

July 5, 1966

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3,259,233

CONTAINER CLOSURE

Filed Sept. 9, 1963

FIG. 1

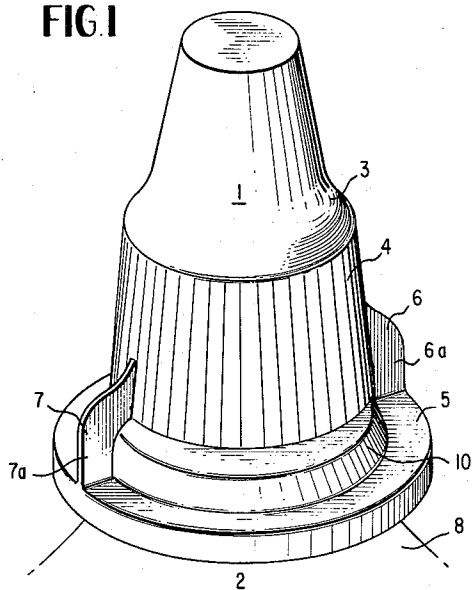


FIG. 2

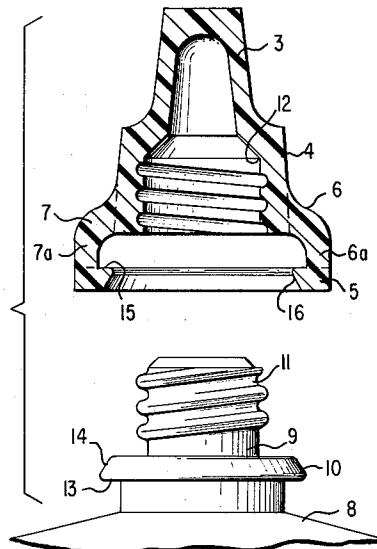


FIG. 4

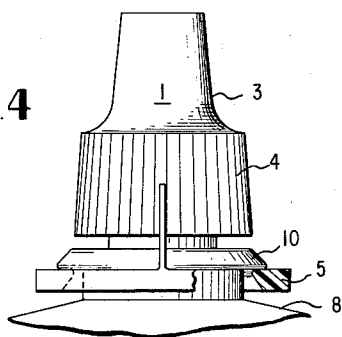


FIG. 3

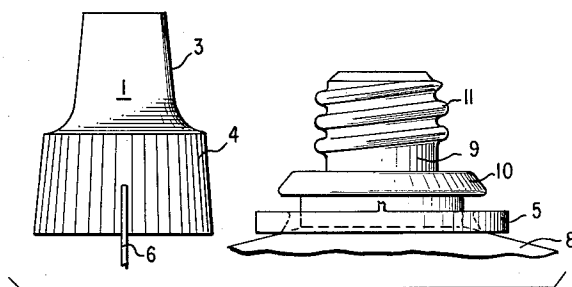
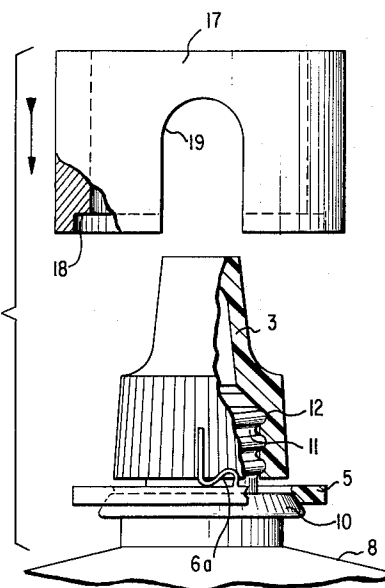


FIG. 5

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CONTAINER CLOSURE

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Filed Sept. 9, 1963, Ser. No. 307,630
3 Claims. (Cl. 220-27)

This invention pertains to a container closure. In particular, it relates to a closure for a material container provided with a unique, tamper-proof structure.

A variety of container closure structures have been developed for the specific purpose of providing an indication of the initial removal of a closure from its associated container. Such devices are intended to prevent tampering with the contents of the container prior to the intended, first authorized dispensing of the container contents.

In general, tamper-proof closure structures heretofore developed have been characterized by structural complexity and attendant expense. Many such structures have been of such a cumbersome character as to virtually prohibit their commercial utilization.

Of particular consequence has been the interference which many tamper-proof structures have provided with usual closure securing means. Many tamper-proof structures have adversely affected the initial installation of a closure and/or have interfered with the subsequent use of a closure after its initial removal.

It is an object of the present invention to provide an improved container structure characterized by a tamper-proof closure which substantially obviates the afore-noted tamper-proof closure deficiencies.

It is a particular object of the invention to provide a tamper-proof closure which may comprise an integral unit molded of plastic and which is characterized by structural simplicity, nominal fabrication cost, and maximum ease of utilization.

It is another object of the invention to provide such a closure which does not interfere with a normal closure securing structure, such as a threaded connection employed to secure a cap to a threaded container neck.

A further object of the invention is to provide such a closure by means of which tampering with the closure or container contents prior to a first authorized use of the container may be readily detected.

A still further object of the invention is to provide a tamper-proof closure wherein the components employed as a tamper-proof mechanism are structurally and functionally independent of the normal closure securing structure.

It is also an object of the invention to provide such a structure which is devoid of tamper-proof components which would impede the use of a closure subsequent to its initial removal from a container.

Yet another object of the invention is to provide a tamper-proof closure which, after its initial removal from a container, will leave in place a closure component attesting to the initial opening of the container.

The improved structure with which the invention is concerned relates particularly to a closure for a container, which container includes a container body, a material outlet, and abutment or locking means. The closure includes a closure body adapted to be moved generally axially of the material outlet for engagement therewith. The closure further includes a continuous, resiliently distensible ring and flexible connecting means extending between the closure body and this ring. The ring is adapted to be positioned between the closure body and the body of the container. Conventional closure securing means may be provided which are cooperable between the closure body and the material outlet of the container.

The aforesaid closure ring is adapted to engage the container carried abutment means before the closure body is fully secured on the material outlet such that the ring is prevented from moving axially toward the container body for at least a terminal portion of the axial movement of the closure body onto the material outlet. While the ring is thus prevented from undergoing axial movement, the connecting means flexes to allow relative convergence of the closure body and the ring. The ring is sufficiently resilient or elastic to allow it to be moved axially over the material outlet and toward the container body and to be resiliently distended so as to move past the abutment means. After passing the abutment means, the ring resiliently contracts so as to be engageable with the abutment means when moved axially of the material outlet and away from the container body.

In describing this improved structure, reference will be made to a preferred embodiment illustrated in the accompanying drawings. In these drawings:

FIGURE 1 is a perspective, fragmentary view of an upper portion of a container illustrating a preferred form of the improved closure of this invention installed in tamper-proof position on a material outlet;

FIGURE 2 is a fragmentary, partially sectioned, elevational view of closure and material outlet components of the present invention in axially separated relationship;

FIGURE 3 is a fragmentary, partially sectioned, elevational view of partially assembled closure and material outlet components of the preferred form of the invention, which view further schematically illustrates a tool which may be employed to complete the assembly of these components;

FIGURE 4 is a fragmentary, partially sectioned, elevational view illustrating fully assembled closure and material outlet components of the invention; and

FIGURE 5 is a fragmentary, schematic, elevational view of the disassembled components shown in FIGURE 4, illustrating the manner in which the closure body is removed from the material outlet so as to leave a closure ring in place on the container to attest to the initial removal of the closure body.

A preferred embodiment of the tamper-proof closure of this invention is illustrated in FIGURE 1. As shown in this illustration, a closure 1 is installed in a material outlet closing position on the upper end of a container 2, a fragmentary upper portion only of which is pictured.

Preferably, closure 1 is fabricated as an integral unit by molding it of a resilient plastic material such as polyethylene or polypropylene. Container 2 is preferably fabricated in this same fashion.

Closure 1 includes a closure body 3. While the body 3 may assume a variety of configurations, it is expected that in most instances it will be generally cylindrical in character, i.e. have circular cross sections. If desired, a portion 4 of the container body may be provided with exterior ribs or may be roughened or otherwise modified to facilitate the manipulation of the closure to effect the closure securing action hereinafter described.

Closure 1 includes, as an integral component, a continuous, resiliently distensible ring 5. Ring 5 is supported in axially spaced relation with the closure body 3 by connecting means such as relatively thin webs 6 and 7.

As shown, webs 6 and 7 are disposed on diametrically opposite sides of the closure body 3 and ring 5. Connecting webs 6 and 7 each project generally laterally outwardly of the closure body 3 and then longitudinally downwardly toward the ring 5 so as to support the ring 5 below the closure body 3 when the closure 1 is installed as shown in FIGURE 1.

The ring 5 is connected to the closure body 3 only by the webs 6 and 7, with each such web having a thin flexing portion extending generally upwardly from the

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upper surface of the ring 5 so as to be parallel or generally longitudinally aligned with the cylindrical axis of the closure 1. The flexing portion of the connecting web 6 comprises a generally rectangularly configured web portion 6a extending from the ring 5. A corresponding rectangular flexing portion 7a comprises the lower end of the connecting web 7. As shown in FIGURES 1 and 2, the connecting web portions 6a and 7a are each disposed laterally outwardly of the extended outer peripheral surface of the closure body portion 4 which lies adjacent the ring 5.

Each connecting element or web 6 and 7 has a cross section extending transversely of the cylindrical axis of the closure 1 which may be generally rectangular in configuration and is elongate in a direction extending radially of this axis.

As shown in FIGURE 2, the container 2 includes a material housing or body portion 8, a fragmentary upper portion only of which is shown. Container 2 further includes a material outlet 9 and abutment or locking means which may comprise an annular rim 10. Rim 10 may be carried on the outlet 9 in relatively close proximity to the container body 8.

Outlet 9 may be a conventional material outlet having a generally cylindrical cross section. Outlet 9 may include a conventional, externally threaded portion 11 adapted to matingly engage an internally threaded portion 12 of the closure body portion 4. As will be apparent, closure securing cooperation occurs between the closure securing means 12 and 11 when the closure 1 is moved axially of and toward the outlet 9 and appropriately rotated so as to cause the threaded closure portion 12 to engage and advance over the threaded outlet portion 11.

The tamper-proof components of the invention include the connecting webs 6 and 7, the ring 5 and the abutment rim 10.

The abutment rim 10 has an outer diameter which exceeds the minimum inner diameter of the ring 5. Abutment 10 includes a generally planar, first locking surface 13 formed on the underside of the rim. As illustrated, locking surface 13 may extend generally perpendicular of the cylindrical axis of the material outlet 9.

Locking rim 10 further includes a first camming surface 14. As illustrated, surface 14 may comprise a truncated, conical surface which faces away from the container body 8. Surface 14, as shown, flares outwardly toward the body 8. The relationship between the locking surface 13 and camming surface 14 is such that the locking surface 13 is disposed between the camming surface 14 and the container body 8.

Ring 5 includes a generally planar, second locking surface 15 comprising the upper surface of this ring. As shown, locking surface 15 may extend generally perpendicular of the axis of the closure body 3.

Ring 5 further includes a second camming surface 16, which may also be of a generally truncated, conical configuration. Camming surface 16, when disposed in operative relationship with respect to the container 1, faces generally toward the container body 8 and flares outwardly toward the body 8. In this operative position, the second camming surface 16 is disposed between the second locking surface 15 and the container body 8.

FIGURES 3 and 4 illustrate the manner in which the closure 1 may be assembled on the material outlet 9 and brought into tamper-proof engagement with the locking rim 10.

The initial step in applying the closure 1 involves merely threadably advancing the closure portion 12 over the threaded outlet portion 11 so as to cause the closure body 3 to advance axially of the outlet 9 and toward the container body 8. Before the closure body 3 is fully secured on the outlet 9, i.e. before the threaded portion 12 has moved to its maximum axial extent on the threaded portion 11, the ring 5 will engage the locking abutment

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or rim 10. Owing to the interference fit between these components, the rim 10 will prevent axial movement of the ring 5 during the terminal portion of the axial movement of the closure body 3 onto the material outlet 9. With the ring thus immobilized against axial movement, and with the closure body 3 continuing to move axially toward the container body, the ring 5 and closure body 3 will be caused to mutually converge so as to cause the connecting web portions 7a and 6a to flex laterally in the general manner shown in FIGURE 3. This lateral flexing of the resilient web portions 6a and 7a will, for the most part, occur in substantial longitudinal alignment with the ring 5 and at a point displaced laterally outwardly from the container body 3. As a result, the flexing of the connecting webs 6 and 7 will not interfere with the convergence of the ring 5 and the closure body 3.

After the axial movement of the closure body 3 has been completed, i.e. when the threaded closure portion 12 has fully engaged the threaded outlet portion 11, the tamper-proof interlocking between the closure ring 5 and the container locking rim 10 may be effected. This interengagement may be accomplished by employing a simple tool such as the device 17 schematically illustrated in FIGURE 3. Assembling tool 17 may comprise a generally cylindrical shell having a notched portion 18 on its lower cylindrical face defining an annular shelf adapted to receive the upper portion of the ring 5. Tool 17 may further include cut-out portions such as the portion 19 which are adapted to provide sufficient space in the area of the flexed web portions 6a and 7a so as to avoid engagement with the webs.

The tool 17 may be moved axially toward the ring 5 so as to bring the shelf 18 into engagement with the upper surface of the ring 5. Axial force may then be exerted on the tool 17 toward the body 8. This force will cause the resilient ring 5 to distend or resiliently expand so as to cam over and move past the abutment rim 10. After the ring 5 has cleared the abutment rim 10, it will then resiliently contract to assume the position shown in FIGURE 4. In this position the ring locking surface 15 is disposed between the rim locking surface 13 and the container body 8, with there being very little, if any, clearance space between these components.

As will be apparent, the locking surface 15 will thus be engageable with the locking surface 13 when the closure 1 is sought to be moved axially away from the container body 8 so as to prevent removal of the closure body 3 and ring 5 from the container.

The orientation of the locking surfaces 13 and 15 is such that no camming tendencies exist between these surfaces which would facilitate the camming of the ring 5 over the rim 10 in a direction away from the container body 8. The close spacing of the rim 10 and body 8 is such as to virtually prevent the utilization of any tool in an effort to pry the ring 5 over the rim 10. As a result, removal of the closure body 3 may be accomplished only by severing the webs 6 and 7 so as to vitiate the locking effect or impeding interaction of the ring 5 and locking rim 10.

Webs 6 and 7 may be severed by cutting them with an appropriate cutting tool if desired. Under certain circumstances it might be desirable to dimension the webs 6 and 7 to make them so thin as to enable them to tear or separate in response to an axial force exerted thereon when the closure body 3 is rotated to unscrew this body from the outlet 9. As will be apparent, during this unscrewing action the closure body 3 will exert an upward force on the webs 6 and 7 while the ring 5, in being retained by the rim 10, will exert a downward force on the webs 6 and 7. These opposing forces may be sufficient to effect the tearing of the webs 6 and 7 if the webs are appropriately dimensioned.

As shown in FIGURE 5, the initial removal of the closure body 3 provides a telltale indication of the initial closure removal. This telltale indication includes the

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severed webs 6 and 7 as well as the presence of the freed ring 5 on the container 2 below the locking rim 10.

In describing the structure and mode of operation of the tamper-proof closure of this invention, its several advantages have been made apparent.

The integral character of both the closure and container facilitate their being expeditiously and economically molded of plastic materials such as polyethylene and polypropylene. As a result, a tamper-proof container and closure assembly may be produced at nominal cost which is characterized by maximum structural simplicity, maximum functional reliability and maximum ease of installation and use.

The structure of the tamper-proof components, i.e. the connecting webs, the closure ring, and the container locking rim, are such as to avoid any interference with the action of the conventional closure securing means, i.e. the threaded closure and material outlet portions. The interlocking between the closure ring and the container locking rim may be effected entirely independently of the normal closure securing action by the simple expedient of exerting axial force on the ring 5.

The connecting webs 6 and 7 are uniquely configured such that, when flexed, no interference is caused with respect to the convergence of the ring 5 and the closure body 3.

After the initial removal of the closure body 4, there are no residual tamper-proof components which will in any way adversely affect or impede the repeated removal and re-installation of the closure during subsequent use of the container.

The structure of the tamper-proof elements is such as to leave a two-fold indication of the initial use of the container, i.e. the severed webs, as well as the ring 5 which remains in place on the container.

While the invention has been described with reference to a preferred embodiment, certain modifications may be obvious to those skilled in the tamper-proof container art. For example, the configuration of the connecting webs, closure ring, container locking rim, closure, container body and material outlet may be substantially modified. Fabrication materials other than those specifically disclosed may be employed. The shape and relative inclination of the locking and camming surfaces may be substantially altered. For example, the locking surfaces 13 and 15 might slope or flare downwardly and outwardly toward the container body rather than extend generally perpendicular to the common axis of the material outlet 9 and closure body 3. In addition, closure securing means other than a conventional, threaded interconnection might be employed.

Modifications such as those noted, as well as other additions, deletions, substitutions and changes with respect to the illustrated embodiment may be made within the

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purview of the invention as defined in the appended claims.

What is claimed is:

1. In a combination including a closure and a container having a body and an externally threaded outlet neck, the improvement comprising:
 - an internally threaded closure body;
 - a resiliently distensible ring spaced axially below said closure body and having an opening generally axially aligned with said closure body;
 - flexible connecting means integral with and projecting outwardly from side portions of said closure body and laterally downwardly toward said ring so as to support said ring;
 - abutment means having an external dimension transverse of the axis of said closure which exceeds the size of the opening in said ring, said abutment means being located on said container below said neck;
 - said abutment means comprising a first planar locking surface facing downwardly and a first camming surface flaring upwardly and inwardly from said first locking surface;
 - said ring including a second planar locking surface facing upwardly and a second camming surface flaring downwardly and outwardly from said locking surface;
 - said ring being adapted to snap over said abutment means and lock therebelow during assembly of said closure on said container, with said abutment means removably retaining said ring on said neck subsequent to the breaking of said connecting means to effect the removal of said closure.
2. The combination improvement described in claim 1 wherein said connecting means comprises at least a pair of connecting elements positioned on diametrically opposite sides of said closure body, each of said connecting elements comprising a web having a cross section transverse of the axis of said closure body which is elongate in a direction extending generally radially of said closure body axis.
3. The combination improvement described in claim 2 wherein said closure body, said connecting elements, and said ring comprise an integral molded unit.

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