 12 and a lid 14. The entire closure 10 is preferably formed out of a conventional thermoplastic material as an integral unit as indicated in FIG. 5 of the drawing by modern injection molding techniques. Such material should have the property of being comparatively rigid when present in a comparatively thick member, should be somewhat resilient and should have the property of being flexible and frangible when present in an area or member of comparatively thin dimension. Common polyolefins, such as low density polyethylene, are considered to be particularly suitable for use in the formation of this closure 10.

The top 12 in the complete closure 10 includes a dependent outer peripheral skirt 16 and a connective interdependent peripheral skirt 18. These skirts 16 and 18 are preferably provided with conventional ridges 20 used in holding them with respect to the neck of a container and used so that a seal is formed with respect to such a neck. Because of their function, the skirts 16 and 18 may be regarded as "means for attaching" the top 12 to a container. Other equivalent means as are known to the art may be employed.

The top 12 carries what may be regarded as a spout 22 having a dispensing opening 24 located therein. It will be noted that this opening 24 leads from the interior of the skirt 18 at the under surface of the top 12 to the outer surface of the top 12. At this outer surface, a short wall 26 formed at the end of the spout 22 partially overlays the opening 24. This wall 26 will serve to direct material passing through the opening 24 towards the left hand side of the closure 10 as this closure is viewed in all of the figures of the drawing.

The top 12 carries an attached, extending flange 28 having a straight edge 30 attached to a corresponding edge 32 of the lid 14 by means of a small, comparatively thin flexible web 34. In effect this web 34 is a part of the flange 28. This flange 28 also includes a hole 36 spaced from the principal portion of the top 12 and the skirt 16 a comparatively short distance and a line of holes 37 in the nature of perforations along the exterior of the skirt 16. These holes 37 should be so numerous and so closely spaced as to easily permit the flange 28 to be severed along them.

The web 34 should be sufficiently thin so that it can be flexed 180 degrees without difficulty and without breaking. It should be sufficiently thick so that it will permit the flow of polymeric material during injection molding operations. The precise thickness of the web 34 will vary depending upon the properties of the particular material used in constructing the closure 10.

The web 34 permits the lid 14 to be folded about the flange 28 so that the lid 14 can be moved a position as indicated in FIGS. 1 and 2 of the drawings from a position as shown in FIG. 5. In such position as shown in FIG. 1 aligned cylindrical trunnions 38 on the extremity of the lid 14 remote from the wall 34 are located in bearing openings 40 having restricted entrances

42. Such bearing openings 40 and their entrances 42 are formed integrally with the top 12 on a portion of this top remote from the web 34. It will be realized that as molded, the axes of the trunnions 38 and the bearing openings 40 are parallel to one another and to the web 34, and that the distance between these axes and the web 34 are equal.

The structures of the trunnions 38 and the bearing openings 40 are designed to serve the same function as the trunnions and bearings shown in the Wilson et al. U.S. Pat. 2,793,795. These are constructed so that they can be "popped" into an engaged position as shown in FIGS. 1 and 2 during the described folding of the lid 14. These trunnions 38 and the bearing openings 40 may be considered as cooperating bearing-trunnion units. Since their function is to permit rotation during the use of the closure 10 it will be apparent that bearing means may be located on the lid 14 and that cooperating trunnion means may be located on the top 12.

The lid 14 also includes a sealing boss 44 having an internal sealing groove 46 which is adapted to fit over and engage the end of the spout 22 when the lid 14 is attached as shown in FIGS. 1 and 2 of the drawings. This structure of the boss 44 and the groove 46 is designed to form a seal with respect to the opening 24. The lid 14 also preferably includes a small-headed projection 48 which is adapted to be forced through the hole 36 in order to secure the lid 14 to the flange 28. This lid 14 may also include a grooved lip 50 which is adapted to be snapped into engagement with a complimentary shaped grooved lip 52 on the top 12 when this lid 14 is secured in place as shown in FIGS. 1 and 2.

The utilization of the complete closure is relatively simple. As this closure is manufactured, the various parts will have positions as indicated in FIG. 5 of the drawing. In order to assemble the closure 10 for use, the lid is pivoted about the web 34 over the upper surface of the top 14. As such pivoting of the lid 14 occurs, the trunnions 38 and bearing openings 40 will come into proximity to one another and these trunnions 38 are snapped into the bearing openings 40 through the restricted entrances 42 through the application of moderate pressure. As such pivoting occurs the projection 48 will be popped through the hole 36. When the trunnions 38 are so positioned the spout 22 and the wall 26 will fit into the groove 46 in the boss 44 so that the opening 24 is sealed off. At this point the complete closure 10 will appear as indicated in FIGS. 1, 2 and 3 of the drawing and will be ready for installation.

The closure 10 may be installed on appropriate container in a conventional manner and then then container may be shipped to where it will be sold or used. At the initial use of the closure 10, upward pressure will be applied to the flange 28. At this time the flange 28 will break off along the holes 37 which are in the nature of perforations. As this occurs the broken-off portion of the flange 28 will be carried upward with the lid 24 because of the engagement of the projection 48 in the hole 36. As the lid 14 is rotated in this manner, the spout 22 will of course be uncovered. Normally the lid 14 is rotated to a position as indicated in FIG. 4 of the drawings. In such a position material can be dispensed through the closure 10 and through the opening 24.

The closure 10 may be reaealed prior to further use by merely rotating the lid 14 to its initial position as indicated in FIGS. 1 and 2 of the drawings. During such opening and closing, the lips 50 and 52 will snap over one another so as to be disengaged as the lid 14 is opened and so as to be engaged as the lid 14 is closed. Thus, these lips 50 and 52 act essentially as detents because of the inherent resiliency of the material used in the closure 10. If desired, they may be considered as a means for holding the lid 14 in a closed position.

It will be apparent that with the closure 10 the web 34 may be used instead of the holes 37 as a frangible member. Normally this web 34 should not be weaker or more resistant to breakage than the line defined by the holes 37 in order to obtain a mechanical advantage for many easy openings of the complete closure 10. It will be apparent that this closure 10 is constructed so as to facilitate breakage in the area of the holes 37 since these holes are closer to the axis of rotation of the trunnions 38 than the flange 28.

In FIGS. 6 through 9 of the drawings there is shown another complete tamper-proof closure 60 of the present invention. This closure 60 includes a closure top 62 and a lid 64, this top 62 corresponding to the top 12 previously described and this lid 64 corresponding to the lid 14 previously indicated. The entire closure 60 is preferably formed as an integral structure or unit in the same manner as the closure 10 out of materials such as are used in the manufacture of the closure 10.

The top 62 includes the dependent skirt 66 which includes an external annular projection 68. A cavity 70 of an annular ring like form is located above this projection 68 generally between it, the top 62 and a dependent flange 72 carried by the top 62. This cavity 70 is intended to be used in a conventional manner for use in attaching the closure 60 to a known type of container. Hence, it may be regarded as a "means for attaching" the top 62 to a container. Other equivalent means may be employed.

The top 62 has an enlarged opening 74 located within it concentric with the skirt 66 so as to be essentially defined by this skirt 66. Within this opening 74 there are sloping walls 76 leading to an internal projecting annular ridge or flange 78. The top 62 also carries an extending flange 86 corresponding to the flange 28 previously described. This flange 86 has a straight edge 88 attached to a corresponding edge 90 of a flange 94 of the lid 64 by means of a thin, small flexible wall or web 92. This web 92 is of the same character as the flexible wall 34 previously described and in effect forms a part of the flange 86.

The central portion of this lid 64 also carries a dependent skirt 96 having an outer wall 97 shaped in a complimentary manner to the walls 76. Thus, this skirt includes a peripheral annular groove 98. This structure is designed so that the skirt 96 may be "popped" into or "snapped" into place within the opening 74 by temporary deformation of the material within the top 62 and the lid 64 so that the flange 78 will fit within the groove 98 and so that the seal will be formed between the exterior of the skirt 96 and the contacted portions of the top 62.

The lid 64 also includes aligned trunnions 100 corresponding to the trunnions 38 previously described. These trunnions 100 are constructed so that they are capable of being "popped" or "snapped" into the bearing openings 86 upon the assembly of the complete closure 60 after it has been molded to a configuration as shown in FIG. 10 of the drawing. During such assembly the lid 64 is rotated with respect to the top 62 about the web 92 acting as a pivot until the trunnions 100 are above the bearing openings 84. At this time the trunnions 100 may be pushed into the bearing openings 84 by the application of pressure, causing a temporary deformation of the bearing structures 82. The lid 64 also includes a back wall 102.

The use of the closure 60 is essentially similar to the use of the closure 10 previously described. After the closure 60 is assembled as indicated, it is installed on a container in a conventional manner. Thereafter by visual inspection of the web 92 it is possible to determine that this closure has not been opened. When, however, it is desired to open this closure, pressure may be applied underneath the flange 86 causing some temporary deformation of this flange. As this occurs normally the pressure applied will be sufficient to rupture the web 92. If however it is desired, the web 92 may be severed by mechanical means such as a knife or a pair of scissors.

Once the web 92 is severed, pressure will be applied to the flange 94 and this in turn will be transmitted through the central region of the lid 64. As this occurs the groove 98 will be "snapped" away from the flange 78 and the entire lid 64 will be rotated to an open position as indicated in FIG. 1. In this position the walls 102 and 80 will abut against one another so that the lid 64 will be supported as shown in FIG. 9 in what may be regarded as a slightly over center position in which the principal weight of the lid 64 is to the right of an imaginary line drawn vertically through the axis of rotation of the trunnions

100. This will help maintain the lid 64 in an open position as shown. If desired, other means such as detents may be used for the same purpose.

When the lid 64 is in an open position the entire closure 60 may of course be used to dispense the contents of a container to which it is attached. Whenever desired the closure 60 may be closed by rotating the lid 64 from an open position as shown in FIG. 9 to a closed position as shown in FIG. 7. As the lid 64 assumes this closed position, moderate pressure should be applied so as to bring the skirt 96 into a closed, sealed relationship with the top 62 by "snapping" the flange 78 into the groove 98. This flange 78 and the groove 98 thereafter interfit so as to hold the lid 64 with respect to the top 62. Thus they serve as a "means for holding" the lid in a closed position.

I claim:

1. A tamper-proof closure which includes:
an initially integral closure top and closure lid, said top and said lid being connected by a web,
said lid, said top and said web being formed of a flexible resilient material,
said web being sufficiently thin so that it can be flexed without breaking in the assembly of such closure, said web being capable of being broken,
said top and said lid being separate and apart except as connected by said web prior to the assembly of said closure,
said top and said lid being capable of being pivoted about said web to an assembled position in which said lid overlies said top during the assembly of said closure,
said lid and said top carrying cooperating bearing means and trunnion means capable of being snapped together during the assembly of said closure,
said bearing means and said trunnion means being located remote from said web and serving to mount said lid on said top when said closure is assembled,
means for attaching said closure to a container formed on said lid,
an opening for use in dispensing material extending through said top,
means on said lid for covering said opening when said closure is assembled,
said closure being capable of being initially opened by breaking said web and by pivoting said lid with respect to said top through the operation of said coacting bearing and trunnion means,
said coacting bearing and trunnion means serving to secure said lid to said top after said closure has been initially opened so that said lid can be rotated between an open position in which said opening is uncovered and a closed position in which said opening is covered.

2. A tamper-proof closure as claimed in claim 1 including:
interlocking means on said lid and said top for holding said lid in said closed position, said interlocking means being capable of releasing said lid so as to permit said lid to be rotated to said open position.

3. A tamper-proof closure as claimed in claim 2 wherein:
said interlocking means comprise interengageable lips on said top and said lid, said lips being capable of being snapped together and capable of being snapped apart.

4. A tamper-proof closure as claimed in claim 2 wherein:
said interlocking means comprise an interfitting groove and a flange, said groove and said flange being capable of being snapped together and being capable of being snapped apart.

5. A tamper-proof closure as claimed in claim 1 wherein:
said trunnion means are located on said lid and said bearing means are located on said top.

6. A tamper-proof closure as claimed in claim 1 wherein:
said means on said lid for covering said opening serves to seal said opening when said lid is in said closed position.

7. A tamper-proof closure as claimed in claim 1 including:
interlocking means on said lid and said top for holding said lid in said closed position, said interlocking means being capable of releasing said lid so as to permit said lid to be rotated to said open position, and wherein
said trunnion means are located on said lid and said bearing means are located on said top,
said means on said lid for covering said opening serves to seal said opening when said lid is in said closed position.

* * * * *