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Wassilieff

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[45] **July 24, 1973**

[54] **SAFETY CLOSURES FOR CONTAINERS**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **215/42,** 215/43 R, 215/46 A, 215/55

[51] **Int. Cl.** **B65d 41/20**

[58] **Field of Search** ..... 215/9, 42, 43 R, 215/43 A, 46 A, 48, 55

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Assistant Examiner—Stephen Marcus
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[57] **ABSTRACT**

Tamper-proof closure means for a container comprises a stopper and a safety device connected to the stopper by a breakable connection. Co-operating faces or projections on the safety device and the stopper are adapted to push against each other during closing of the stopper, and to move away from each other, so breaking the breakable connection, during opening of the stopper.

12 Claims, 10 Drawing Figures

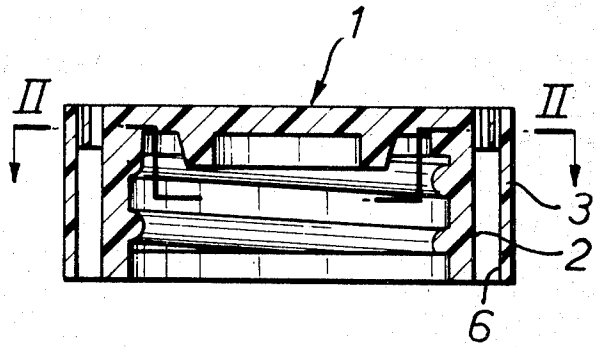

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FIG.1

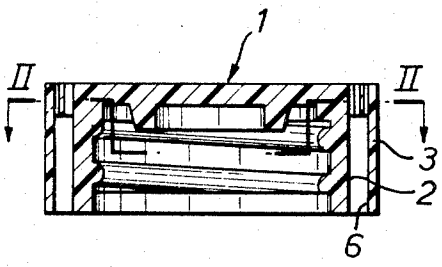

FIG.4

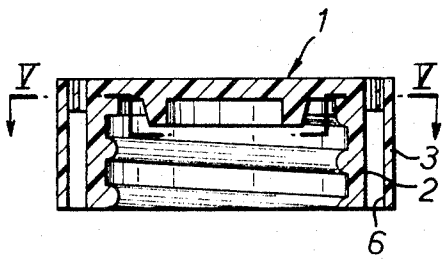

FIG.2

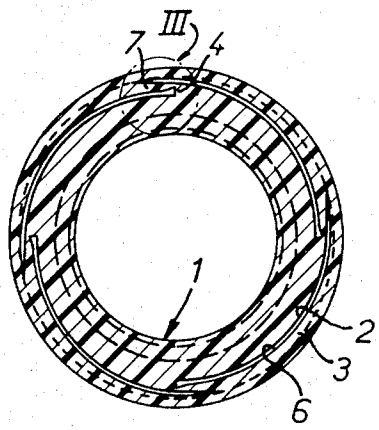

FIG.5

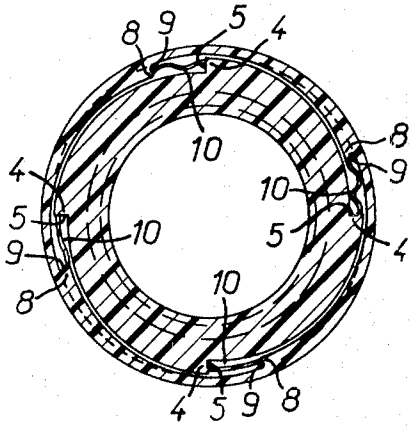

FIG.3

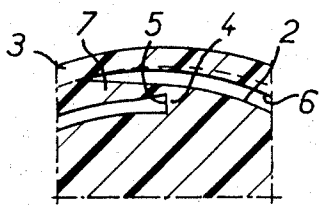

FIG.6

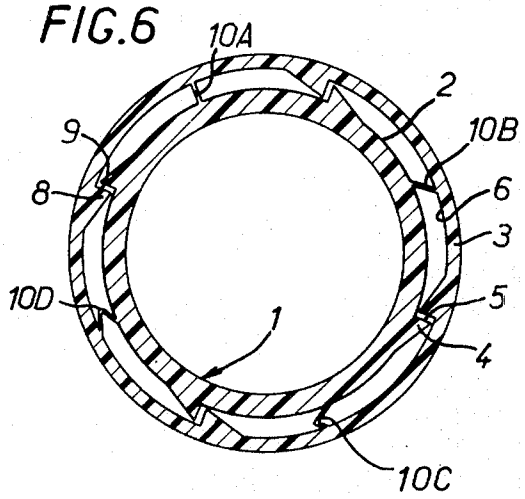

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FIG. 7

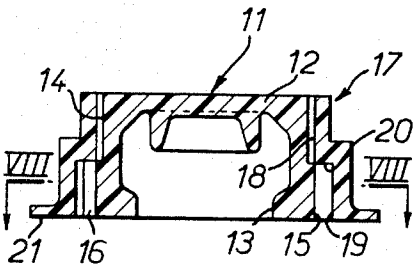


FIG. 8

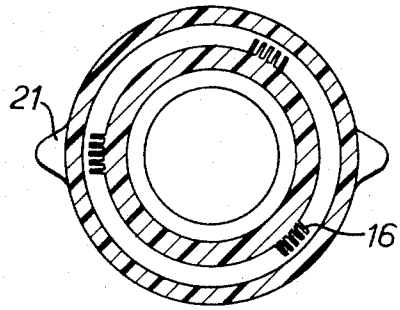


FIG. 9

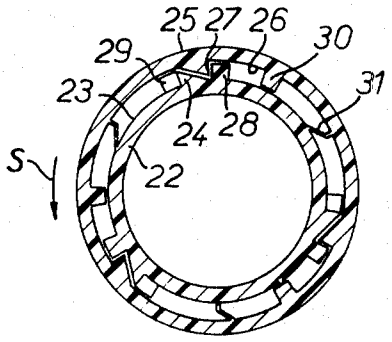
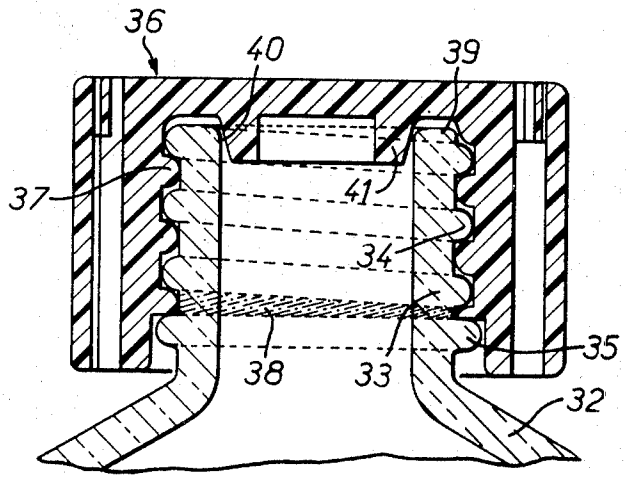


FIG. 10



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SAFETY CLOSURES FOR CONTAINERS

BACKGROUND OF THE INVENTION

The present invention relates to tamper-proof closure means for containers, of the kind comprising a breakable connection which is adapted to be broken in the course of the first opening operation and the integrity of which ensures the integrity of the contents of the container.

The invention has the object of facilitating the manufacture, utilization, and effectiveness of closure means of this kind.

SUMMARY

According to the invention closure means for a container, comprises a stopper, a safety device connected to the latter by a breakable connection, said device covering the stopper to the extent required to enable the latter to be acted on for the purpose of opening the container only by manipulating said device as long as the connection remains intact, and at least two co-operating faces or porjections disposed respectively on said device and on said stopper and adapted to push one against the other in order to drive the stopper by acting on the device for the purpose of closing the stopper, and to move away from one another, thus breaking the breakable connection, when the device is acted on in the direction for opening the container.

In one form of construction of the closure means defined above, the safety device is a false skirt, hereinafter referred to as "skirt," of cylindrical, prismatic, or other shape, surrounding the side face of the stopper.

In one application the co-operating faces or projections are formed on the side face of the stopper and on the inside face of the skirt.

It is convenient for the breakable connection to comprise at least one connecting means consisting of a film of plastics material connecting the mutually opposite faces of the stopper and of the device or skirt.

In one particular case the zones of attachment of a connecting means of this kind are situated on the previously mentioned co-operating pushing faces.

In one embodiment the stopper is driven by the device with the aid of a plurality of connecting means distributed on the periphery of the stopper and each comprising at least two of the aforesaid co-operating faces or projections.

It is advantageous for the breakable connection to be composed of a plurality of connecting means adapted to break in succession, and not simultaneously, when the device is operated for the purpose of opening the container, thus making it easier to break the breakable connection by applying a force less than that required for unstoppering the container.

According to one application, this stepped breaking of the breakable connections is effected by giving them different thicknesses and/or different lengths in the direction of the breaking force.

The arrangements proposed above are suitable equally for screw closures and for push-in closures.

According to one embodiment which is applicable to push-in closure means, at least one of the two mutually opposite faces of the skirt and of the stopper has a radial step which at an intermediate level in the closure means constitutes a co-operating face of the above mentioned type which is transversal in relation to the axis of the closure means.

In one form of push-in closure means according to the invention at least one of the two mutually opposite faces of the skirt and of the stopper is provided, over part of its height, with thin axial ribs connected by their top or bottom ends to a co-operating face formed on the skirt or on the stopper, and which are adapted to strike against said face when the skirt is acted on for the purpose of closing the container, and separated therefrom by rupture along the edge of the ribs, when the skirt is acted on for the purpose of opening the container.

In an alternative form of push-in closure means according to the invention, the thrust face or faces of the stopper are angularly spaced from the corresponding thrust faces of the skirt, in order to facilitate moulding, the co-operating thrust faces being adapted to take up position axially one opposite the other through the rotation of the skirt on the stopper, on a determined angular path, the skirt being locked in position at the end of the path.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical axial section, by way of example, of a screw type closure means according to the invention,

FIG. 2 is a cross-section along the line II—II in FIG. 1,

FIG. 3 shows on a larger scale a detail of FIG. 2,

FIG. 4 shows in vertical axial section an alternative form of screw type closure means according to the invention,

FIG. 5 is a cross-section along the line V—V in FIG. 4,

FIG. 6 is a cross-section of another screw type of closure means,

FIG. 7 is a vertical axial section of a push-in closure means according to the invention,

FIG. 8 is a cross-section along the line VIII—VIII in FIG. 7,

FIG. 9 is a cross-section of an alternative push-in closure means, and

FIG. 10 illustrates an improvement to the screwthread of a screw type closure means.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In each embodiment the closure means is formed of plastic material.

In FIGS. 1 to 3 a container stopper 1 of the screw type has a side face 2 surrounded by a cylindrical skirt 3. In its upper portion the side face 2 has four projections 4 uniformly spaced over the periphery of the stopper and each having a radially disposed face 5. The inner face 6 of the skirt 3 has four projecting tongues directed circumferentially towards the faces 5, the end faces (not given a reference) of said tongues being in fact moulded integrally with part of the faces 5. The tongues 7 are thus connected to the projections 4 by thin films of plastics material.

In the state illustrated, the side face 2 of the stopper is not directly accessible. It can thus be attempted to screw on or unscrew the stopper only with the aid of the skirt. When the stopper is first screwed on at the depot where the containers are packed or filled, the tongues 7 push against the projections 4, thus enabling the skirt to drive the stopper in the screweing-on direction. When the first attempt is made to unscrew the

stopper, the thin films connecting the elements 7 to the elements 4 break before the torque applied to the skirt attains a value required for unstoppering the container. The fact that the films can break, which is easy to see because they are situated in the top portion of the closure means, enables them to serve as check or guarantee elements. After they have broken, the skirt can be removed and the side face of the stopper acted on directly.

In the variant illustrated in FIGS. 4 and 5 the stopper 1, its side face 2, the skirt 3, and the projections 4 having radial faces 5 are as described with reference to the embodiment of the preceding Figures. In four positions the face 6 of the skirt has four projections 8, each of which has a radial face 9 disposed opposite and at a distance from a face 5 on the stopper, said radial face 9 being connected to said face 5 by a thin film 10 of plastics material. The distances between mutually corresponding faces 5, 9 are equal, but the films 10 have quite different dimensions from one another.

In order to place the stopper in position by screwing-on after filling at the packing depot, the skirt drives the stopper by pushing the radial faces 9 against the corresponding radial faces 5, the intermediate films 10 being crushed. When the first attempt at unscrewing is made, the films of plastics material distributed over the periphery of the closure means break successively in the order of the increasing lengths, the first to break being the shortest.

In the embodiment illustrated in FIG. 6, the stopper 1 is provided on its side face 2 with four tooth-shaped projections 4 which are regularly spaced over the periphery of the closure means and each of which having a radially disposed face 5. On its inner face 6 the skirt 3 has four tooth-shaped projections 8, each of which is provided with a radial face 9 situated opposite and at a distance from a respective face 5. The stopper and the skirt are connected by four thin films 10 of moulding material, which are situated between the four sets of co-operating teeth 4, 8. The film 10A is plane in shape and occupies a radial position. The film 10B, which is plane in shape, is inclined in relation to the local radial direction. The film 10C and the film 10D are curved or folded in shape. Screwing-on after packing is effected by contact and the pushing of the faces 9 against the faces 5. If the skirt is manipulated in the unscrewing direction, the films 10A to 10D are stretched to different extents in dependence on their original shape and break successively in accordance with their starting dimensions in cross-section, their axial dimensions, and their thicknesses. Similarly to the embodiment of FIGS. 4 and 5, the stepped rupture of these films facilitates the maintaining of the breaking torque of the breakable connection at a value substantially lower than that of the unscrewing torque.

FIGS. 7 and 8 relate to a push-on closure means to which an axial force must be applied in one direction or the other in order to fasten it to the neck of the container or to remove it therefrom. As in the preceding examples, this closure means is composed of two elements, namely a stopper and a skirt. The stopper 11 of the cap type, has the general shape of a hollow cylinder provided with an end 12, which is intended to enclose a container neck and is provided at its bottom part with an annular rim 13 bent inwards to engage under a neck ring (not shown). The side face of the stopper has a top portion 14 slightly recessed in relation to the remaining bottom portion 15. At each of three positions spaced apart on its periphery at equal angular intervals the face 15 has five thin axial ribs 16.

The inner face of the skirt 17 has a top portion 18 situated opposite the stopper face 14 and a bottom portion 19 of larger diameter situated opposite the stopper face 15. The two faces 18, 19, which are offset in relation to one another, are connected by an underface 20 disposed transversely in relation to the axis of the closure means. The ribs 16, which are moulded integrally with the stopper and skirt, are joined to the stopper along their axial dimension and to the skirt along their radial dimension at the level of the underface 20, the radial dimension being the shorter of the two. The diameter of the upper face 18 of the skirt is at least equal to the diameter of the bottom face 15 of the stopper, so that the stopper and the skirt are connected to one another only by the ribs 16.

In order to stopper the container after filling, either the bottom 12 of the stopper 11 or the skirt 17 can be acted on. In the latter case, the skirt drives the stopper by pushing axially against the ribs 16. In order to remove the closure means it is possible to act only on the skirt, making use of the lugs 21 formed on its bottom edge. The axial force thus imparted to the skirt in the upward direction has the effect of breaking its connection to the ribs 16 along the relatively short radial direction of the latter, before attaining a value sufficient to extract the stopper.

The variant illustrated in FIG. 9 also relates to a push-on closure means. On its side face 23 the stopper 22 has four projections 24 of sawtooth profile. The skirt 25 surrounding the stopper 22 is provided on its inside face 26 with four sawtooth projections 27, each of which has a face inclined slightly in relation to the local tangential direction and opposite a parallel projecting face 24. In addition, the side face 23 of the stopper has a tooth-like projection 28 opposite the second, radially disposed face of each of the projections 27, and also a tooth-like projection 29 side by side with the second, radially disposed face of each of the projections 24. The projections 29 terminate at the top at a level at least equal to the bottom level of the sawteeth 27. Finally, tooth-like projections 30 are formed on the inner face 26 of the skirt 25, and thin films 31 of moulding material form a breakable connection between the stopper and the skirt.

In order to push the closure means received from the manufacturing process, (that is to say as illustrated) over or into the container neck, the first step is to turn the skirt, in relation to the stopper, in the direction of the arrow S. The teeth 27 slide over the teeth 24 along their respective inclined faces, moving radially apart towards the outside, and through relaxation return to the starting radial position after passing the teeth 24. Rotation in the direction of the arrow S is then stopped through the striking of the projections 30 against the projections 28 and the return movement of the skirt towards the rear is prevented because the respective radial faces of the sawtooth projections 24, 27 bear against one another. The skirt is thus locked in a position such that the sawteeth 27 lie over the teeth 29, so that the stopper can be driven in by applying a force axially to the skirt, through the axial thrust applied to the tooth-like projections 29 by means of the projections 27. If an axial force is applied to the skirt in the opposite direction, that is to say the unstoppering direction,

the projections **27** move away from the tooth-like projections **29** and this force can be transmitted to the stopper only through the breakable connections **31**, which results in their breaking. This embodiment has the advantage over the previous one of not stressing the breakable connection during stoppering, and of facilitating the provision of an ample surface of contact between the projections co-operating by axial thrust in the downward direction.

FIG. **10** illustrates an improvement which is applicable generally to screw cap type stoppers serving to close containers having an externally threaded neck. A glass container **32** has a neck **33** provided on its outer face with a screwthread **34** and a bottom ring **35**. A stopper **36** has a screwthread **37** on its inner face; said screwthread terminates at the bottom in a tapered portion **38** which is driven in after the style of a wedge, in the course of the screwing operation, between the horizontal ring **35** and the adjacent portion of the neck screwthread **34**. This makes it possible for the stopper to be locked more effectively by screwing, but without ensuring fluid-tight contact between the stopper and the top surface **39** of the neck, since the stopper is prevented from being screwed right home by the position of the ring. If necessary a seal may be restored by elastic contact between the inner face **40** of the container neck and a re-entrant element **41** extending downwards from the bottom face of the bottom of the stopper.

The arrangements just described enable sufficient play, determined in dependence on the material used for manufacture, to be provided between the stopper and the safety device, so as to prevent the stopper from being tightened by radial compression of the latter, which would make it possible to unstopper the container without breaking the breakable connection.

I claim:

1. Closure means for a container, said means formed as a one-piece molding, comprising a stopper, a safety device connected to the latter by a breakable connection, said device covering the stopper to the extent required to make it impossible to act on said stopper in the opening direction except by manipulating said device as long as the connection remains intact, and at least two cooperating projections disposed respectively on the device and on the stopper and adapted to push one against the other to drive the stopper to closing position when the device is acted on in the direction required for closing the container, and to move apart from one another, breaking the breakable connection when the device is acted on in the direction required for opening the container.

2. Closure means according to claim **1**, in which the safety device is a skirt surrounding the side face of the stopper.

3. Closure means according to claim **2**, in which the co-operating projections are formed on the side face of the stopper and on the inside face of the skirt.

4. Closure means according to claim **2**, in which the breakable connection comprises at least one film of material connecting the oppositely situated faces of the stopper and skirt.

5. Closure means according to claim **4**, in which the film constitutes a connection between the aforesaid two co-operating projections.

6. Closure means according to claim **1**, in which the stopper is driven by the device with the aid of a plurality of connecting means distributed over the periphery of the stopper and each comprising at least two of the aforesaid co-operating projections.

7. closure means according to claim **1**, in which the breakable connection consists of a plurality of connections adapted to break successively when the device is acted on in the direction in which the container is opened.

8. Closure means according to claim **7**, in which the connections are films of material having different respective lengths from one another in the direction of the breaking force.

9. Closure means according to claim **1**, of the push-on or push-in type, in which the safety device has a face opposite the side face of the stopper, at least one of said faces having a radial step which constitutes, at an intermediate level in the closure means, one of the aforesaid co-operating projections disposed transversely in relation to the axis of the closure means.

10. Closure means according to claim **9**, in which the transversal projection formed by stepping on one of the two aforesaid oppositely situated faces is attached to thin axial ribs formed on the other of the said oppositely situated faces.

11. Closure means according to claim **1**, of the push-in or push-on type, in which the safety device is provided, on a face disposed opposite the side face of the stopper, with at least one projection adapted to take up position, when the device is rotated on the stopper, in line with and above a co-operating projection formed on said side face.

12. Closure means according to claim **11**, provided with means of rotationally locking the device on the stopper after the aforesaid co-operating projections have been brought vertically in line with one another.

* * * * *