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[54] **APPARATUS FOR RELEASING CLOSURE MEMBERS**
 6 Claims, 6 Drawing Figs.

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[50] Field of Search 81/3.4,
 3.34, 3.3, 3.38, 3.1 B, 64, 177 N, 180

ABSTRACT: There is disclosed a device for releasing closure members from containers. The device has a frustoconical-shaped body member of a relatively rigid material which has a frustoconical-shaped recess therein. Within the recess is located a frustoconical-shaped gripping member of a resilient material, which is open ended at its larger end and able to engage a closure member. The body member and gripping member are restrained from relative movement, and by engaging the gripping member on the outside of a closure member, a person may apply torque to the body member and thus to the closure member. Thus by imparting relative angular displacement between the container and its closure member, the closure member may be removed from the container.

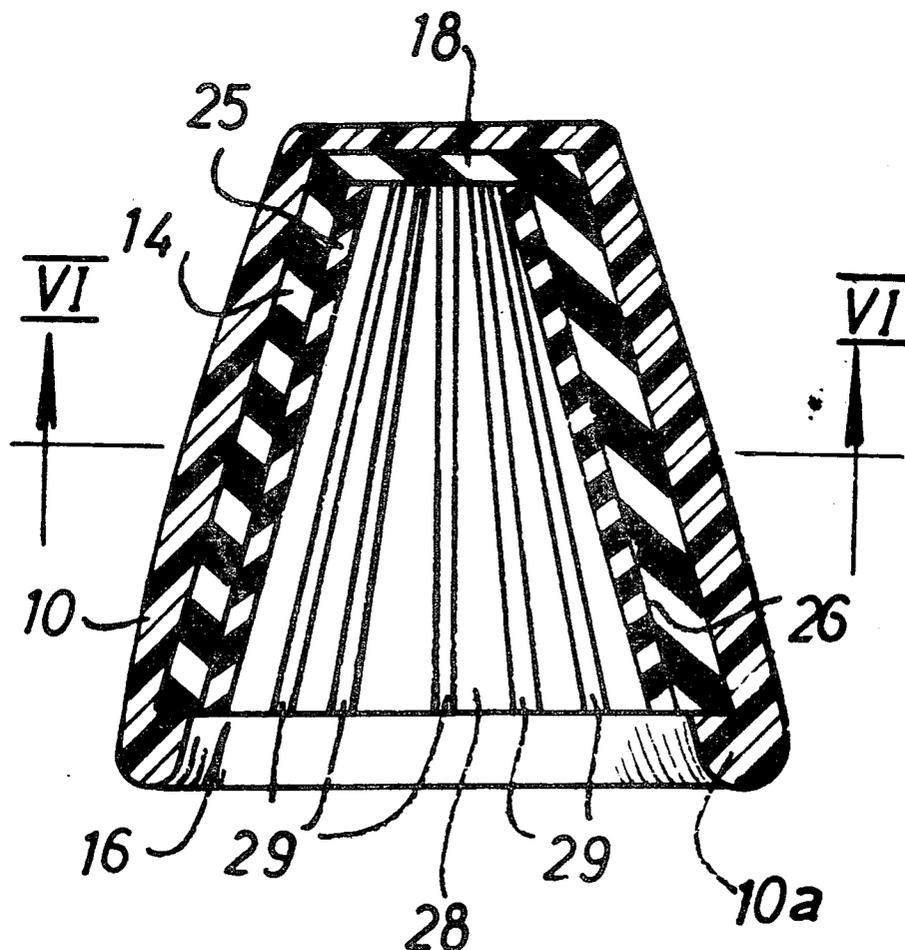


FIG. 1.

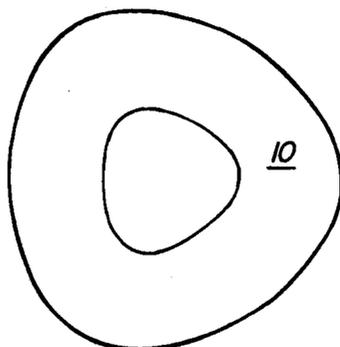


FIG. 2.

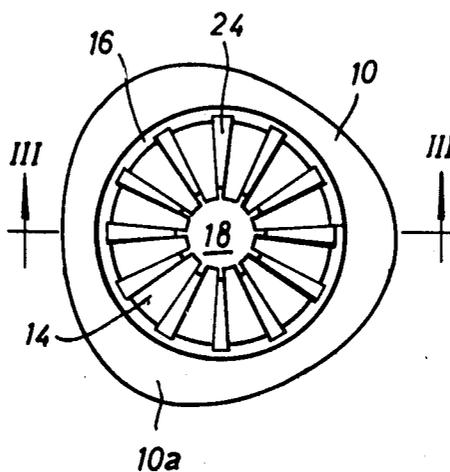
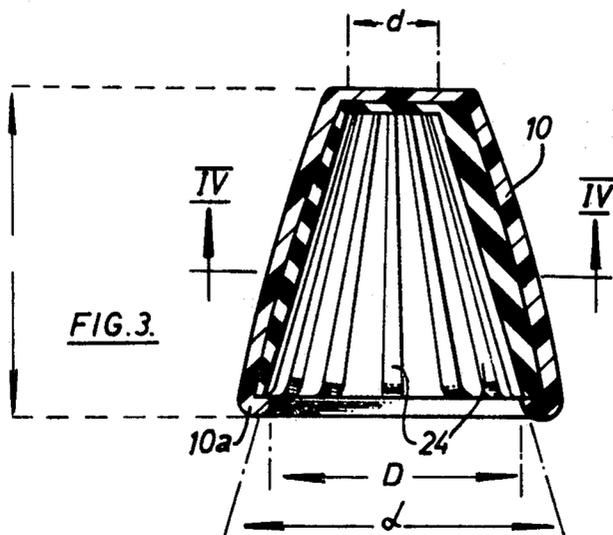
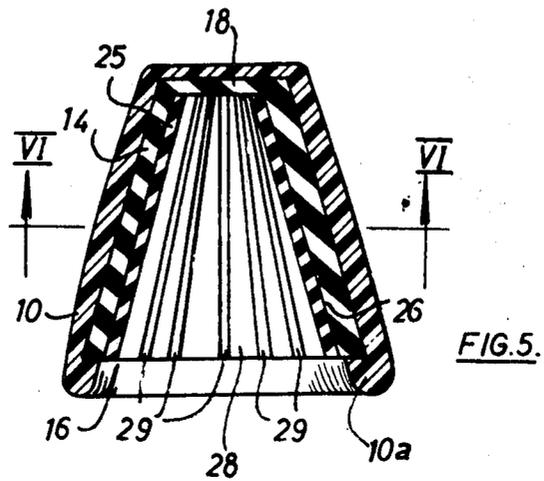
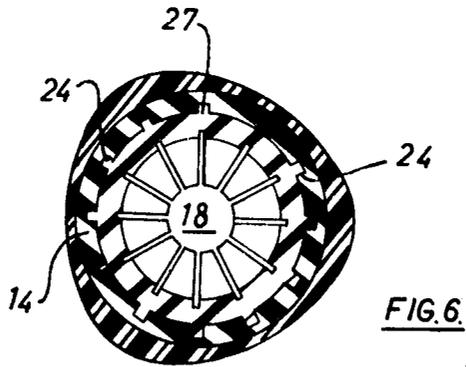
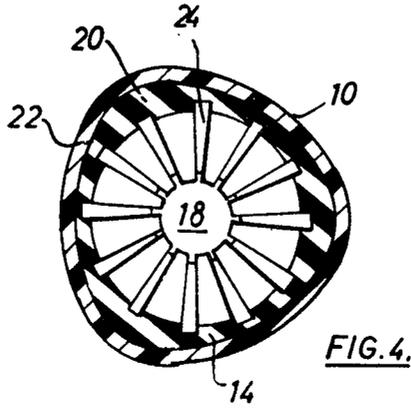


FIG. 3.



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APPARATUS FOR RELEASING CLOSURE MEMBERS

BACKGROUND OF THE INVENTION

Many forms of containers are known which are provided with a closure member which is attached thereto by a locking arrangement which requires relative angular displacement between the container and closure member. In order to release the closure member from the container it is necessary to impart some angular displacement of the closure member relative to the container. One example of this form of closure is a screw stopper often used as a closure member for a bottle. Another example is a closure connected to a container by a bayonet connection. A still further example is a closure member in the form of a cap which is screwed on to the outside of a container such as a jar.

Many containers provided with closure members of this type are in everyday household use and quite often the opening of such a container presents a serious problem to the housewife.

SUMMARY OF THE INVENTION

According to the present invention a device for use in imparting relative angular displacement between a container and a closure therefore comprises a body member of relatively rigid material having a frustoconical recess therein, a hollow frustoconical gripping member of resilient elastic material open ended at its larger end contained within the recess in the body member and adapted to be engaged with the outside of a closure member, the gripping member and said recess being substantially complementarily shaped, and cooperating means on the gripping member and the body member being provided for restraining relative angular displacement between said members in at least one direction.

The gripping member may be provided with a series of grooves or flutings on its inner surface for providing better frictional engagement with a closure member and may be provided on its external surface with one or more protuberances received in complementarily shaped recesses formed in the inner surface of the frustoconical recess of the body member to serve as said cooperating means for restraining angular displacement between said members.

The body member may be generally frustoconical in external shape and adapted to be held in the hand, with the lip at the open end of the body member being flanged inwardly to retain the gripping member. For applying a releasing torque between a closure member and a container the body member is held in one hand and the gripping member within the body engaged with the closure member, while the body of the container is engaged by the other hand and by appropriate twisting movement of one hand relatively to the other a releasing torque is applied.

In another embodiment the body member is provided with means whereby it can be attached to some suitable support such as a wall and angular displacement relatively thereto restrained. With this embodiment it is only necessary to engage the outside of the closure member in the gripping member while the body of the container is held in the hand.

While the range of outside diameters of closure members for which a device can be useful is effectively limited by the internal diameters of the open end and other end of the gripping member, a single device may suffice for a reasonable range of closure members, for example the larger diameter of the gripping member at its open end may be in the region of 2 inches and the inside diameter at its other end in the region of one half inch. Another suitable range may be from 3 inches diameter at the open end to 2 inches diameter at its other end, and even larger diameters are envisaged.

A further embodiment of the present invention provides for a single device to be capable of being used over two different ranges of diameters of closure members. In this embodiment the gripping member is in two parts, the first part being hollow and frustoconical in shape and made of a resilient elastic

material. This first part has an outer surface which is complementary to the inner surface of the body member, and an inner surface which is provided with a series of tapered grooves or flutings; the grooves being widest at the larger diameter open end and narrowing towards the inner end. A body member with this first part of the gripping member may be used to remove closure members from containers over a first range of diameters defined by the large outer diameter and small inner diameter of the said first part of the gripping member; the tapered grooves or flutings on the first part providing better frictional engagement with a closure member. The second part of the gripping member is in the form of a sleeve of frustoconical shape which is also made of a resilient elastic material, the outer surface of the sleeve being complementary to the inner surface of the said first part of the gripping member. The outer surface of the sleeve has longitudinal tapered ribs which are so arranged as to be complementary to the tapered grooves or flutings on the inner surface of the said first part when the sleeve is placed in the device, thus preventing any angular displacement of the sleeve or second part relative to the said first part. Since the sleeve will have a smaller diameter at its outer end than the open end diameter of the said first part, and will have a smaller diameter at its inner end than the diameter of the closed inner end of the said first part, the insertion of the sleeve into juxtaposition to the first part enables the device to be utilized on a second range of closure diameters thus increasing the usefulness of the device. This second range of closure diameters for which the device may be used enables the same device to be used on closures of smaller diameter than would have been possible if the device had only been usable with the first part of the gripping member, over the first range of diameters. This second part of the gripping member may be removed from or inserted into the device as desired, the second part being in the form of a sleeve (i.e. open at either end) to facilitate the removal of the second part from the device. In a preferred embodiment of the present invention the grooves or flutings on the inner surface of the first part of the gripping member will be preferably much larger than the grooves or flutings on the inner surface of the said second part of sleeve; the ribs on the outer surface of the sleeve being of substantially equivalent dimensions to the grooves or flutings on the first part.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be further described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a plan view of one embodiment,

FIG. 2 is an inverted plan view of the embodiment of FIG. 1,

FIG. 3 is a cross section along the line III—III of FIG. 2,

FIG. 4 is a cross section along the line IV—IV of FIG. 3.

FIG. 5 is a cross section as in FIG. 3, with a sleeve inserted in the device and shown in cross section, and

FIG. 6 is a cross section along the line IV—IV of FIG. 5.

Referring initially to FIGS. 1 to 4, a device intended to be held in the hand comprises a generally frustoconically shaped body 10 of a relatively rigid plastics material provided with a frustoconically shaped recess 12 in which is received a frustoconical gripping member 14 of a resilient material, such as natural or synthetic rubber, which is open at its larger diameter end and closed at its inner smaller diameter end 18. The external surface of the gripping member 14 is provided with a series of protuberances 20 received in complementarily shaped recesses 22 provided on the inner surface of the body 10. The inner surface of the gripping member 14 is slotted or fluted by a series of tapered grooves 24. These tapered grooves 24 narrowing from the larger diameter end 16 of the gripping member 14 towards the inner smaller diameter end 18. The gripping member 14 is held in the body member 10 by a lip 10a which extends inwardly from the edge of the larger diameter open end of the body member and engages the edge of the open end of the frustoconical gripping member 14.

In use the body 10 is held in one hand and the inside surface of the gripping member 14 is engaged on the exterior surface of a closure member of a container which is held in the other hand. By exerting a twisting movement between the hands the necessary torque can be achieved on the closure member relatively to the container for effecting release of the closure member from the container.

Referring now to FIGS. 5 and 6 these figures illustrate the device as illustrated in FIGS. 1 to 4 but with a second part to the gripping member in the form of a sleeve 25, inserted in the device. The sleeve 25 is a frustoconical shape, open at both ends and constructed from a resilient elastic material, such as natural or synthetic rubber. The outer surface 26 of the sleeve 25 is complementary to the inner surface of the gripping member 14 and has longitudinal tapered ribs 27 which fit into the tapered grooves 24 on the inner surface of the gripping member 14, when the sleeve is inserted in the device. The inner surface 28 of the sleeve 25 has a series of longitudinal substantially parallel grooves 29 which when the sleeve is inserted in the device and the device engages on a closure member, these substantially parallel grooves 29 provide for better frictional engagement of the closure member, the ribs 27 locking into the grooves 24 and preventing any angular displacement of the sleeve 25 relative to the gripping member 14 and body member 10. The insertion of this sleeve 25 thus adapts the device for use over a second range of closure diameters. Since the inner end diameter of the sleeve 25 is smaller than the inner end diameter of the gripping member 14, the insertion of the sleeve 25 in the device means that the device can effectively be used on closures which previously would have been too small to be gripped by the gripping member 14. Thus by the insertion or removal of the sleeve 25 from the device, one device can be effectively used over two different ranges of closure diameters. The sleeve 25 is open at both ends to facilitate the removal of the sleeve from the device, as, if the sleeve were closed at its inner end it would create a vacuum between the sleeve and the gripping member 14 when it was inserted in the device, thus making it difficult to remove the sleeve when required.

By way of example in the embodiment illustrated, the included angle α (FIG. 3) is 35° , the overall height H is $2\frac{1}{4}$ inches, the open end diameter D is 2 inches, and the closed end diameter d is $1\frac{1}{2}$. The width of the grooves in the inner surface of the gripping member 14 is 0.10 inch at the outer large diameter end and it tapers towards the inner smaller diameter end 18 at the same angle as the frustoconical shape of the gripping member. Also, by way of example, in the embodiment illustrated in FIGS. 5 and 6 the ribs 27 on the sleeve 25 have the same dimensions as the tapered grooves 24 in the gripping member 14, and the inner surface of the sleeve 25 has parallel grooves of width 0.050 inch. The grooves in both the sleeve 25 and the gripping member 14 may conveniently be one sixteenth inch deep, the ribs 27 on the outer surface of the sleeve being of a likewise height. The gripping member and

sleeve may each have a normal wall thickness of one eighth inch, whilst the protuberances 20 on the gripping member have an additional thickness of three thirty-seconds inch.

It will be understood that the dimensions given in respect of the embodiments illustrated in the accompanying drawings are purely by way of example and are not to be understood in a limiting sense. The included angle may vary between 25° and 40° , the overall height from $1\frac{1}{2}$ inch to 3 inches, the dimensions being dictated primarily by the duty which the device is intended to perform.

What I claim is:

1. A closure gripping device for use in imparting relative angular displacement between a container and a closure therefore comprising:

a body member of relatively rigid material having a recess therein,

a hollow gripping member of resilient material contained within the recess in the body member and nonrotatable relative thereto in at least one direction, said gripping member including a first part having a generally frustoconical interior and open ended at its larger end and adapted to be engaged with the outside of a closure member,

said gripping member including a second part in the form of a tapered sleeve being removably engageable against the inside surface of said first part, whereby said second part can be inserted or removed to increase the range of diameters over which the device can be used.

2. The device, as set forth in claim 1, wherein said first part of said gripping member has an outer surface which is complementary to the inner surface of said body member and an inner surface provided with a series of grooves or flutings.

3. The device, as set forth in claim 2, wherein said grooves or flutings are tapered and are widest at said open larger end of said first part, and narrowing towards its other end.

4. The device, as set forth in claim 2, wherein said second part of said gripping member has an outer surface which is complementary to the inner surface of the said first part,

said outer surface of the second part having longitudinal ribs which are complementary to said grooves or flutings on said inner surface of said first part of said gripping member.

5. The device, as set forth in claim 4, wherein said longitudinal ribs on said outer surface of said second part are tapered and fit into said grooves or flutings of said first part of the gripping member.

6. The device, as set forth in claim 2, wherein said second part of said gripping member has a series of grooves or flutings on its inner surface which are narrower than those on said inner surface of said first part of said gripping member.

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