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Referencia: Solicitud de PCT Patente de Invención denominada ***Cierre para Recipientes con Banda Indicativa, la Cual se Deforma al Intento de Manipular el Cierre.***

Asunto: Respuesta al Requerimiento No. 2359 del 23 de febrero de 2021.

Expediente No. NC2019/0003551

Juan Carlos Cuesta Quintero, mayor de edad, identificado como aparece al pie de mi firma, obrando en mi calidad de apoderado de la sociedad **GCL International S.A.R.L**, doy respuesta al Oficio No. 2359 del 23 de febrero de 2021, bajo los siguientes términos:

1. Título:

De acuerdo con las objeciones planteadas por parte del Examinador en cuanto al título, la solicitante procederá a ajustar el título al siguiente:

Cierre para Recipientes con Banda Indicativa, la Cual se Deforma al Intento de Manipular el Cierre

2. Reivindicaciones:

- La reivindicación 12 reclama un recipiente que tiene un cuello provisto de un cierre a prueba de manipulación conforme se define en cualquiera de las reivindicaciones precedentes.

“12. Un recipiente que tiene un cuello provisto de un cierre a prueba de manipulación de acuerdo con cualquier reivindicación precedente.”

Entendemos que la redacción de la reivindicación 12 es lo más concisa posible, pues define un recipiente que tiene un cuello, donde el cuello del recipiente está provisto de un cierre a prueba de manipulación como el definido en cualquiera de las reivindicaciones precedentes. Es decir, que el recipiente que protege la reivindicación 12 es aquel que tiene un cuello con un cierre como el que se define

en cualquiera de las reivindicaciones 1 a 11. Es una definición precisa, porque protege un recipiente que tiene el cierre de cualquiera de las reivindicaciones 1 a 11 y no otro recipiente, y también es concisa, porque expresa en una redacción clara y con economía de palabras el objeto protegido. En efecto, el recipiente de la reivindicación 12 puede tener un cierre conforme a cualquiera de las reivindicaciones 1 a 11, puesto que todos los cierres definidos en las reivindicaciones 1 a 11 son compatibles con el recipiente definido en la reivindicación 12.

Ninguna de las enmiendas introducidas va más allá del ámbito de protección conferido por la solicitud de patente tal y como fue originalmente presentada.

3. Examen de Patentabilidad:

Se han modificado las reivindicaciones basándose en las reivindicaciones concedidas de la Patente Europea paralela nº EP3523212B, cuya copia se adjunta. La reivindicación 1 de EP3523212B corresponde a la anterior reivindicación 7 en tramitación. Se han incluido las características de la anterior reivindicación 7 en la reivindicación 1 modificada.

Se presenta una argumentación en apoyo de la patentabilidad basado en que la anterior reivindicación 7 (reivindicación 1 de EP3523212B) se corresponde con la reivindicación 7 de la solicitud de patente internacional originaria (PCT) y se indica en la opinión escrita de la autoridad internacional de búsqueda (WO-ISA) que es tanto novedosa como inventiva a la vista del estado de la técnica citado en el ISR (incluyendo D1 (WO 2015/113851 A1)).

Se adjunta una copia de la publicación internacional, así como una copia de la WO-ISA, en donde cumplimos con traer a colación los puntos relevantes de la explicación mencionada de la EPO donde se indican las características diferenciadoras de la invención, el problema que resuelve y por qué dichas características son nuevas e inventivas.

3. Reivindicación 7: el documento D1 divulga un cierre a prueba de manipulación (1) para un cuello de recipiente, difiriendo la materia objeto de la reivindicación 7 de este en cuanto a que la disposición de enganche de banda de rasgado a prueba de manipulación comprende:

una primera rampa circunferencial y un bloque, espaciados en una dirección periférica del cierre a prueba de manipulación, se extienden radialmente hacia dentro desde la banda de rasgado a prueba de manipulación,

una segunda rampa circunferencial y una pinza oscilante, espaciadas en la dirección periférica del cierre a prueba de manipulación, se extienden radialmente hacia fuera desde la segunda parte de envoltura, y



la rotación de la banda de rasgado a prueba de manipulación en una primera dirección de rotación obliga al bloque a toparse contra la pinza oscilante y obliga a la primera rampa circunferencial a desplazarse a lo largo de la segunda rampa circunferencial para hacer que un arco de la banda de rasgado a prueba de manipulación se doble radialmente hacia fuera.

- 3.1.1. Puede considerarse que el problema que debe resolver la presente invención consiste en proporcionar al cierre a prueba de manipulación una característica adicional a prueba de manipulación de refuerzo.
- 3.1.2. Se entiende que la solución a este problema expuesta en la reivindicación 7 de la presente solicitud presenta actividad inventiva (Artículo 33(3) PCT) por los siguientes motivos, y es que esta no es conocida a partir de la técnica anterior disponible ni tampoco puede deducirse directamente de la misma.
- 3.1.3. Las reivindicaciones 8-12, cuando dependen de la reivindicación 7, según viene expuesta, también cumplen los requisitos del PCT con respecto a la novedad y a la actividad inventiva.

En vista de todo lo anterior, ruego a usted estudiar nuevamente la solicitud con base en las modificaciones realizadas y proceder de conformidad.

Cordialmente,

Juan Carlos Cuesta Quintero.

C.C. 79.339.809 de Bogotá

T.P. 43.273 del C.S. de la J.

BANDEJA DE ENTRADA >

NC2021/0006505 - NC Modificación a las reivindicaciones - Solicitado en Patente
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Contacto

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1 Solicitud (es)

Número de solicitud	Tipo de solicitud	Título/Denominación	Fecha de radicación	Estado(s)	Titular
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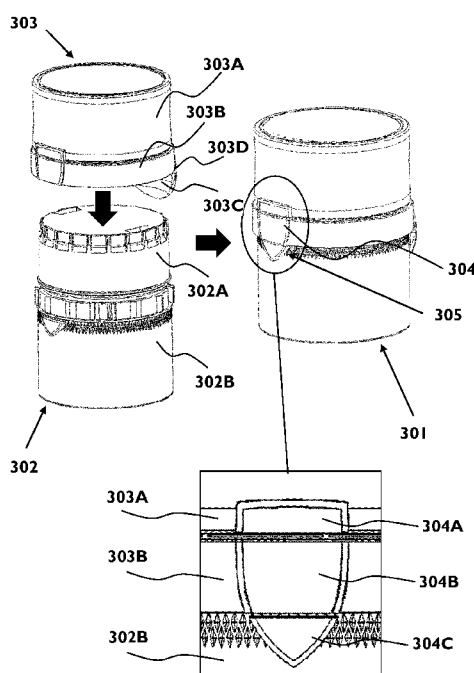


FIGURE 3

(57) **Abstract:** A tamper-evident closure (301) for a container neck (102) comprises a shell (302) comprising first and second shell parts (302A, 302B), and a tamper-evident over cap (303) comprising a cap part (303A) fixed to the exterior of the first shell part (302A) and a tamper-evident tear band (303B) releasably connected to the cap part (302A) and releasably located around the exterior of the second shell part (303B). The tamper-evident closure (301) further comprises a multi-section tamper-evident element (304) incorporating an indelible visual indicium (305). The cap part (303A) comprises a first section (304A) of the multi-section tamper-evident element (304), the tamper-evident tear band (304B) comprises a second section (304B) of the multi-section tamper-evident element (304), and the second shell portion (302B) comprises a third section (304C) of the multi-section tamper-evident element (304). A tamper-evident closure (701, 901) comprising a tamper-evident tear band engagement arrangement.

IMPROVEMENTS IN OR RELATING TO CLOSURES

Field of the Invention

The present invention relates generally to a closure for a container and particularly to a
5 closure with means for indicating that the closure has been opened at least once.

Background of the Invention

There is an increasing demand for tamper-indicating systems which ensure that a container
is not re-filled with non-original contents. Whilst it is relatively easy to produce some form
10 of tamper-evidence, it is much more difficult to provide tamper-evidence which cannot be
either overcome without causing the tamper-evidence system to activate, or activated and
then returned to a visually identical state so as to appear non-activated.

International Publication No. WO 2015/113851 A1, the contents of which are incorporated
15 herein by reference, discloses a closure for a container, the closure comprising a shell
comprising a first shell part and a second shell part, and a tamper-evident overcap. The
tamper-evident overcap comprises a cap which is fixed to the exterior of the first shell part
and a tamper-evident member which is releasably connected to the cap and releasably
located around the exterior of at least part of the second shell part so that the cap cannot
20 be removed before the tamper-evident member is released, in which the first and second
shell parts cannot be separated before the tamper-evident member is released, and after
the tamper-evident member has been released the cap is removable together with the first
shell part. The tamper-evident overcap may be retrofittable to pre-existing shells.

25 This document discloses a tamper-evident closure having a tamper-evident band which can
be teared off in order to allow the first shell part underneath the overcap to be twisted
and removed in order to get access to the contents of the container. The container may
be a spirits bottle. The tamper-evident closure can exhibit a further tamper-evident means
that indicates that the container has been opened at least once. In particular, the tamper-
30 evident closure can be a 'gap-generating' closure, wherein during first opening of the
tamper-evident closure an irreversible gap between first and second portions of the

tamper-evident closure is generated to provide evidence that the tamper-evident closure has been opened.

5 The present invention seeks to provide an improvement over prior art tamper-evident closures.

10 In one aspect, the present invention provides an innovative design for a tamper-evident band that causes the tamper-evident band to break or otherwise be damaged if an attempt is made to open the tamper-evident closure without tearing the tamper-evident band off first.

15 The innovative design seeks to ensure the tamper-evident band cannot be released and subsequently returned to the original condition without leaving visual evidence that an attempt has been made to avoid tearing the tamper-evident band off when opening the tamper-evident closure.

20 The present invention provides an innovative design for a tamper-evident tear band of a tamper-evident closure that is opened by an unscrewing action that prevents the tamper-evident tear band from turning before the tamper-evident tear band is released.

In another aspect, the present invention provides an innovative design for a tamper-evident band that prevents a non-original tear-band being used in an attempt to visually reconstruct the tamper-evident closure after first opening.

25 The present invention provides an innovative design for a tamper-evident tear band of a tamper-evident closure having a gap-generating mechanism that utilises the gap generated on first opening in the prevention of attempted reconstruction of the tamper-evident closure after first opening.

30 The tamper-evident closure may be a spirits bottle closure.

Summary of the Invention

According to a first aspect there is provided a tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a multi-section tamper-evident element incorporating an indelible visual indicium; the cap part comprises a first section of the multi-section tamper-evident element, the tamper-evident tear band comprises a second section of the multi-section tamper-evident element, and the second shell portion comprises a third section of the multi-section tamper-evident element; and releasing the tamper-evident tear band releases the second section of the multi-section tamper-evident element from the tamper-evident closure.

The indelible visual indicium may be incorporated in the multi-section tamper-evident element by a moulding process, an etching process, or an engraving process. The indelible visual indicium may be incorporated in the multi-section tamper-evident element by laser marking.

The indelible visual indicium may include one or more items, each of which may be a shape item, a pattern item, an alpha-numerical item, or a graphics item. The indelible visual indicium, or one or more items thereof, may include a plurality of constituent portions.

The first section of the multi-section tamper-evident element may comprise a first constituent portion of the indelible visual indicium, the second section of the multi-section tamper-evident element may comprise a second constituent portion of the indelible visual indicium, and the third section of the multi-section tamper-evident element may comprise a third constituent portion of the indelible visual indicium.

The indelible visual indicium may comprise a unique identifier item, and at least the second section and the third section of the multi-section tamper-evident element may comprise a presentation of the unique identifier item.

- 5 According to a second aspect there is provided a tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior
- 10 of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a window comprising at least one opening is defined in the tamper-evident tear band, a protrusion
- 15 extends radially outwardly from the second shell part, and the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening.

- According to a third aspect there is provided a tamper-evident closure for a container neck,
- 20 the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the
- 25 removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band, a second
- 30 circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the

swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.

- 5 According to a fourth aspect there is provided a tamper-evident closure comprising two or more of a multi-section tamper-evident member as featured in the first aspect, a tamper-evident tear band engagement arrangement as featured in the second aspect and a tamper-evident tear band engagement arrangement as featured in the third aspect.
- 10 A tamper-evident closure according to the first aspect, second aspect, third aspect or fourth aspect may include a gap-generating mechanism.

- The tamper-evident closure may therefore further comprise: a first portion including an inner part and an outer part, a second portion, and a locking mechanism; the first portion
- 15 removably engaged with the second portion; the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap between the first shell part
- 20 and the second shell part, the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first shell part and the second shell part.

The locking mechanism may comprise a ratchet mechanism.

- 25 The gap may be an unobstructed gap.

The first portion may be removably engaged with the second portion by a screw-thread arrangement. Alternatively, the first portion may be removably engaged with the second portion by a push-fit arrangement.

30

The shell may be formed from a metal or a plastics material.

According to a fifth aspect there is provided a container having a neck provided with a tamper-evident closure according to the first aspect, the second aspect, the third aspect or the fourth aspect.

- 5 The container may be a bottle. The bottle may be a glass bottle. The glass bottle may be a spirits bottle.

Further particular and preferred aspects of the invention are set out in the accompanying dependent claims.

10

Brief Description of the Drawings

The present invention will now be more particularly described, with reference to the accompanying drawings, in which:

- 15 **Figures 1A to 1E** show a first prior art tamper-evident closure;
Figures 2A to 2E show a second prior art tamper-evident closure;
Figure 3 shows a tamper-evident closure according to a first arrangement;
Figures 4 to 6 show different examples of a multi-section tamper-evident element;
Figures 7 & 8 show a tamper-evident closure according to a second arrangement;
20 **Figures 9 & 10** show a tamper-evident closure according to a third arrangement;
and

- Figures 11 to 20** show features of a gap-generating mechanism that may be incorporated into a tamper-evident closure according to the first arrangement of **Figures 3 to 6**, the second arrangement of **Figures 7 & 8** or the third arrangement of **Figures 9 & 10**.
25

Description

- Illustrative embodiments and examples are described below in sufficient detail to enable those of ordinary skill in the art to embody and implement the apparatus, systems and/or
30 processes described herein. It is to be understood that embodiments and examples can be provided in many alternate forms and the invention should not be construed as limited to the embodiments and examples set forth herein but by the scope of the appended claims.

Unless otherwise defined, all terms (including technical and scientific terms) used herein are to be interpreted as is customary in the art. In addition, features referred to herein in the singular can number one or more, unless the context clearly indicates otherwise.

5 Similarly, the terms “comprises,” “comprising,” “includes,” and/or “including,” when used herein, specify the presence of the stated feature or features and do not preclude the presence or addition of one or more other features, unless the context clearly indicates otherwise.

10 **Figures 1A to 1E** show a first prior art tamper-evident closure 101, fitted to a container neck 102. The tamper-evident closure 101 comprises a shell 103 having a first shell part 103A and a second shell part 103B. The shell 103 may be formed from a metal or a plastics material.

15 A tamper-evident overcap 104 is fitted over the first shell part 103A. The tamper-evident overcap 104 includes a cap part 104A and a tamper-evident tear band 104B. The overcap 104 may be formed from any suitable material. The overcap 104 may be formed from a plastics material.

20 The cap part 104A is secured to the first shell part 103A (by friction and an adhesive) and has a free end that is frangibly connected to the tamper-evident tear band 104B.

The tamper-evident tear band 104B includes a generally disc-shaped section 104C that is formed to appear like a seal. A frangible line 104D extends around one side of the generally
25 disc-shaped section 104C, and extends between upper and lower edges of the tamper-evident tear band 104B, as illustrated in **Figure 1A**.

The tamper-evident tear band 104B is removably secured around the second shell part 103B so that the cap part 104A (carried on the first shell part 103A) cannot be removed
30 before the tamper-evident tear band 104B is released.

The cap part 104A and the first shell part 103A together form a removable cap.

In order to remove the removable cap, the tamper-evident tear band 104B must first be released. This is achieved by lifting the generally disc-shaped section 104C to cause the frangible line 104D to break, as illustrated in **Figure 1B**. The generally disc-shaped section
5 104C can then be pulled to tear the tamper-evident tear band 104B away from the free end of the cap part 104A, as illustrated in **Figure 1C**.

Thereafter, a user may grasp the cap part 104A to unscrew the removable cap; the cap part 104A is secured to the first shell part 103A so that they co-rotate off the container neck
10 102. (in an alternative example the removable cap can be pulled off).

The removable cap (cap part 104A and first shell part 103A) is shown removed in **Figure 1D**, and is shown subsequently replaced in **Figure 1E**.

15 The first and second shell parts 103A and 103B cannot be separated before the tamper-evident tear band 104B is released. As shown in **Figure 1B**, an outer surface of the second shell part 103B is provided with axial ribs 105 that are arranged to engage corresponding axial ribs (not visible) on an inner surface of the tamper-evident band 104B to prevent the tamper-evident band 104B from rotating prior to being released.

20

An example of first prior art tamper-evident closure 101 is described in International Publication No. WO 2015/113851 A1.

Figures 2A to 2E show a second prior art tamper-evident closure 201, fitted to a
25 container neck 202. The tamper-evident closure 202 comprises a shell 203 having a first shell part 203A and a second shell part 203B, and a tamper-evident overcap 204 fitted over the first shell part 203A, the tamper-evident overcap 204 including a cap part 204A and a tamper-evident tear band 204B.

30 The cap part 204A is secured to the first shell part 203A, and has a free end that is frangibly connected to the tamper-evident tear band 204B.

As illustrated in **Figure 2A**, the tamper-evident tear band 204B includes a generally disc-shaped section 204C that is formed to appear like a seal, and a frangible line 204D that extends around one side of the generally disc-shaped section 204C and extends between upper and lower edges of the tamper-evident tear band 204B,

5

The cap part 204A and the first shell part 203A together form a removable cap.

The tamper-evident tear band 204B is removably secured around the second shell part 203B so that the removable cap cannot be removed before the tamper-evident tear band 204B is released.

10

To remove the removable cap, the tamper-evident tear band 204B must therefore first be released. The generally disc-shaped section 204C must be lifted to break the frangible line 204D, as illustrated in **Figure 2B**. The generally disc-shaped section 204C can then be pulled to separate the tamper-evident tear band 204B from the cap part 204A, as illustrated in **Figure 2C**.

15

Thereafter, a user may then unscrew the removable cap (or alternatively pull the removable cap off), the cap part 104A and the first shell part 203A to which the cap part 204A is secured moving together off the container neck 102.

20

The removable cap (cap part 104A and first shell part 103A) is shown removed in **Figure 2D**, and is shown subsequently replaced in **Figure 2E**.

The second prior art tamper-evident closure 201 of **Figures 2A to 2E** differs from the first prior art tamper-evident closure 101 of **Figures 1A to 1E** in that the second prior art tamper-evident closure 201 incorporates a gap-generating mechanism (not shown) that is arranged such that during first opening of the second prior art tamper-evident closure 201, an irreversible G is generated between the first and second shell parts 203A and 203B. When the removable cap is replaced the gap G is evident, as can be seen in **Figure 2E** (no such gap can be seen in **Figure 1E**). The irreversible gap G thus provides an indication that the tamper-evident closure has been opened at least once.

30

An example of second prior art tamper-evident closure 201 is described in International Publication No. WO 2015/113851 A1.

- 5 The gap-generating mechanism of the second prior art tamper-evident closure 201 may be a gap-generating mechanism as described in International Publication No. WO 2006/117505 A1. The irreversible gap may be an unobstructed gap.

10 A tamper-evident closure for a container neck, according to a first arrangement, is shown in **Figure 3**.

Tamper-evident closure 301 comprises a shell 302 comprising a first shell part 302A and a second shell part 302B, and a tamper-evident overcap 303 comprising a cap part 303A and a tamper-evident tear-band 303B.

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The shell 302 may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the shell 302 is formed from a metal material.

20 The tamper-evident overcap 303 may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the tamper-evident overcap 303 is formed from a plastics material.

25 The tamper-evident overcap 303 is fitted over the shell 302, as shown. The cap part 303A is secured to the first shell part 302A in any suitable manner, which may utilise friction and/or an adhesive. The cap part 303A has a free end that is frangibly connected to the tamper-evident tear-band 303B. The tamper-evident tear band 303B is releasably located around the exterior of the second shell part 303B such that a removable cap portion of the tamper-evident closure 301, which comprises the cap part 303A and the first shell part 302A, is removable after the tamper-evident tear band 303B is released. The second shell
30 part 303B remains on the container neck.

The tamper-evident tear band 303B includes a pull section 303C, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 303B. A frangible line 303D extends around a side of the pull section 303C and extends between upper and lower edges of the tamper-evident tear band 303B.

5

To open the tamper-evident closure 301, the tamper-evident tear band 303B must first be released. The tamper-evident tear band 303B and second shell part 302B are provided with co-operating axial ribs (ribs 304 of the second shell part 302B only are shown) to prevent the tamper-evident band 303B from rotating prior to being released.

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To release the tamper-evident tear band 303B, the pull section 303C is lifted and pulled to break the frangible line 303D and tear the tamper-evident tear band 303B from the cap part 303A. The removable cap (cap part 303A and first shell part 302A) may then be removed).

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Thus, the tamper-evident closure 301 is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

However, differences will now be described.

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Tamper-evident closure 301 comprises a multi-section tamper-evident element 304 incorporating an indelible visual indicium 305.

The term “indelible” is used herein to mean permanent and durable, and difficult to remove.

25

Preferably the indelible visual indicium is resistant to the application of at least abrasion, heat and acids.

As shown, the cap part 30AB comprises a first section 304A of the multi-section tamper-evident element 304, the tamper-evident tear-band 303B comprises a second section 304B of the multi-section tamper-evident element 304, and the second shell portion 302B comprises a third section 304C of the multi-section tamper-evident element 304.

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In the shown arrangement, the second section 304B of the multi-section tamper-evident element 304 is disposed, in an axial direction of the tamper-evident closure 301, between the first section 304A and the third section 304C.

- 5 Releasing the tamper-evident tear-band 303B releases the second section 304B of the multi-section tamper-evident element 304 from the tamper-evident closure 301.

This will remove an intermediate section of the multi-section tamper-evident element 304, and provide an indication of first opening.

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The tamper-evident closure 301 may a gap-generating mechanism, which causes an irreversible gap to be generated during first opening, such that when the removable cap (cap part 303A and first shell part 302A) is replaced, the distance between the upper edge of the third section 304C and the first section 304A of the multi-section tamper-evident
15 element 304 is greater than before first opening, and therefore any attempt to glue the tamper-evident tear-band 303B back into place will not restore the original appearance of the tamper-evident closure 301 (due to the increase in separation in the axial direction).

- As shown in **Figure 3**, when the overcap 303 is initially assembled over the shell 302, the
20 first, second and third sections 304A, 304B and 304C of the multi-section tamper-evident element 304 are in an aligned condition.

- The indelible visual indicium 305 may include one or more items of any suitable type, each of which may be a shape item, a pattern item, an alpha-numerical item, or a graphics item,
25 and, as appropriate, an item may include a plurality of constituent portions.

An item may be presented in any suitable. An item may be presented in all raised, all recessed, or a combination of raised or recessed regions.

- 30 A shape item may, for example, be presented using a raised region to present a substantially solid shape or outlines the boundary or edge of a shape.

The shape may be, for example a shield shape, such as is shown in **Figure 3**, or any other regular or irregular shape. The shape may, for example, be a square, a triangle, an oval. A pattern item may present any suitable pattern. An alpha-numerical item may be a code. a graphics item may be a logo.

5

A pattern item may be any suitable pattern, which may be example be or include a cross-hatching pattern or a regular or irregular display or dots or shapes.

An alpha-numeric item may be a name or a code.

10

A graphic item may be picture, which may be a logo.

The indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 by any suitable process, such as a moulding process, an etching process, or an engraving process. The indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 by laser marking. It is to be appreciated that the indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 as the tamper-evident closure 301 is being formed, or may be included as a post-initial production stage.

20

Although the arrangement of **Figure 3** shows the multi-section tamper-evident element 304 located diametrically opposite the pull section 303C, it is to be appreciated that any suitable relative radial and/or axial positioning may be utilised.

25 Different example arrangements of a multi-section tamper-evident element 304 will now be described, with reference to **Figures 4 to 6**.

Illustrated in **Figure 4** is an example in which the indelible visual indicium 305 comprises an item 401 distributed across the first, second and third sections 304A, 304B and 304C of the multi-section tamper-evident element 304, such that the first section 304A comprises a first constituent portion 401A of the item 401, the second section 304B comprises a second constituent portion 401B of the item 401, and the third section 304C comprises a

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third constituent portion 401C of the item 401. When the tamper-evident tear-band 303B is released, the second constituent portion 305B is removed, resulting in a visual interruption of the indelible visual indicium 305.

- 5 When the tamper-evident tear-band 303B has been disposed of, any attempt to replace the original tamper-evident tear-band 303B with a non-original tamper-evident tear band is now made more difficult as it must visually match the first constituent portion 305A of the cap part 304A and the third constituent portion 305C of the second shell part 304C, which remains on the container neck.

10

As illustrated in **Figure 5**, the indelible visual indicium 305 may comprise a unique identifier item 501, with at least the second section 304B and the third section 304C of the multi-section tamper-evident element 304 comprising a presentation of the unique identifier item 501 (in this illustration the first section 304A also comprises a presentation of the unique
15 identifier item 501).

- The use of a unique identifier item 501 advantageously increases the complexity of an attempt to replace the original tamper-evident tear-band 303B with a non-original tamper-evident tear band (and in this illustration to replace the original cap part 303A with a non-
20 original cap part) as there is a requirement for the unique identifier item 501 remaining on the container neck, by virtue of the presentation of the unique identifier item 501 on the third section 304C of the multi-section tamper-evident element 304) to be present also on the other parts being substituted.

- 25 A third example is illustrated in **Figure 6** in which the indelible visual indicium 305 includes a first item 601 and a second different item 602 distributed across the first, second and third sections 304A, 304B, 304C of the multi-section tamper-evident element 304, such that the first section 304A comprises a first constituent portion 601A of the first item 306E, the second section 304B comprises a second constituent portion 601B of the first item
30 306E and a first constituent portion 602A of the second item 306F, and the third section 304C comprises a second constituent portion 602B of the second item 306F. When the

tamper-evident tear-band 303B is released, the second constituent portion 305B is removed, resulting in a visual interruption of the indelible visual indicium 305.

Each section of the multi-section tamper-evident member may have any suitable dimensions. Each section may have the same, or a different depth dimension, in the axial direction of the tamper-evident closure, as one or more other sections of the multi-section tamper-evident member. In addition, a multi-section tamper-evident member may have more than three sections.

10 A tamper-evident closure may be provided with more than one multi-section tamper-evident member as described herein. Each multi-section tamper-evident member of a plurality of multi-section tamper-evident members may be the same as, or different from, one or more others of the plurality of multi-section tamper-evident members.

15 A tamper-evident closure for a container neck, according to a second arrangement, is shown in **Figures 7 & 8**.

Tamper-evident closure 701 comprises a shell 702 comprising a first shell part 702A and a second shell part 702B, and a tamper-evident overcap 703 comprising a cap part 703A and a tamper-evident tear-band 703B.

The shell 702 may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the shell 702 is formed from a metal material.

25 The tamper-evident overcap 703 may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the tamper-evident overcap 703 is formed from a plastics material.

The tamper-evident overcap 703 is fitted over the shell 702, as shown. The cap part 703A is secured to the first shell part 702A in any suitable manner, which may utilise friction and/or an adhesive. The cap part 703A has a free end that is frangibly connected to the tamper-evident tear-band 703B. The tamper-evident tear band 703B is releasably located

around the exterior of the second shell part 703B such that a removable cap portion of the tamper-evident closure 701, which comprises the cap part 703A and the first shell part 702A, is removable after the tamper-evident tear band 703B is released. The second shell part 703B remains on the container neck.

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The tamper-evident tear band 703B includes a pull section 703C, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 703B. A frangible line (not visible) extends around a side of the pull section 703C and extends between upper and lower edges of the tamper-evident tear band 703B.

10

To open the tamper-evident closure 701, the tamper-evident tear band 703B must first be released. The tamper-evident tear band 703B and second shell part are provided with co-operating axial ribs to prevent the tamper-evident band 703B from rotating prior to being released.

15

To release the tamper-evident tear band 703B, the pull section 703C is lifted and pulled to break the frangible line and tear the tamper-evident tear band 703B from the cap part 703A. The removable cap (cap part 703A and first shell part 702A) may then be removed.

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Thus, the tamper-evident closure 701 is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

However, differences will now be described.

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As shown in **Figures 7 & 8**, the tamper-evident closure 701 comprises a tamper-evident tear band engagement arrangement, in which a window 704 comprising a periphery 705 and at least one opening 706, within the area bounded by the periphery 705, is defined in the tamper-evident tear band 703B and a protrusion 707 extends radially outwardly from the second shell part 702B. As illustrated in **Figure 8**, when the tamper-evident tear overcap 703 is assembled with the shell 702, the tamper-evident tear band 703B is snap-fitted over the protrusion 707, as the tamper-evident tear overcap 701 is applied

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downwardly around the first shell part 702A, such that the protrusion 707 extends into the opening 706.

When the tamper-evident overcap 703 is in snap-fit engagement with the second shell part 702B, the window 704 and protrusion 707 co-operate to provide an anti-tamper feature. The co-operating window 704 and protrusion 707 increase the difficulty of rotating the tamper-evident tear band 703B before it is removed. In addition, any attempt to unhook the window 704 of the tamper-evident tear band 703B from the protrusion 707 will result in irreversible deformation or distortion in, or damage to, the tamper-evident tear band 703B, if this does not cause the tamper-evident tear band 703B to break. The deformation, distortion or other damage provides evidence that an attempt has been made to open the tamper-evident closure 701 without detaching the tamper-evident tear band 703B from the cap part 703A.

The tamper-evident closure 701 may include a gap-generating mechanism, which causes an irreversible gap to be generated during first opening, such that when the removable top part (cap part 703A and first shell part 702A) is replaced, there is an axial separation between the first shell part 702A and the second shell part 702B that was not present before the first opening event, which has the effect that any attempt to glue the tamper-evident tear-band 703B back into place will not restore the original appearance of the tamper-evident closure 701 and also the window 704 cannot be snapped back over the protrusion 707 thus enhancing the visual discrepancy.

Each of the window 704, periphery 705, and at least one opening 706, and the protrusion 707, may have any suitable shape and dimensions. The protrusion 707 may have any suitable profile, and may present more than one projection elements at a terminal end thereof for engaging an opening of the window 704.

The protrusion 707 may comprise or constitute at least one indelible visual indicium, which may comprise one or more item such as a shape item, a pattern item, an alphanumeric item or a graphic item as described above. An attempt to open the tamper-evident closure 701 without first releasing the tamper-evident tear band 703B may also result in damage to an

indelible visual indicium of the protrusion, which again will provide visual evidence of tampering.

Although the arrangement of **Figures 7 & 8** shows the co-operating window 704 of the tamper-evident tear band 703B and the protrusion 707 of the second shell part 703B located diametrically opposite the pull section 703C that any suitable relative radial and/or axial positioning may be utilised.

In addition, although the arrangement of **Figures 7 & 8** shows the protrusion for engaging the tamper-evident tear band extending from a second shell part, it is to be appreciated that the protrusion could alternatively extend from a closure body portion, that comprises or otherwise effectively provides a shell part, and achieve the same effect.

Further, although the arrangement of **Figures 7 & 8** shows the opening extending all the way through the tamper-evident tear band, so that it is open to the internal side and the external side thereof, it is to be appreciated that the opening could alternatively extend partially through the tamper-evident tear band, so that it is open only to the internal side thereof.

A tamper-evident closure may be provided with more than one co-operating window and protrusion as described herein. Each co-operating window and protrusion of a plurality of co-operating windows and protrusions may be the same as, or different from, one or more others of the plurality of co-operating windows and protrusions.

A tamper-evident closure for a container neck, according to a second arrangement, is shown in **Figures 9 & 10**.

The tamper-evident closure comprises a shell comprising a first shell part and a second shell part 902B, and a tamper-evident overcap comprising a cap part and a tamper-evident tear-band 903B.

The shell may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the shell is formed from a metal material.

5 The tamper-evident overcap may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the tamper-evident overcap is formed from a plastics material.

10 The tamper-evident overcap is fitted over the shell. The cap part is secured to the first shell part in any suitable manner, which may utilise friction and/or an adhesive. The cap part has a free end that is frangibly connected to the tamper-evident tear-band 903B. The tamper-evident tear band 903B is releasably located around the exterior of the second shell part 902B such that a removable cap portion of the tamper-evident closure, which comprises the cap part and the first shell part, is removable after the tamper-evident tear band 903B has been released. The second shell part 923B remains on the container neck.

15 The tamper-evident tear band 903B includes a pull section, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 903B. A frangible line extends around a side of the pull section and extends between upper and lower edges of the tamper-evident tear band 903B.

20 To open the tamper-evident closure, the tamper-evident tear band 903B must first be released. The tamper-evident tear band 903B and second shell part may be provided with co-operating axial ribs to prevent the tamper-evident band 903B from rotating prior to being released.

25 To release the tamper-evident tear band 903B, the pull section is lifted and pulled to break the frangible line and tear the tamper-evident tear band 903B from the cap part. The removable cap (cap part and first shell part) may then be removed).

30 Thus, the tamper-evident closure is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

However, differences will now be described.

As shown in **Figure 9**, the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a first circumferential ramp 904 and a block 905, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band 903B, a second circumferential ramp 906 and a swing clip 907, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part 902B and, as illustrated in **Figure 10**, rotation of the tamper-evident tear band 903B in a first direction of rotation R forces the block 905 to abut against the swing clip 907 and forces the first circumferential ramp 904 to travel along the second circumferential ramp 906 to cause an arc of the tamper-evident tear band 903B to bend radially outwardly.

The co-operating ramps 904, 906 and co-operating block 905 and swing clip 907 increase the difficulty of rotating the tamper-evident tear band 903B before it is removed. In addition, rotation of the tamper-evident tear band 903B will result in irreversible deformation or distortion in, or damage to, the tamper-evident tear band 903B, if this does not cause the tamper-evident tear band 903B to break. The deformation, distortion or other damage provides evidence that an attempt has been made to open the tamper-evident closure without first tearing the tamper-evident tear band 903B from the cap part.

As shown in **Figures 9 & 10**, the tamper-evident tear band engagement arrangement may comprise a swing clip stopper 908, and the swing clip 907 may comprise an acute corner 909 with a sharp edge 910, and a slot 911 may be located adjacent the block 905, into which the acute corner 909 of the swing clip 907 extends.

As shown in **Figure 10**, in response to rotation of the tamper-evident tear band 903B before removal from the overcap, the block 905 catches the acute corner 909 and causes the swing clip 907 to swing against the swing clip stopper 908, with the acute corner 909 acting on the tamper-evident tear band 903B to force the tamper-evident tear band 903B outwards. The swing clip stopper 908 prevents overbending of the swing clip 907. In addition, the sharp edge 910 of the swing clip 907 is forced into the tamper-evident tear

band 903B. At the same time, the first ramp 904 rides along the second ramp 906, and the second ramp 906 acting on the tamper-evident tear band 903B to force the tamper-evident tear band 903B outwards. The regions of contact between the swing clip 907 and the tamper-evident tear band 903B and between the second ramp 906 and the first ramp 905 result in concentrated stress in the tamper-evident tear band 903B. The interaction between the first ramp 904 and the block 905 of the tamper-evident tear band 703B and the second ramp 906 and swing clip 907 of the second shell part 902B imparts tension into an arc, indicated generally at 912, of the tamper-evident tear band 903B that irreversibly stretches the tamper-evident tear band 903B to a larger diameter.

The tamper-evident closure may include a gap-generating mechanism, which causes an irreversible gap to be generated during initial opening, such that when the removable cap (cap part and first shell part) is replaced, there is an axial separation between the first shell part and the second shell part that did not exist prior to the initial opening,

The tamper-evident closure may include more than one block and swing clip, and more than one first ramp and second ramp.

An example gap-generating mechanism that may be incorporated into a tamper-evident closure according to the first arrangement of **Figures 3 to 6**, the second arrangement of **Figures 7 & 8** or the third arrangement of **Figures 9 & 10** will now be described with reference to **Figures 11 to 20**.

The example gap-generating mechanism is shown in **Figures 11 to 20** incorporated in an example closure, for the purpose of facilitating the understanding of the construction and operation of the example gap-generating mechanism.

Referring to **Figure 11**, there is shown a closure generally indicated 10 secured onto a container neck 15.

The closure 10 comprises a main body 20, an inner part 25 and an outer part 30. A shell 35, in this example a metal shell, forms an outer casing to the closure 10 and is divided into a cylindrical lower shell part 36 and a cup-shape second shell part 37.

- 5 Together the main body 20 and the cylindrical lower shell part 36 comprise a second portion and the inner part 25, outer part 30 and the cup-shape second shell part 37 comprise a cap-like first portion.

10 The cylindrical lower shell part 36 and cup-shape second shell part 37 are separated at a split line 40 formed by a cutting process once the shell 35 has been applied to the first and second portions of the closure 10.

The main body 20 is fixed onto the container neck 15 by clips 45, which project inwardly and engage under a shoulder 50 of the container neck 15.

15

In this example, the closure 10 comprises a valve arrangement. A valve housing 55 is clipped into the main body 20, and includes a sealing lip 57 which seals against the top surface 16 of the container neck 15. A float valve 65 is housed in the valve housing 55, and can seal against a valve seat 60 to prevent re-filling of the container. A valve control ball 70 is
20 located on top of the float valve 65.

In use, to open the closure 10, the cup-shape second shell part 37 of the shell 35 is rotated. This unscrews the outer part 30 from the inner part 25. The outer part 30 unscrews until a locking mechanism described in more detail below locks it to the inner part 25. With the
25 outer 30 and inner part 25 locked together, the inner part 25 can then be unscrewed from the main body 20.

When the cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) is screwed back onto the main body 20, a gap G is formed between the cup-shape second shell part 37 and the cylindrical lower shell part 36, as shown in **Figure 12**. This is because the outer part 30 cannot be screwed completely back down onto the inner part 25 by virtue of the locking mechanism. In addition, in this example, the bottom of the
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inner part 25 protrudes below the bottom of the outer part 30 so as to be visible in the gap G, as can be seen in **Figure 13**.

5 The gap G formed between the cup-shape second shell part 37 and the cylindrical lower shell part 36 is unobstructed in the sense that there is no obstruction member trapped between the cup-shape second shell part 37 and the cylindrical lower shell part 36.

Referring now to **Figures 14 & 15**, the main body 20 is shown in more detail.

10 The main body 20 comprises a lower engagement portion 21 and an upper flow regulation portion 22 defining an aperture.

15 The lower engagement portion 21 comprises a generally cylindrical body having two diametrically opposed windows 21a, each of which has at a lower edge a ledge 45 for engagement under the shoulder 50 of the container neck 15 as shown in **Figures 11 & 12**. In addition, the interior surface of the lower portion 21a has a plurality of mutually spaced axial ribs 21b which, in use, lock onto the outer surface of the container neck 15 to prevent relative rotation between the main body 20 and the container neck 15.

20 The upper flow regulation portion 22 of the main body 20 is generally frusto-conical in shape and has external screw threads 22a. At the base of the portion upper flow regulation portion 22 where it joins the lower engagement portion 21, two sets of ratchet teeth 23 are positioned. The ratchet teeth 23 engage corresponding ratchet teeth 25c on the inner part 25 to prevent the inner part 25 from rotating whilst the outer part 30 is being rotated
25 for the first time, to open the closure 10 for the first time. Only after the outer part 30 has locked against the inner part 25 can the inner part 25 be rotated relative to the main body 20. At the opposite end of the upper flow regulation portion 22 a dome-shape flow regulator 22b is positioned in the aperture. The aperture itself is defined by a circumferential pouring lip 22c.

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Referring now to **Figures 16 to 18**, the inner part 25 is shown in more detail.

The inner part 25 is generally cup-shape with a cylindrical side wall 25a closed at one end by a top plate 25b.

5 The interior surface of the open end of the cylindrical side wall 25a includes a continuous series of ratchet teeth 25c which engage the ratchet teeth 23 on the main body portion 22.

The exterior of the cylindrical side wall 25a includes two inclined side ramps 26. At the start of each inclined side ramp 26 is a locking step 26a, the purpose of which will be described in more detail below.

10

The cylindrical side wall 25a also comprises a pair of ratchet members 27a, 27b adjacent the top plate 25b.

15

The exterior surface of the cylindrical side wall 25a also comprises a circumferential bead 25d, the purpose of which will be described in more detail below.

The top plate 25b comprises a pair of opposing arcuate ramps 28a, 28b each of which terminates with a locking recess 29a, 29b.

20 Referring now to **Figures 19 & 20**, the outer part 30 is shown in more detail.

The outer part 30 is generally cup-shape and comprises a cylindrical side wall 30a and a top plate 30b.

25 The exterior of the outer part 30 comprises a plurality of knurls 30c which help to lock the cup-shape second shell part 37 and to prevent relative rotation.

30 The interior of the cylindrical side wall 30a comprises a circumferential bead 31 for preventing the outer part 30 being lifted off the inner part by engagement with the corresponding bead 25d.

The interior of the cylindrical side wall 30a also comprises a pair of drive dogs 32 which engage in the inclined side ramps 26 of the inner part 25 and ride up them as the outer part 30 is rotated relative to the inner part 25.

- 5 The interior of the cylindrical side wall 30a also comprises a pair of diametrically opposed ratchet arrangements 33a, 33b designed and positioned to run over and lock onto the corresponding ratchet arrangements 27a, 27b on the inner part 25 to prevent counter rotation.
- 10 The underside of the top plate 30b includes a pair of drive dogs 34a, 34b each of which comprises a main body 38a, 38b and a locking tooth 39a, 39b.

The operation of the gap-generating closure 10 will now be described in more detail.

- 15 Initially the main body 20 is locked onto the container neck 15 by the ribs 21b to prevent axial and rotational movement. The inner part 25 cannot rotate relative to the main body 20 by virtue of the ratchets 23, 25c. The cup-shape second shell part 37 cannot rotate relative to the outer part 30 by virtue of the knurls 30c. The outer part 30 cannot be lifted off the inner part 25 by virtue of the locking beads 25d, 31 and by virtue of the drive dogs 20 32 engaging under the steps 26a.

- The cup-shape second shell part 37 is grasped by a user and turned. This causes the outer part 30 to rotate relative to the inner part 25. The drive dogs 32 in the outer part rise up the inclined side ramps 26 in the inner part 25 and the drive dogs 34a rise up the ramps 25 28a, 29a. The ratchets 33a, 33b pass over the ratchets 27a, 27b.

- The outer part 30 is caused to rise, in this example by 2mm. At this point continued rotation causes the locking teeth 39a, 39b to drop into the locking recesses 29a, 29b. In addition, the ratchets 33a, 33b have rotated beyond the ratchets 27a, 27b. The inner part 30 25 drops back down, in this example by 0.5mm.

Continued rotation of the outer part 30 relative to the inner part 25 is not possible because the drive dogs 32 abut against the end of the inclined side ramps 26 and the drive dogs 34a, 34b abut against the end of the ramps 28a, 28b.

- 5 In this second position the open end of the outer part 30 has moved axially away from the open end of the inner part 25 to expose the free end of the cylindrical side wall 25a.

Continued rotation of the cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) overcomes the torque required to allow the ratchets 25c to
10 pass over the ratchets 23 which causes the inner part 25 to rotate relative to the main body 20. The internal screw threads 25e on the inner part 25 rise up the external screw threads 22a of the main body 20.

The cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part
15 37) can now be lifted off the main body 20 to allow the contents of the container to be dispensed.

The contents are dispensed through the valve housing 55. The valve 65 lifts off the seat 60 as the container is upturned and contents flow out. The valve 65 re-seals against the seat
20 60 under the weight of the ball 70 when the container is returned to an upright position. This prevents re-filling of the container.

When the cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) is returned the inner part 25 is screwed back onto the body 20. The inner
25 part 25 screws back down to its original position, but the outer part 30 cannot because it is locked in position both by the axial locking means provided by the drive dogs 34a, 34b and the lateral locking means provided by the ratchets 33a, 33b and 27a, 27b. This means that the gap G is formed between the first and second shell parts 36, 37 with the bottom of the inner part 25 visible through it. This irreversible opening event provides visual
30 evidence that the closure 10 has been opened at least once. The gap G cannot be closed without destroying the closure 10.

Because the gap G between the first and second shell parts 36, 37 is not generated by placing an obstruction directly between them, it is not possible to close the gap G by a simple cutting operation.

- 5 By providing the dual axial and lateral ratchet arrangements, re-setting the closure 10 back to its original position to close the gap G is prevented. In an alternative example (not shown) a similar closure 10 is provided with just an axial ratchet arrangement. A similar closure 10 may also have an alternative valve or pourer arrangement.
- 10 A tamper-evident closure according to the first arrangement of **Figures 3 to 6**, the second arrangement of **Figures 7 & 8** or the third arrangement of **Figures 9 & 10** may therefore include a first portion including an inner part and an outer part, a second portion, and a locking mechanism, the first portion removably engaged with the second portion; and the outer part movable relative to the inner part upon first opening of the tamper-evident
- 15 closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap between the first shell part and the second shell part, the locking mechanism configured to lock the outer part in the second position to maintain the gap
- 20 between the first shell part and the second shell part.

The gap may be an unobstructed gap.

- 25 The first portion may be removably engaged with the second portion by a screw-thread arrangement.

- The first and second shell parts may be initially joined by a plurality of frangible bridges which will break if either: i) the second shell part is rotated before initial opening; or ii) an attempt is made to pull the removable cap-portion off without unscrewing. These frangible
- 30 bridges therefore serve as an additional tamper-evident feature.

It is to be appreciated that a tamper-evident closure may comprise a combination of a multi-section tamper-evident member as described herein (**Figures 3 to 6**) and a tamper-evident tear band engagement arrangement as described herein (**Figures 7 & 8; Figures 9 & 10**). The tamper-evident closure may include a gap-generating mechanism, and may include
5 further tamper-evident features not specifically described herein.

According to an arrangement of a tamper-evident closure, the tamper-evident closure comprises at least one multi-section tamper-evident member as described herein (with reference to **Figures 3 to 6**) and at least one co-operating opening and protrusion as
10 described herein (with reference to **Figures 7 & 8**). The tamper-evident closure may be a gap-generating or a non-gap-generating closure.

A container having a neck provided with a tamper-evident closure according to the first arrangement of **Figures 3 to 6**, the second arrangement of **Figures 7 & 8** or the third
15 arrangement of **Figures 9 & 10** is also provided by the present invention.

A container having a neck provided with a tamper-evident closure comprising two or more of the multi-section tamper-evident member of the first arrangement of **Figures 3 to 6**, the tamper-evident tear band engagement arrangement the second arrangement of
20 **Figures 7 & 8** and the tamper-evident tear band engagement arrangement of the third arrangement of **Figures 9 & 10** is also provided by the present invention.

The container may be a bottle. The bottle may be a glass bottle. The glass bottle may be a spirits bottle.
25

Although illustrative embodiments and example of the invention have been disclosed in detail herein, with reference to the accompanying drawings, it is to be understood that the invention is not limited to the precise embodiment and examples shown and/or described and that various changes and modifications can be effected therein by one skilled in the art
30 without departing from the scope of the invention as defined by the appended claims.

Claims

1. A tamper-evident closure for a container neck, the tamper-evident closure comprising:

- 5 a shell comprising a first shell part and a second shell part, and
a tamper-evident overcap comprising a cap part and a tamper-evident tear band;
the cap part fixed to the exterior of the first shell part, and the tamper-evident tear
band releasably connected to the cap part and releasably located around the exterior of
the second shell part such that a removable cap portion of the tamper-evident closure, the
10 removable cap portion comprising the cap part and the first shell part, is removable after
the tamper-evident tear band is released; wherein
the tamper-evident closure further comprises a multi-section tamper-evident
element incorporating an indelible visual indicium;
the cap part comprises a first section of the multi-section tamper-evident element,
15 the tamper-evident tear band comprises a second section of the multi-section
tamper-evident element, and
the second shell portion comprises a third section of the multi-section tamper-
evident element; and
releasing the tamper-evident tear band releases the second section of the multi-
20 section tamper-evident element from the tamper-evident closure.

2. A tamper-evident closure as claimed in claim 1, wherein the indelible visual
indiciu is incorporated in the multi-section tamper-evident element the one of: a moulding
process, an etching process, an engraving process.

25

3. A tamper-evident closure as claimed in claim 1 or claim 2, wherein:

- the first section of the multi-section tamper-evident element comprises a first
constituent portion of the indelible visual indicium,
the second section of the multi-section tamper-evident element comprises a second
30 constituent portion of the indelible visual indicium, and
the third section of the multi-section tamper-evident element comprises a third
constituent portion of the indelible visual indicium.

4. A tamper-evident closure as claimed in any of claims 1 to 3, wherein the indelible indicium comprises at least one of: a shape item, a pattern item, an alpha-numerical item, a graphics item.

5

5. A tamper-evident closure as claimed in claim 1 or claim 2, wherein:
the indelible visual indicium comprises a unique identifier item, and
at least the second section and the third section of the multi-section tamper-evident element comprises a presentation of the unique identifier item.

10

6. A tamper-evident closure for a container neck, the tamper-evident closure comprising:

a shell comprising a first shell part and a second shell part, and

a tamper-evident overcap comprising a cap part and a tamper-evident tear band;

15

the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein

20

the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which,

a window comprising at least one opening is defined in the tamper-evident tear band,

a protrusion extends radially outwardly from the second shell part, and

the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement

25

in which the protrusion extends into the opening.

7. A tamper-evident closure for a container neck, the tamper-evident closure comprising:

a shell comprising a first shell part and a second shell part, and

30

a tamper-evident overcap comprising a cap part and a tamper-evident tear band;

the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of

the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein

the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which,

a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band,

a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and

rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.

8. A tamper-evident closure as claimed in any preceding claim, wherein the tamper-evident closure further comprises:

a first portion including an inner part and an outer part,

a second portion, and

a locking mechanism;

the first portion removably engaged with the second portion;

the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap between the first shell part and the second shell part,

the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first shell part and the second shell part.

9. A tamper-evident closure as claimed in claim 8, wherein the locking mechanism comprises a ratchet mechanism.

10. A tamper-evident closure as claimed in claim 8 or claim 9, wherein the gap is an unobstructed gap.

11. A tamper-evident closure as claimed in any of claims 8 to 10, wherein the first
5 portion is removably engaged with the second portion by a screw-thread arrangement.

12. A container having a neck provided with a tamper-evident closure as claimed in any preceding claim.

10

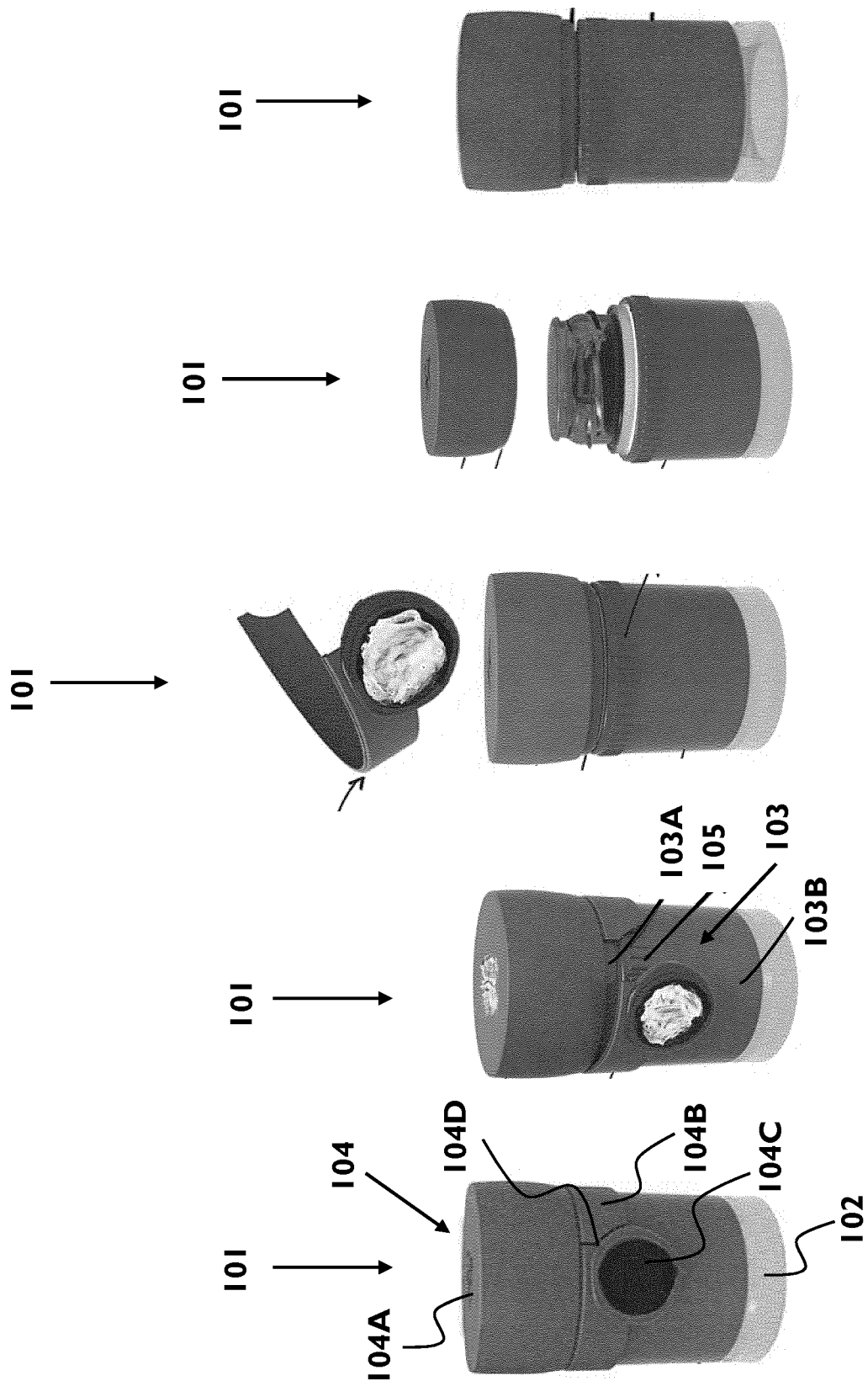


FIGURE 1E
(Prior Art)

FIGURE 1D
(Prior Art)

FIGURE 1C
(Prior Art)

FIGURE 1B
(Prior Art)

FIGURE 1A
(Prior Art)

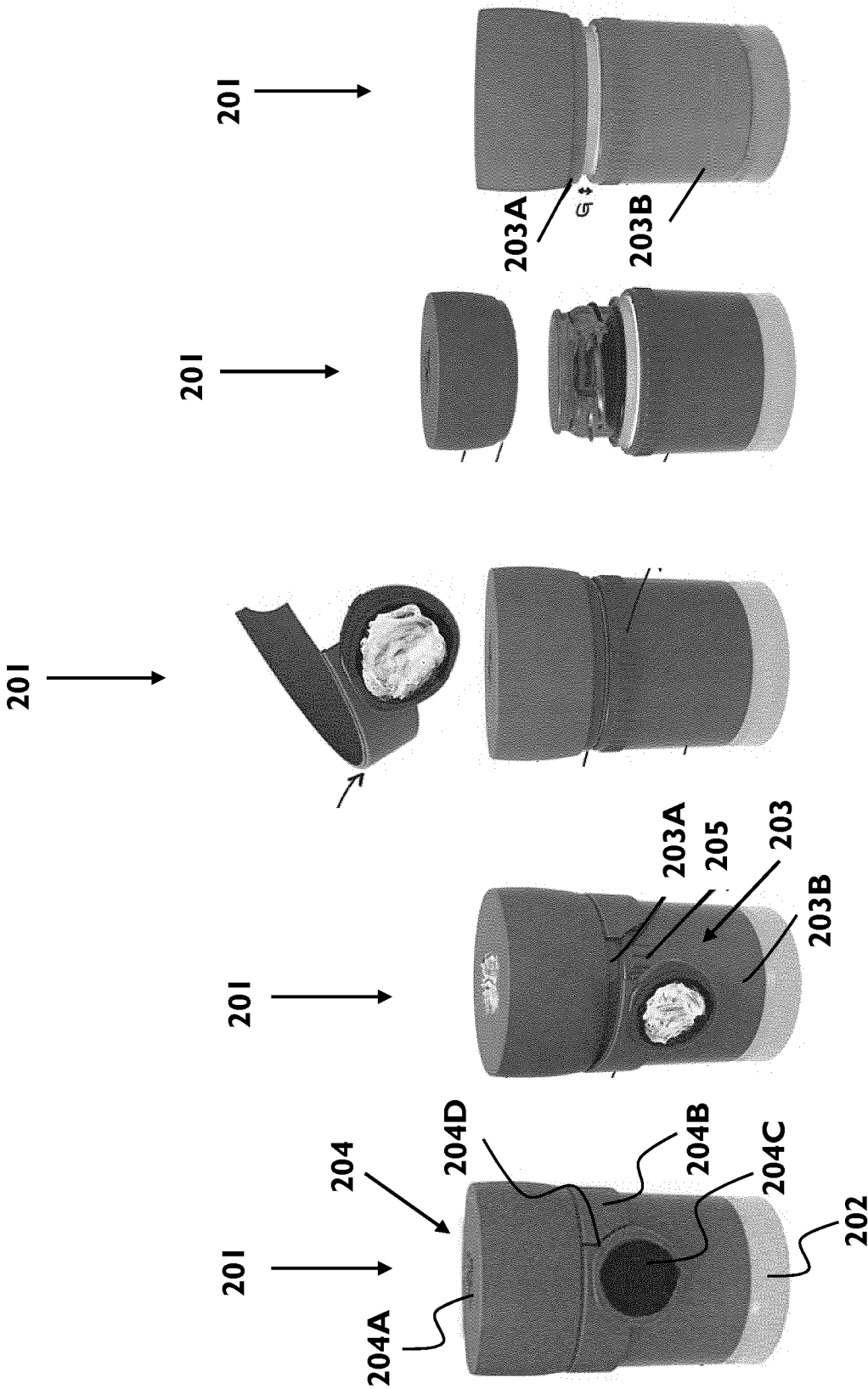


FIGURE 2E
(Prior Art)

FIGURE 2D
(Prior Art)

FIGURE 2C
(Prior Art)

FIGURE 2B
(Prior Art)

FIGURE 2A
(Prior Art)

3/14

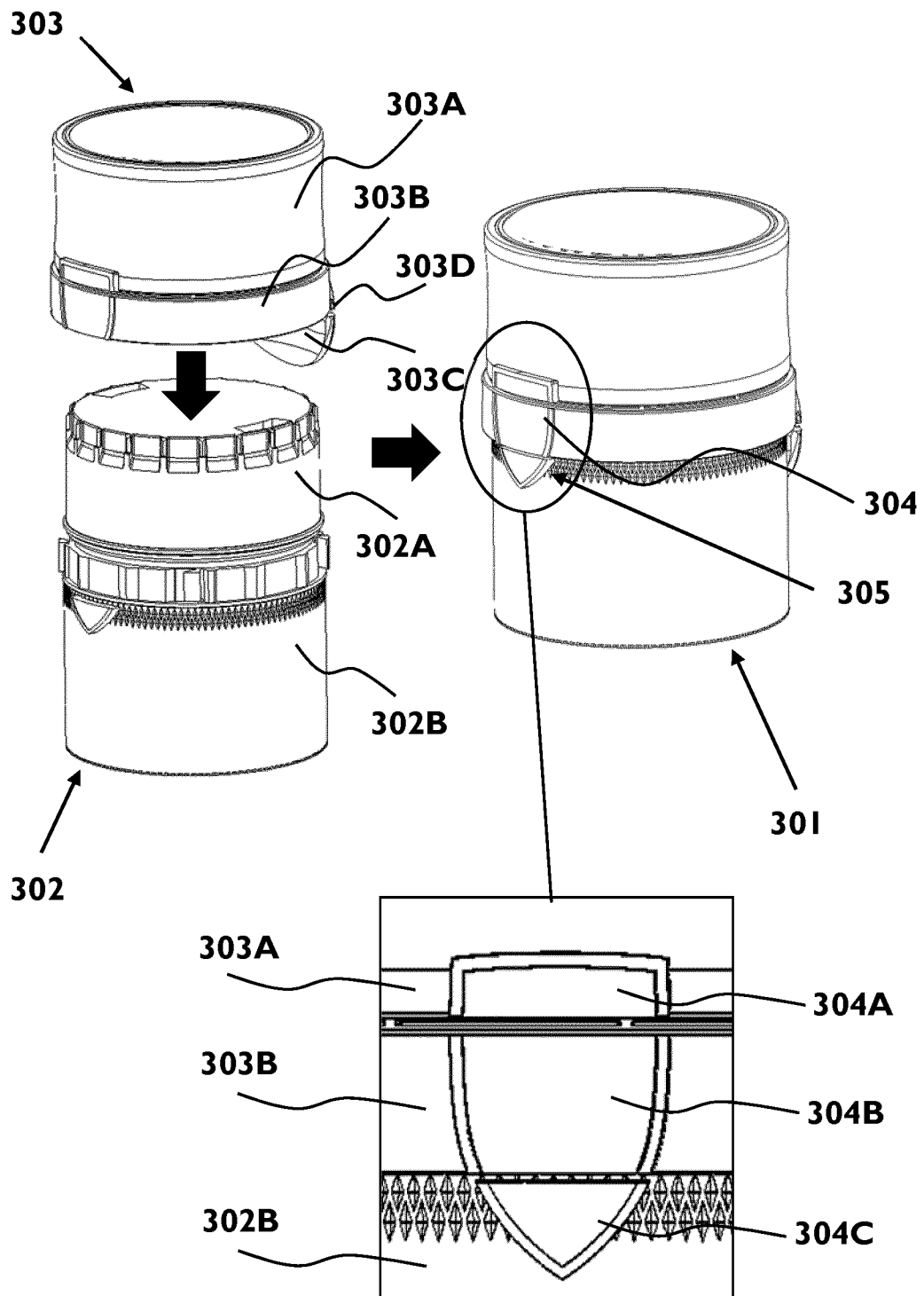


FIGURE 3

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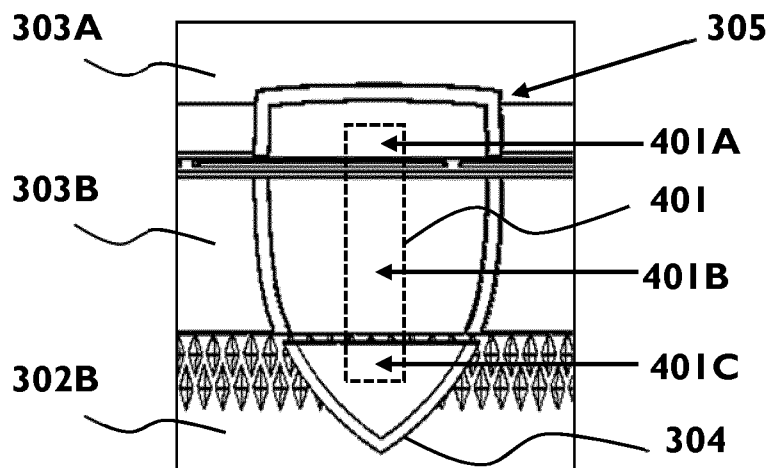


FIGURE 4

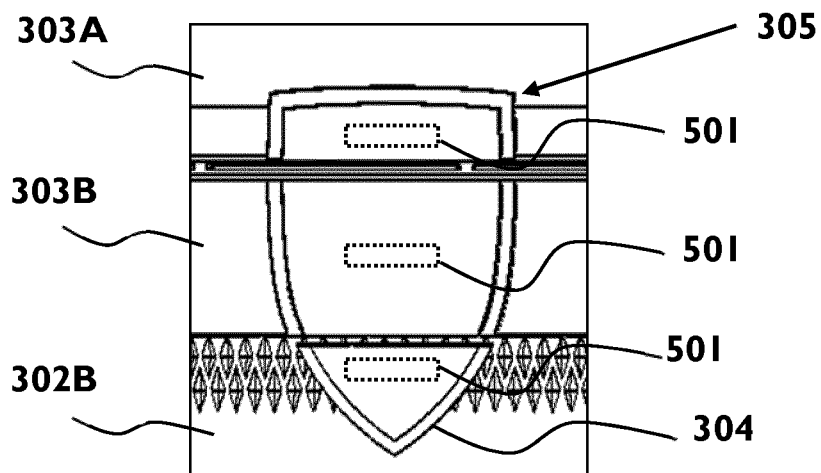


FIGURE 5

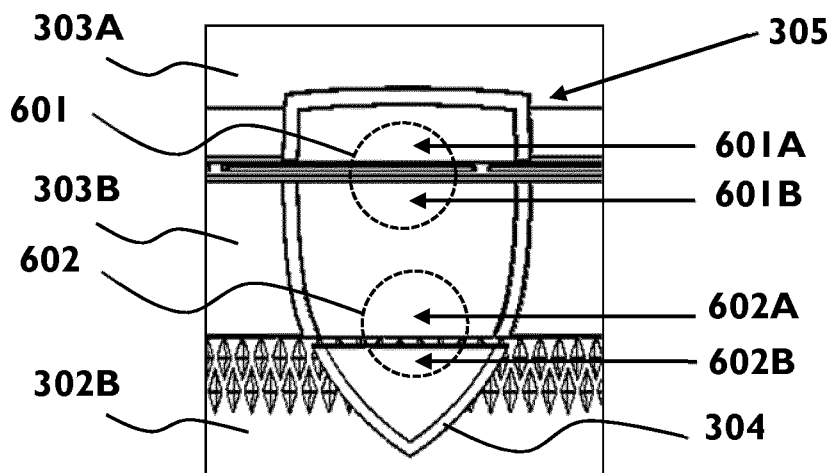


FIGURE 6

5/14

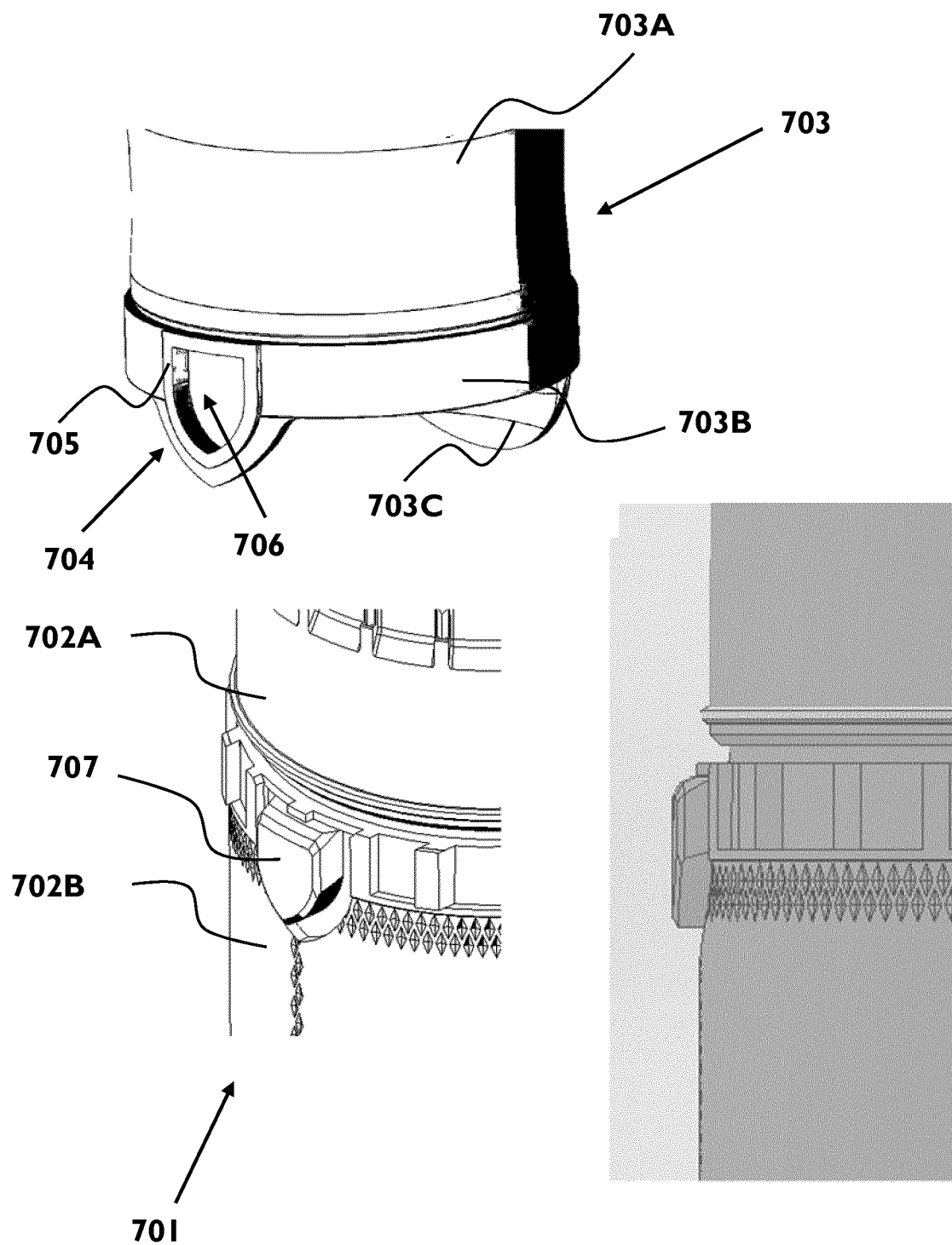


FIGURE 7

6/14

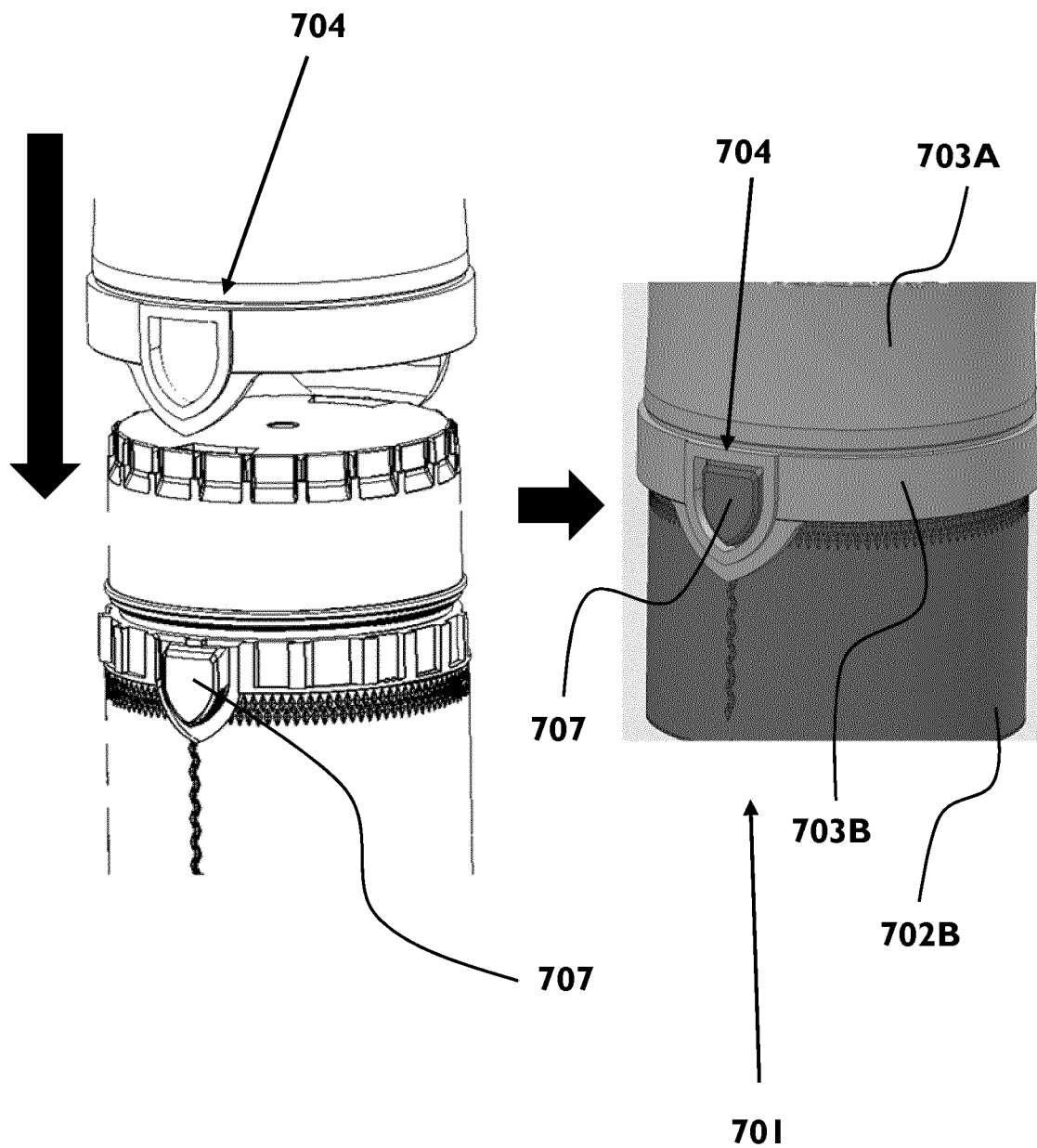


FIGURE 8

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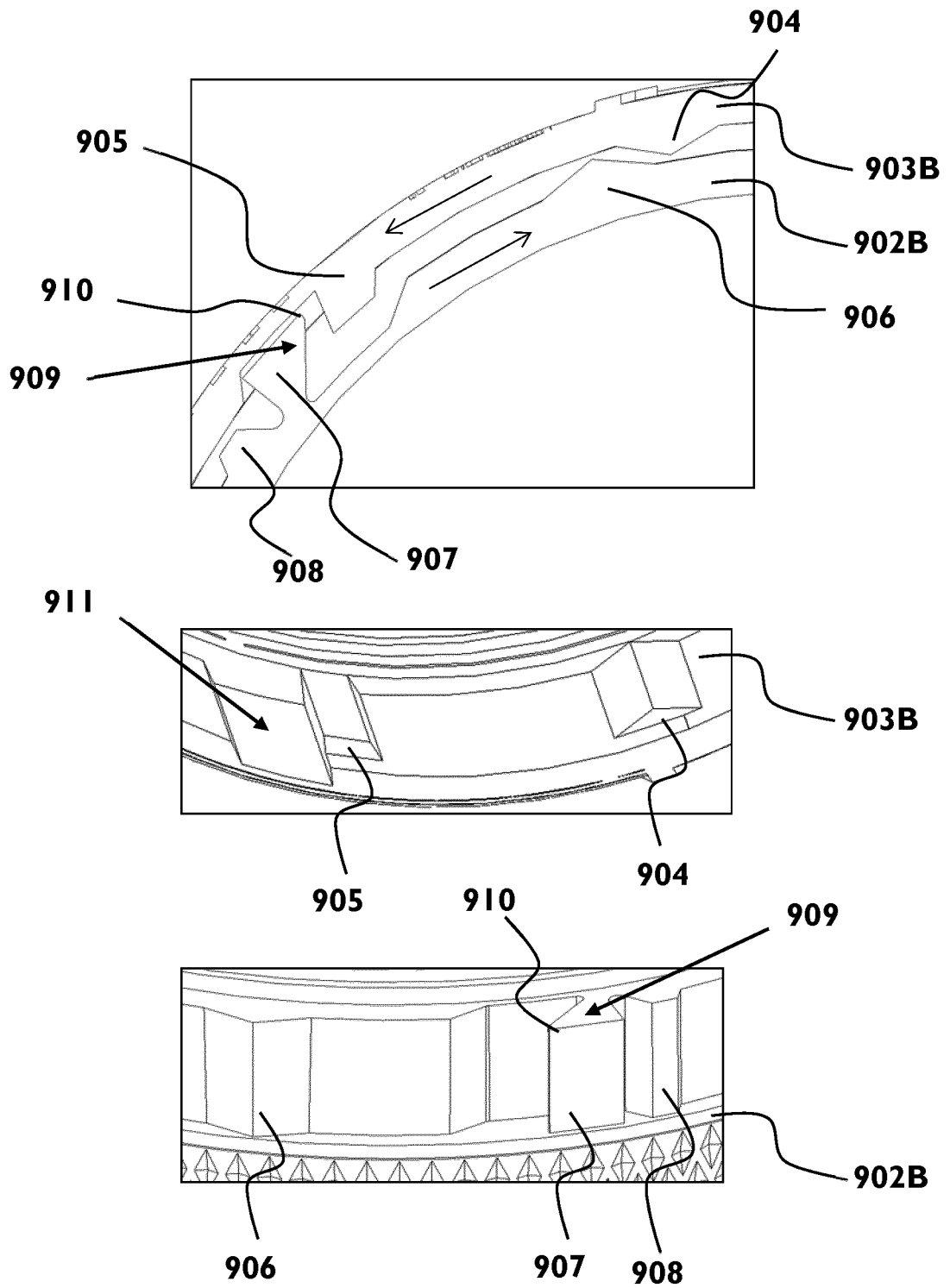


FIGURE 9

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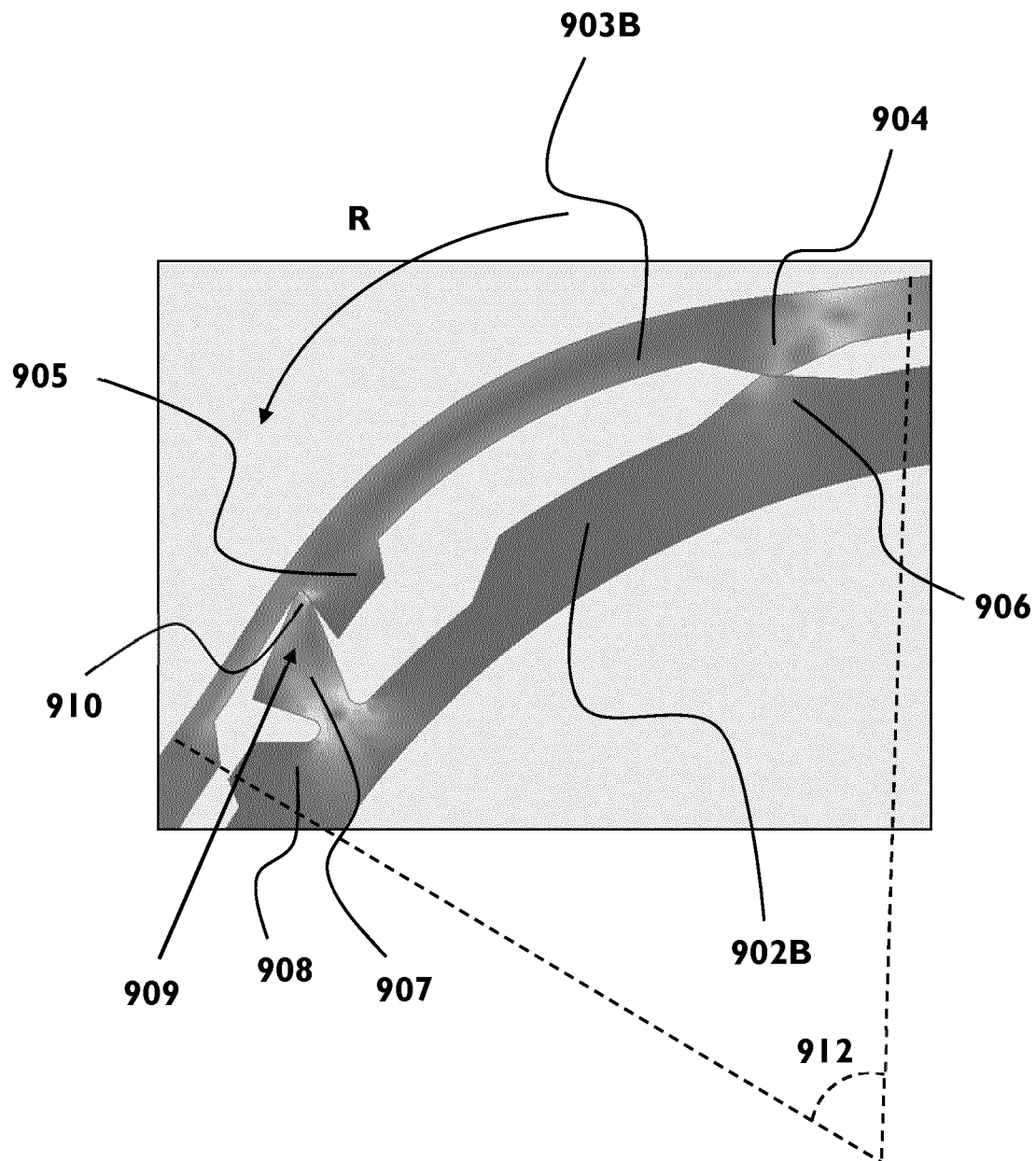


FIGURE 10

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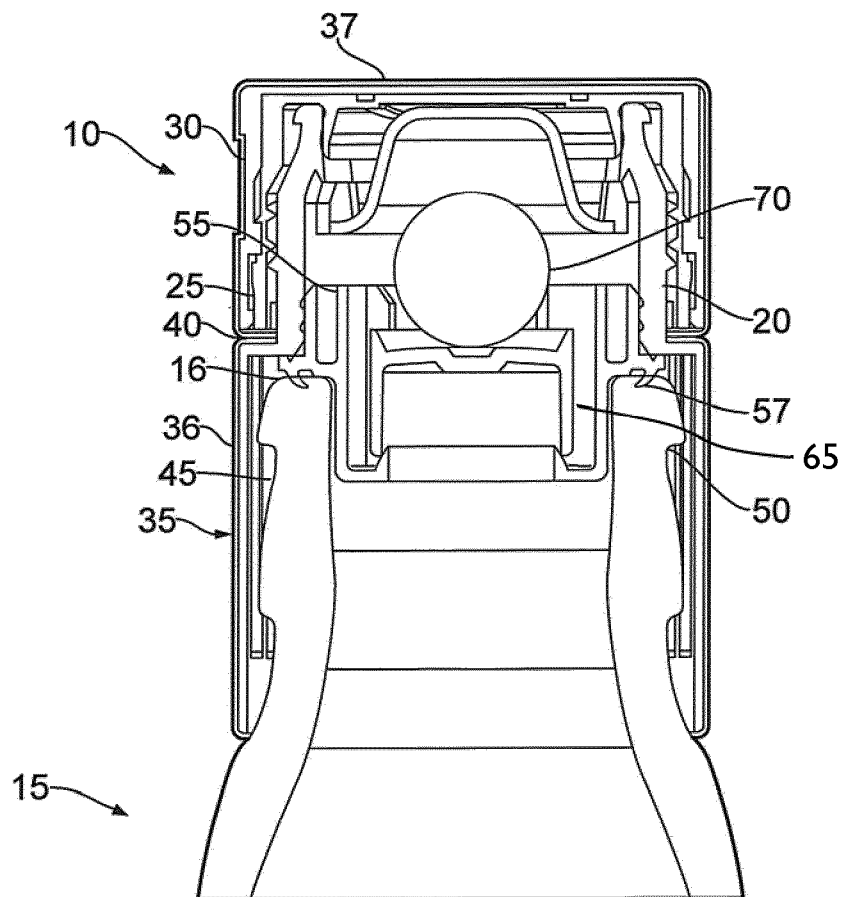


FIGURE 11

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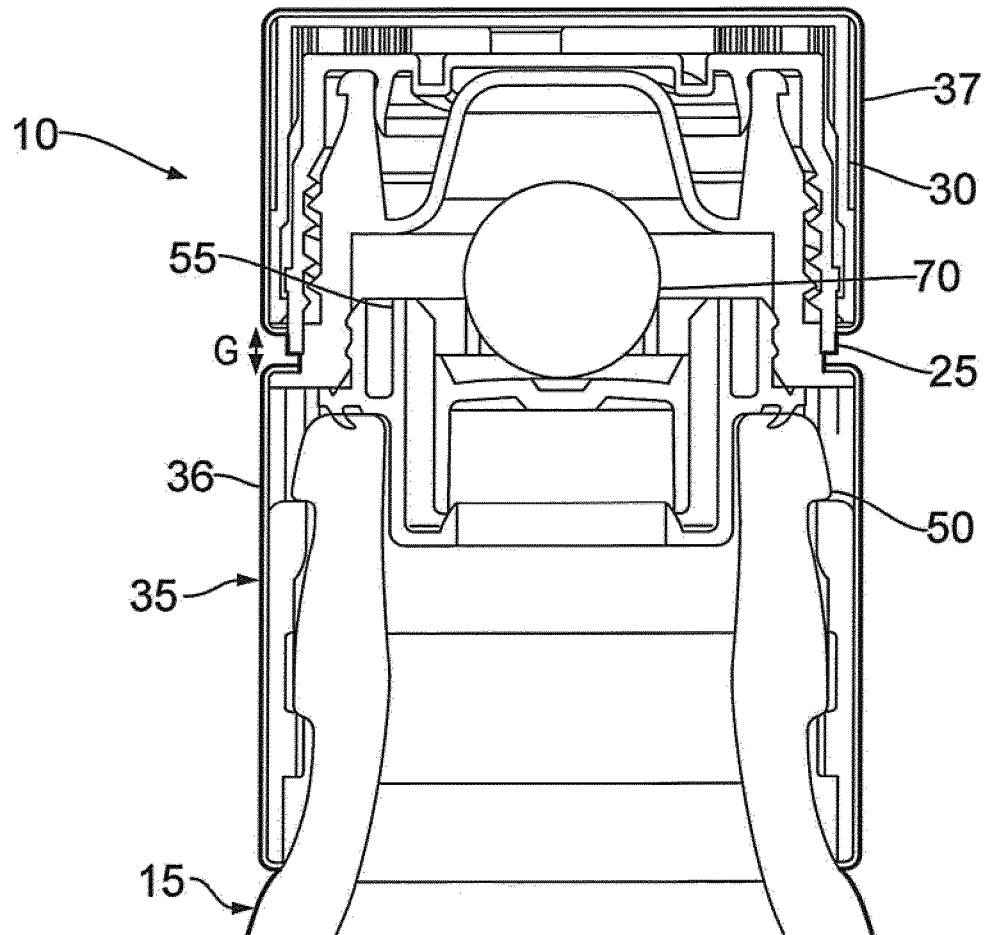


FIGURE 12

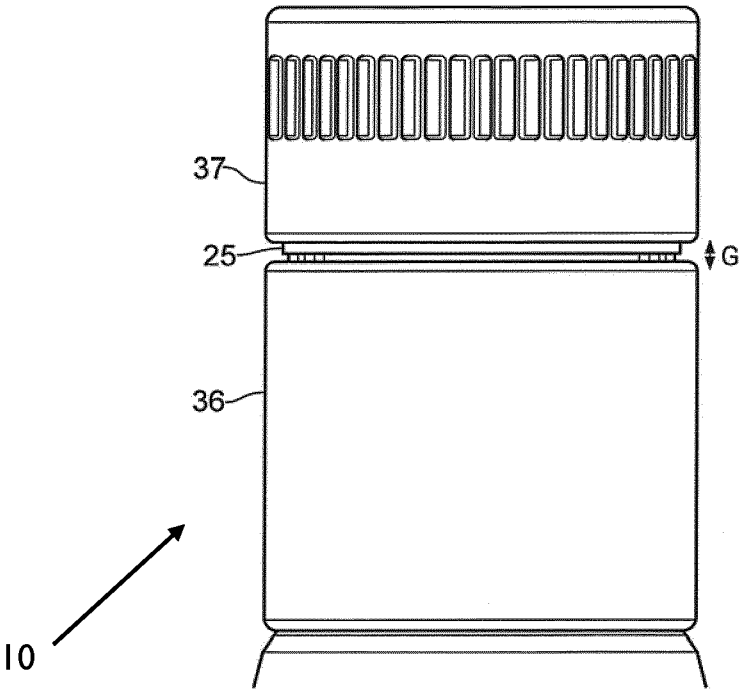


FIGURE 13

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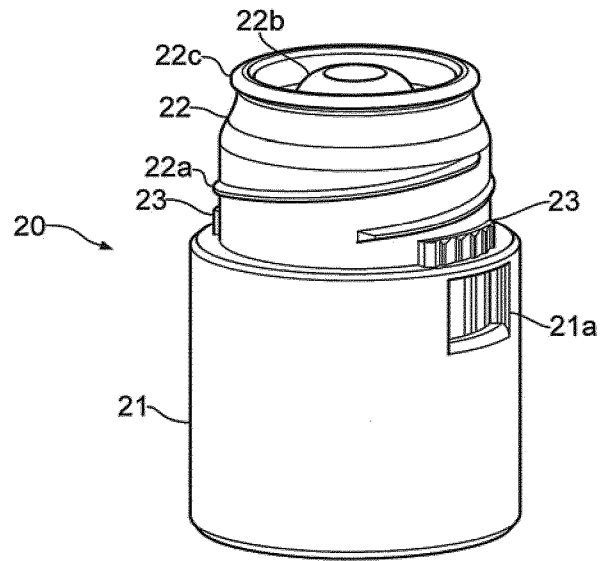


FIGURE 14

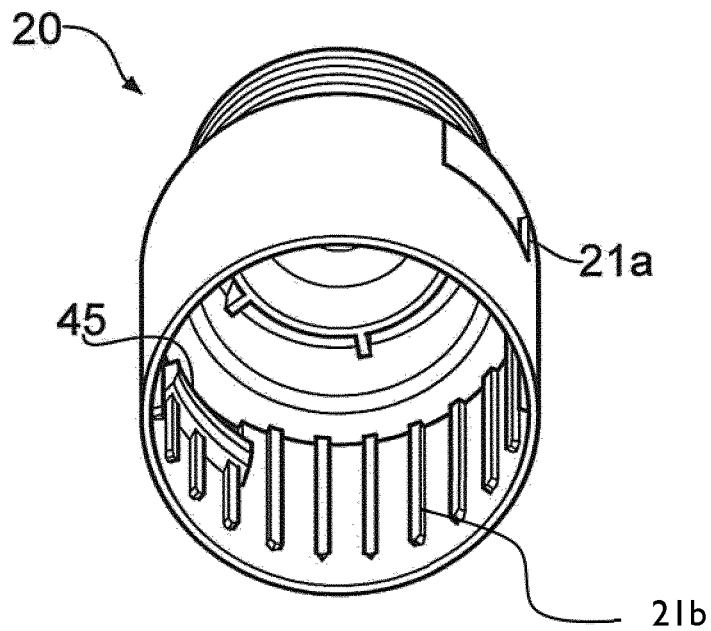


FIGURE 15

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FIGURE 16

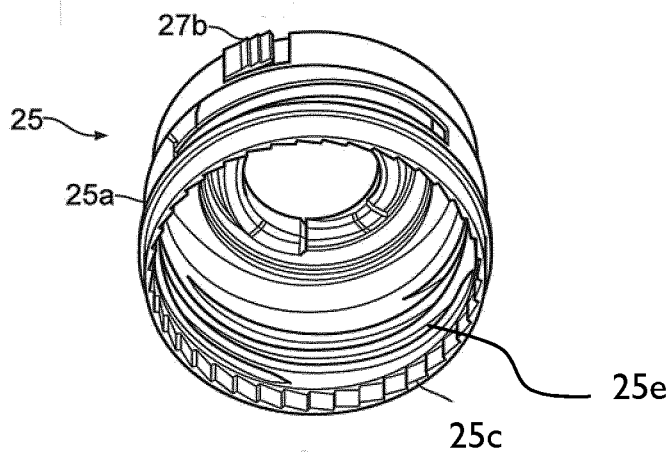
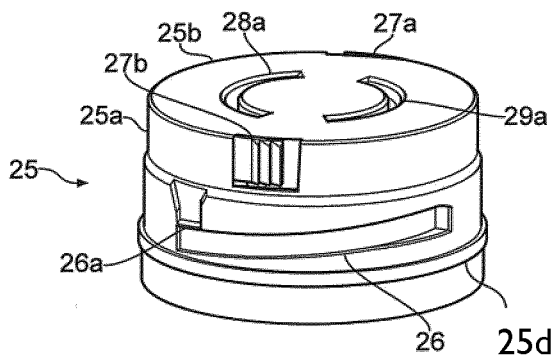


FIGURE 17

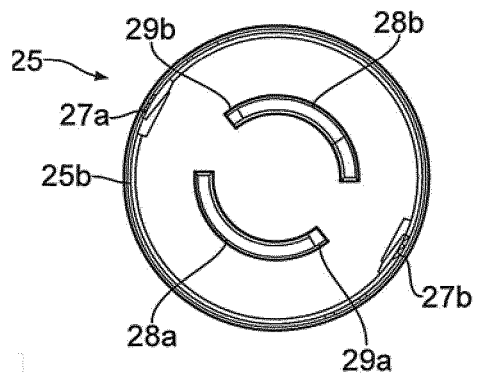


FIGURE 18

14/14

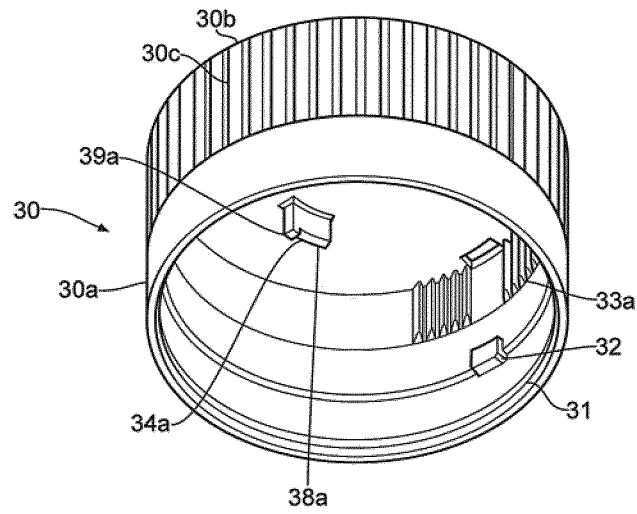


FIGURE 19

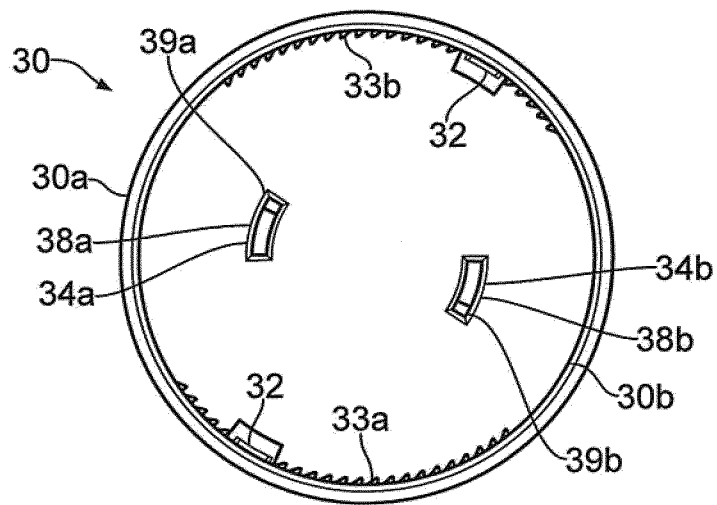


FIGURE 20

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/075687

A. CLASSIFICATION OF SUBJECT MATTER		
INV.	B65D49/02 B65D41/34	B65D55/06 B65D41/62 B65D51/18 B65D55/02
ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) B65D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2015/113851 A1 (OBRIST CLOSURES SWITZERLAND [CH]) 6 August 2015 (2015-08-06) cited in the application	1-6,8-12
A	the whole document	7
Y	DE 10 2004 052163 A1 (WEBER HANNS G [DE]) 27 April 2006 (2006-04-27) paragraphs [0004], [0005], [0017], [0023], [0029] - [0031], [0056], [0057], [0062], [0063]; figures 6,7,8	1-5,8-12
A	US 3 930 588 A (COURSAUT HENRI) 6 January 1976 (1976-01-06) column 3, lines 20-65; figures	1-5,8-12
	-/--	
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 20 February 2018		Date of mailing of the international search report 09/03/2018
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016		Authorized officer Zanghi, Amedeo

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/075687

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/117505 A1 (OBRIST CLOSURES SWITZERLAND [CH]; DOUGLAS MARCUS HAMILTON LLOYD [GB];) 9 November 2006 (2006-11-09) cited in the application the whole document -----	1-5,8-12
A	WO 2011/089191 A1 (BERICAP GMBH & CO KG [DE]; KRAUTKRAEMER GUENTER [DE]) 28 July 2011 (2011-07-28) page 2, line 26 - page 3, line 2; figures -----	1-5,8-12
Y	FR 715 772 A (REICH & CO S) 9 December 1931 (1931-12-09) -----	6
A	page 1, line 48 - page 2, line 54; figures 3-5 -----	1-5,7-12
A	US 5 875 908 A (WITT STEPHEN H [CA] ET AL) 2 March 1999 (1999-03-02) abstract; figures -----	6,8-12
A	WO 2009/146567 A1 (ROCHAT JEAN-DENIS [CH]) 10 December 2009 (2009-12-10) abstract; figures 1-4 -----	7-12
A	EP 0 537 530 A1 (GUALA SPA [IT]) 21 April 1993 (1993-04-21) abstract; figures -----	7-12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/075687

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-5, 8-12

A tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a multi-section tamper-evident element incorporating an indelible visual indicium; the cap part comprises a first section of the multi-section tamper-evident element, the tamper-evident tear band comprises a second section of the multi-section tamper-evident element, and the second shell portion comprises a third section of the multi-section tamper-evident element; and releasing the tamper-evident tear band releases the second section of the multi-section tamper-evident element from the tamper-evident closure

2. claims: 6, 8-12

A tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a window comprising at least one opening is defined in the tamper-evident tear band, a protrusion extends radially outwardly from the second shell part, and the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening.

3. claims: 7-12

A tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band, a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/075687

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015113851 A1	06-08-2015	CN 105939941 A EP 3099596 A1 JP 2017507086 A KR 20160115950 A PH 12016501501 A1 US 2017137189 A1 WO 2015113851 A1	14-09-2016 07-12-2016 16-03-2017 06-10-2016 06-02-2017 18-05-2017 06-08-2015
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/075687

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		IT 1251949 B	27-05-1995
		JP 3455238 B2	14-10-2003
		JP H06135452 A	17-05-1994
		US 5251769 A	12-10-1993
		ZA 9207516 B	26-04-1993

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No. PCT/EP2017/075687	International filing date (day/month/year) 09.10.2017	Priority date (day/month/year) 10.10.2016
International Patent Classification (IPC) or both national classification and IPC INV. B65D49/02 B65D55/06 B65D41/62 B65D51/18 B65D55/02 B65D41/34		
Applicant OBRIST CLOSURES SWITZERLAND GMBH		

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer Zanghi, Amedeo Telephone No. +31 70 340-0
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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed:
 - ☐ in the form of an Annex C/ST.25 text file.
 - ☐ on paper or in the form of an image file.
 - b. ☐ furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. ☐ furnished subsequent to the international filing date for the purposes of international search only:
 - ☐ in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - ☐ on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- ☒ paid additional fees
 - ☐ paid additional fees under protest and, where applicable, the protest fee
 - ☐ paid additional fees under protest but the applicable protest fee was not paid
 - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- ☐ complied with
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☒ all parts.
 - ☐ the parts relating to claims Nos.

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-12</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>7</u>
	No: Claims	<u>1-6, 8-12</u>
Industrial applicability (IA)	Yes: Claims	<u>1-12</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item IV

Lack of unity of invention

1 The present application relates to several inventions or groups of inventions which are not so linked as to form a single general inventive concept and therefore do not comply with the requirements of PCT Rule 13.1, the different inventions being the following:

1.1 Invention 1 - Claims 1,2-5,8-12:

A tamper-evident closure for a container neck, the tamper-evident closure comprising:
a shell comprising a first shell part and a second shell part, and
a tamper-evident overcap comprising a cap part and a tamper-evident tear band;
the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein
the tamper-evident closure further comprises a multi-section tamper-evident element incorporating an indelible visual indicium;
the cap part comprises a first section of the multi-section tamper-evident element,
the tamper-evident tear band comprises a second section of the multi-section tamper-evident element, and
the second shell portion comprises a third section of the multi-section tamper-evident element; and
releasing the tamper-evident tear band releases the second section of the multi-section tamper-evident element from the tamper-evident closure.

1.2 Invention 2 - Claims 6,8-12:

A tamper-evident closure for a container neck, the tamper-evident closure comprising:
a shell comprising a first shell part and a second shell part, and
a tamper-evident overcap comprising a cap part and a tamper-evident tear band;
the cap part fixed to the exterior of the first shell part, and the tamper-evident

tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein
the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which,
a window comprising at least one opening is defined in the tamper-evident tear band,
a protrusion extends radially outwardly from the second shell part, and
the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening.

1.3 Invention 3 - Claims 7,8-12

A tamper-evident closure for a container neck, the tamper-evident closure comprising:
a shell comprising a first shell part and a second shell part, and
a tamper-evident overcap comprising a cap part and a tamper-evident tear band;
the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; wherein
the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which,
a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band,
a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and
rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.

- 2 The only features common to these three inventions are:
- a) A tamper-evident closure for a container neck, the tamper-evident closure comprising:
 - a shell comprising a first shell part and a second shell part, and
 - a tamper-evident overcap comprising a cap part and a tamper-evident tear band;
 - the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released.
- Additionally, the second and third invention have a further common feature:
- b) A tamper-evident tear band engagement arrangement.
- 2.1 These features are well known from the prior art, namely by document WO2015/113851 which discloses:
- a) A tamper-evident closure (1) for a container neck, the tamper-evident closure comprising:
 - a shell comprising a first shell part (3A) and a second shell part (3B), and
 - a tamper-evident overcap comprising a cap part (4A) and a tamper-evident tear band (4B);
 - the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part (4A) and releasably located around the exterior of the second shell part (3B) such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part (4A) and the first shell part (3A), is removable after the tamper-evident tear band is released.
 - b) A tamper-evident tear band engagement arrangement (4B, page 6, lines 8-9).
- 2.1.1 Also these features are provided to solve the problem of realising a tamper evident closure for a container (page 1, lines 36--37). Thus, these features cannot be considered to be special technical features.

- 2.2 The remaining features of these inventions solve different problems by means of different potentially special technical features and the general problem cannot be considered as constituting a single general inventive concept between these inventions.
- 2.2.1 The problem to be solved by the first invention is to improve the visibility of the tampering action. The feature which solve this problem is the tamper-evident closure further comprising a multi-section tamper-evident element incorporating an indelible visual indicium;
- 2.2.2 The problem to be solved by the second invention is to restrain the movement between the tamper-evident tear band and the second shell part. The feature which solves this problem is the tamper-evident closure further comprising a tamper-evident tear band engagement arrangement in which, a window comprising at least one opening is defined in the tamper-evident tear band, a protrusion extends radially outwardly from the second shell part, and the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening;
- 2.2.3 The problem to be solved by the third invention is to provide the tamper-evident closure with a backup additional tampering feature. The feature which solves this problem is the tamper-evident closure further comprising a tamper-evident tear band engagement arrangement in which, a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band, a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.
- 2.3 Hence, the inventions comprise neither the same, nor corresponding special technical features, so the technical relationship between the inventions required by Rule 13.2 PCT is lacking and the inventions are not so linked as to form a single general inventive concept as required by Rule 13.1 PCT.
- 2.4 Consequently the application does not meet the requirement for unity of invention.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following documents:
 - D1 WO 2015/113851 A1 (OBRIST CLOSURES SWITZERLAND [CH]) 6 August 2015 (2015-08-06) cited in the application
 - D2 DE 10 2004 052163 A1 (WEBER HANNS G [DE]) 27 April 2006 (2006-04-27)
 - D6 FR 715 772 A (REICH & CO S) 9 December 1931 (1931-12-09)
- 2 To claims 1,6: The subject-matter of claims 1,6 does not involve an inventive step in the sense of Article 33(3) PCT, and the criteria of Article 33(1) PCT are therefore not met. The reasons being as follows:
 - 2.1 Claim 1: Document D1 discloses:

A tamper-evident closure (1) for a container neck, the tamper-evident closure comprising:
a shell comprising a first shell part (3A) and a second shell part (3B), and
a tamper-evident overcap comprising a cap part (4A) and a tamper-evident tear band (4B);
the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part (4A) and releasably located around the exterior of the second shell part (3B) such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part (4A) and the first shell part (3A), is removable after the tamper-evident tear band is released.
 - 2.1.1 The subject-matter of claim 1 therefore differs from this known tamper-evident closure in that:

The tamper-evident closure further comprises a multi-section tamper-evident element incorporating an indelible visual indicium (3);
the cap part (1.1) comprises a first section (3.1) of the multi-section tamper-evident element,
the tamper-evident tear band (1.2) comprises a second section (3.2) of the multi-section tamper-evident element, and

the second shell portion (here the container) comprises a third section (3.3) of the multi-section tamper-evident element; and
releasing the tamper-evident tear band releases the second section of the multi-section tamper-evident element from the tamper-evident closure.

2.1.2 The problem to be solved by the present invention may therefore be regarded as to improve the visibility of the tampering action.

2.1.3 The solution proposed in claim 1 of the present application cannot be considered to involve an inventive step (Article 33(3) PCT), because it is described in document D2 (the reference number in paragraph 2.1 refer to this document and in particular paragraph 56, figures 1,8) as providing the same advantages as in the present application. The skilled person would therefore regard it as a normal design option to include this feature in the tamper-evident closure described in document D1 in order to solve the problem posed. The fact that multi-section tamper-evident element (3) has to be indelible is considered to be an implicit feature of D2.

2.2 Claim 6: Document D1 discloses a tamper-evident closure (1) for a container neck from which the subject-matter of claim 6 differs in that the tamper-evident tear band engagement arrangement comprises:

a window (6) comprising at least one opening is defined in the tamper-evident tear band,

a protrusion (9) extends radially outwardly from the second shell part (the container body), and

the tamper-evident tear band (page 2 lines 8-10) is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening.

2.2.1 The problem to be solved by the present invention may therefore be regarded as to restrain the movement between the tamper-evident tear band and the second shell part.

2.2.2 The solution proposed in claim 1 of the present application cannot be considered to involve an inventive step (Article 33(3) PCT), because it is described in document D6 (the reference number in paragraph 2.2 refer to this document and in particular to figures 3-5) as providing the same advantages as in the present application. The skilled person would therefore regard it as a normal design option to include this feature in the tamper-

evident closure described in document D1 in order to solve the problem posed. The fact this document has been published in 1931 explains why the material is limited to tinplate and other flexible materials.

- 2.3 The following dependent claims (claims 8-12, when depending on claims 1,6) do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step:
- 2.3.1 Claims 2,5: In view of document D2, the respective features of these claims are merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the respective problem posed.
- 2.3.2 Claim 3: Document D2 discloses (figure 7) a tamper-evident closure wherein: the first section (3.1) of the multi-section tamper-evident element comprises a first constituent portion of the indelible visual indicium, the second section (3.2) of the multi-section tamper-evident element comprises a second constituent portion of the indelible visual indicium, and the third section (3.3) of the multi-section tamper-evident element comprises a third constituent portion of the indelible visual indicium.
- 2.3.3 Claim 4: Document D2 discloses (paragraph 23, page 7, lines 39-44) a tamper-evident closure wherein the indelible indicium (3) comprises at least one of: a shape item, a pattern item, an alpha-numerical item, a graphics item.
- 2.3.4 Claim 8: Document D1 discloses (figure 23) a tamper-evident closure wherein the tamper-evident closure further comprises:
a first portion including an inner part (25) and an outer part (30),
a second portion, and
a locking mechanism;
the first portion removably engaged with the second portion;
the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to

generate a gap between the first shell part and the second shell part, the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first shell part and the second shell part.

2.3.5 Claim 9: Document D1 discloses (page 7, line 34 - page 8, line 5) a tamper-evident closure wherein the locking mechanism comprises a ratchet mechanism.

2.3.6 Claim 10: Document D1 discloses a tamper-evident closure wherein the gap is an unobstructed gap (page 7, lines 45-46).

2.3.7 Claim 11: Document D1 discloses (figure 23) a tamper-evident closure wherein the first portion is removably engaged with the second portion by a screw-thread arrangement.

2.3.8 Claim 12: Document D1 discloses (figure 23) a container having a neck provided with a tamper-evident closure as claimed in any preceding claim.

Since the respective feature of these claims is described in the corresponding document as providing the same advantages as in the present application, the skilled person would regard it as a normal design option to combine documents D1, D2 and D6 (when depending on claim 6) in order to solve the respective problems posed.

3 To Claim 7: Document D1 discloses a tamper-evident closure (1) for a container neck from which the subject-matter of claim 7 differs in that the tamper-evident tear band engagement arrangement comprises:

a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band,

a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and

rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.

3.1.1 The problem to be solved by the present invention may be regarded as to provide the tamper-evident closure with a backup additional tampering feature.

- 3.1.2 The solution to this problem proposed in claim 7 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons because it is neither known from, nor rendered obvious by, the available prior art.
- 3.1.3 Claims 8-12, when dependent on claim 7, as such, also meet the requirements of the PCT with respect to novelty and inventive step.

Re Item VII

Certain defects in the international application

- 1 Independent claims 1,6.7 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 2 According to the requirements of Rule 6.2(b) PCT, the features of all claims should be provided with reference signs placed in parentheses.

- 3 Reivindicación 7: el documento D1 divulga un cierre a prueba de manipulación (1) para un cuello de recipiente, difiriendo la materia objeto de la reivindicación 7 de este en cuanto a que la disposición de enganche de banda de rasgado a prueba de manipulación comprende:
- una primera rampa circunferencial y un bloque, espaciados en una dirección periférica del cierre a prueba de manipulación, se extienden radialmente hacia dentro desde la banda de rasgado a prueba de manipulación,
- una segunda rampa circunferencial y una pinza oscilante, espaciadas en la dirección periférica del cierre a prueba de manipulación, se extienden radialmente hacia fuera desde la segunda parte de envoltura, y
- la rotación de la banda de rasgado a prueba de manipulación en una primera dirección de rotación obliga al bloque a toparse contra la pinza oscilante y obliga a la primera rampa circunferencial a desplazarse a lo largo de la segunda rampa circunferencial para hacer que un arco de la banda de rasgado a prueba de manipulación se doble radialmente hacia fuera.
- 3.1.1 Puede considerarse que el problema que debe resolver la presente invención consiste en proporcionar al cierre a prueba de manipulación una característica adicional a prueba de manipulación de refuerzo.
- 3.1.2 Se entiende que la solución a este problema expuesta en la reivindicación 7 de la presente solicitud presenta actividad inventiva (Artículo 33(3) PCT) por los siguientes motivos, y es que esta no es conocida a partir de la técnica anterior disponible ni tampoco puede deducirse directamente de la misma.
- 3.1.3 Las reivindicaciones 8-12, cuando dependen de la reivindicación 7, según viene expuesta, también cumplen los requisitos del PCT con respecto a la novedad y a la actividad inventiva.

(19)



(11)

EP 3 523 212 B1

(12)

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(54) IMPROVEMENTS IN OR RELATING TO CLOSURES

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FR-A- 715 772 US-A- 3 930 588
US-A- 5 875 908**

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Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

Field of the Invention

[0001] The present invention relates generally to a closure for a container and particularly to a closure with means for indicating that the closure has been opened at least once.

Background of the Invention

[0002] There is an increasing demand for tamper-indicating systems which ensure that a container is not re-filled with non-original contents. Whilst it is relatively easy to produce some form of tamper-evidence, it is much more difficult to provide tamper-evidence which cannot be either overcome without causing the tamper-evidence system to activate, or activated and then returned to a visually identical state so as to appear non-activated.

[0003] International Patent Publication No. WO 2015/113851 A1 discloses a closure for a container, the closure comprising a shell comprising a first shell part and a second shell part, and a tamper-evident overcap. The tamper-evident overcap comprises a cap which is fixed to the exterior of the first shell part and a tamper-evident member which is releasably connected to the cap and releasably located around the exterior of at least part of the second shell part so that the cap cannot be removed before the tamper-evident member is released, in which the first and second shell parts cannot be separated before the tamper-evident member is released, and after the tamper-evident member has been released the cap is removable together with the first shell part. The tamper-evident overcap may be retrofittable to pre-existing shells.

[0004] This document discloses a tamper-evident closure having a tamper-evident band which can be torn off in order to allow the first shell part underneath the overcap to be twisted and removed in order to get access to the contents of the container. The container may be a spirits bottle. The tamper-evident closure can exhibit a further tamper-evident means that indicates that the container has been opened at least once. In particular, the tamper-evident closure can be a 'gap-generating' closure, wherein during first opening of the tamper-evident closure an irreversible gap between first and second portions of the tamper-evident closure is generated to provide evidence that the tamper-evident closure has been opened.

[0005] The present invention seeks to provide an improvement over prior art tamper-evident closures.

[0006] In one aspect, the present invention provides an innovative design for a tamper-evident band that causes the tamper-evident band to break or otherwise be damaged if an attempt is made to open the tamper-evident closure without tearing the tamper-evident band off first.

[0007] The innovative design seeks to ensure the

tamper-evident band cannot be released and subsequently returned to the original condition without leaving visual evidence that an attempt has been made to avoid tearing the tamper-evident band off when opening the tamper-evident closure.

[0008] The present invention provides an innovative design for a tamper-evident tear band of a tamper-evident closure that is opened by an unscrewing action that prevents the tamper-evident tear band from turning before the tamper-evident tear band is released.

[0009] In another aspect, the present invention provides an innovative design for a tamper-evident band that prevents a non-original tear-band being used in an attempt to visually reconstruct the tamper-evident closure after first opening.

[0010] The present invention provides an innovative design for a tamper-evident tear band of a tamper-evident closure having a gap-generating mechanism that utilises the gap generated on first opening in the prevention of attempted reconstruction of the tamper-evident closure after first opening.

[0011] The tamper-evident closure may be a spirits bottle closure.

Summary of the Invention

[0012] According to a first aspect there is provided a tamper-evident closure for a container neck, the tamper-evident closure comprising: a shell comprising a first shell part and a second shell part, and a tamper-evident overcap comprising a cap part and a tamper-evident tear band; the cap part fixed to the exterior of the first shell part, and the tamper-evident tear band releasably connected to the cap part and releasably located around the exterior of the second shell part such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band is released; characterised in that: the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a first circumferential ramp and a block, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band, a second circumferential ramp and a swing clip, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part, and rotation of the tamper-evident tear band in a first direction of rotation forces the block to abut against the swing clip and forces the first circumferential ramp to travel along the second circumferential ramp to cause an arc of the tamper-evident tear band to bend radially outwardly.

[0013] According to a second aspect there is provided a tamper-evident closure according to the first aspect, wherein the tamper-evident closure further comprises a multi-section tamper-evident element incorporating an indelible visual indicium; the cap part comprises a first section of the multi-section tamper-evident element, the

tamper-evident tear band comprises a second section of the multi-section tamper-evident element, and the second shell portion comprises a third section of the multi-section tamper-evident element; and releasing the tamper-evident tear band releases the second section of the multi-section tamper-evident element from the tamper-evident closure.

[0014] The indelible visual indicium may be incorporated in the multi-section tamper-evident element by a moulding process, an etching process, or an engraving process. The indelible visual indicium may be incorporated in the multi-section tamper-evident element by laser marking.

[0015] The indelible visual indicium may include one or more items, each of which may be a shape item, a pattern item, an alpha-numerical item, or a graphics item. The indelible visual indicium, or one or more items thereof, may include a plurality of constituent portions.

[0016] The first section of the multi-section tamper-evident element may comprise a first constituent portion of the indelible visual indicium, the second section of the multi-section tamper-evident element may comprise a second constituent portion of the indelible visual indicium, and the third section of the multi-section tamper-evident element may comprise a third constituent portion of the indelible visual indicium.

[0017] The indelible visual indicium may comprise a unique identifier item, and at least the second section and the third section of the multi-section tamper-evident element may comprise a presentation of the unique identifier item.

[0018] According to a third aspect there is provided a tamper-evident closure according to the first aspect or the second aspect, wherein the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a window comprising at least one opening is defined in the tamper-evident tear band, a protrusion extends radially outwardly from the second shell part, and the tamper-evident tear band is engaged with the protrusion by a snap-fit engagement in which the protrusion extends into the opening.

[0019] A tamper-evident closure according to the first aspect, second aspect or third aspect may include a gap-generating mechanism.

[0020] The tamper-evident closure may therefore further comprise: a first portion including an inner part and an outer part, a second portion, and a locking mechanism; the first portion removably engaged with the second portion; the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap between the first shell part and the second shell part, the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first

shell part and the second shell part.

[0021] The locking mechanism may comprise a ratchet mechanism.

[0022] The gap may be an unobstructed gap.

5 [0023] The first portion may be removably engaged with the second portion by a screw-thread arrangement. Alternatively, the first portion may be removably engaged with the second portion by a push-fit arrangement.

10 [0024] The shell may be formed from a metal or a plastics material.

[0025] According to a fourth aspect there is provided a container having a neck provided with a tamper-evident closure according to the first aspect, the second aspect or the third aspect.

15 [0026] The container may be a bottle. The bottle may be a glass bottle. The glass bottle may be a spirits bottle.

[0027] Further particular and preferred aspects of the invention are set out in the accompanying dependent claims.

Brief Description of the Drawings

20 [0028] The present invention will now be more particularly described, with reference to the accompanying drawings, in which:

Figures 1A to 1E show a first prior art tamper-evident closure;

Figures 2A to 2E show a second prior art tamper-evident closure;

Figure 3 shows a tamper-evident closure according to a first arrangement;

Figures 4 to 6 show different examples of a multi-section tamper-evident element;

35 **Figures 7 & 8** show a tamper-evident closure according to a second arrangement;

Figures 9 & 10 show a tamper-evident closure according to an embodiment; and

40 **Figures 11 to 20** show features of a gap-generating mechanism that may be incorporated into a tamper-evident closure according to the embodiment of **Figures 9 & 10** (optionally including the first arrangement of **Figures 3 to 6** and/or the second arrangement of **Figures 7 & 8**).

Description

45 [0029] Illustrative embodiments and examples are described below in sufficient detail to enable those of ordinary skill in the art to embody and implement the apparatus, systems and/or processes described herein. It is to be understood that embodiments and examples can be provided in many alternate forms and the invention should not be construed as limited to the embodiments and examples set forth herein but by the scope of the appended claims.

50 [0030] Unless otherwise defined, all terms (including technical and scientific terms) used herein are to be in-

terpreted as is customary in the art. In addition, features referred to herein in the singular can number one or more, unless the context clearly indicates otherwise. Similarly, the terms "comprises," "comprising," "includes," and/or "including" when used herein, specify the presence of the stated feature or features and do not preclude the presence or addition of one or more other features, unless the context clearly indicates otherwise.

[0031] **Figures 1A to 1E** show a first prior art tamper-evident closure 101, fitted to a container neck 102. The tamper-evident closure 101 comprises a shell 103 having a first shell part 103A and a second shell part 103B. The shell 103 may be formed from a metal or a plastics material.

[0032] A tamper-evident overcap 104 is fitted over the first shell part 103A. The tamper-evident overcap 104 includes a cap part 104A and a tamper-evident tear band 104B. The overcap 104 may be formed from any suitable material. The overcap 104 may be formed from a plastics material.

[0033] The cap part 104A is secured to the first shell part 103A (by friction and an adhesive) and has a free end that is frangibly connected to the tamper-evident tear band 104B.

[0034] The tamper-evident tear band 104B includes a generally disc-shaped section 104C that is formed to appear like a seal. A frangible line 104D extends around one side of the generally disc-shaped section 104C, and extends between upper and lower edges of the tamper-evident tear band 104B, as illustrated in **Figure 1A**.

[0035] The tamper-evident tear band 104B is removably secured around the second shell part 103B so that the cap part 104A (carried on the first shell part 103A) cannot be removed before the tamper-evident tear band 104B is released.

[0036] The cap part 104A and the first shell part 103A together form a removable cap.

[0037] In order to remove the removable cap, the tamper-evident tear band 104B must first be released. This is achieved by lifting the generally disc-shaped section 104C to cause the frangible line 104D to break, as illustrated in **Figure 1B**. The generally disc-shaped section 104C can then be pulled to tear the tamper-evident tear band 104B away from the free end of the cap part 104A, as illustrated in **Figure 1C**.

[0038] Thereafter, a user may grasp the cap part 104A to unscrew the removable cap; the cap part 104A is secured to the first shell part 103A so that they co-rotate off the container neck 102. (in an alternative example the removable cap can be pulled off).

[0039] The removable cap (cap part 104A and first shell part 103A) is shown removed in **Figure 1D**, and is shown subsequently replaced in **Figure 1E**.

[0040] The first and second shell parts 103A and 103B cannot be separated before the tamper-evident tear band 104B is released. As shown in **Figure 1B**, an outer surface of the second shell part 103B is provided with axial ribs 105 that are arranged to engage corresponding axial ribs

(not visible) on an inner surface of the tamper-evident band 104B to prevent the tamper-evident band 104B from rotating prior to being released.

[0041] An example of first prior art tamper-evident closure 101 is described in International Patent Publication No. WO 2015/113851 A1.

[0042] **Figures 2A to 2E** show a second prior art tamper-evident closure 201, fitted to a container neck 202. The tamper-evident closure 202 comprises a shell 203 having a first shell part 203A and a second shell part 203B, and a tamper-evident overcap 204 fitted over the first shell part 203A, the tamper-evident overcap 204 including a cap part 204A and a tamper-evident tear band 204B.

[0043] The cap part 204A is secured to the first shell part 203A, and has a free end that is frangibly connected to the tamper-evident tear band 204B.

[0044] As illustrated in **Figure 2A**, the tamper-evident tear band 204B includes a generally disc-shaped section 204C that is formed to appear like a seal, and a frangible line 204D that extends around one side of the generally disc-shaped section 204C and extends between upper and lower edges of the tamper-evident tear band 204B,

[0045] The cap part 204A and the first shell part 203A together form a removable cap.

[0046] The tamper-evident tear band 204B is removably secured around the second shell part 203B so that the removable cap cannot be removed before the tamper-evident tear band 204B is released.

[0047] To remove the removable cap, the tamper-evident tear band 204B must therefore first be released. The generally disc-shaped section 204C must be lifted to break the frangible line 204D, as illustrated in **Figure 2B**. The generally disc-shaped section 204C can then be pulled to separate the tamper-evident tear band 204B from the cap part 204A, as illustrated in **Figure 2C**.

[0048] Thereafter, a user may then unscrew the removable cap (or alternatively pull the removable cap off), the cap part 204A and the first shell part 203A to which the cap part 204A is secured moving together off the container neck 102.

[0049] The removable cap (cap part 104A and first shell part 103A) is shown removed in **Figure 2D**, and is shown subsequently replaced in **Figure 2E**.

[0050] The second prior art tamper-evident closure 201 of **Figures 2A to 2E** differs from the first prior art tamper-evident closure 101 of **Figures 1A to 1E** in that the second prior art tamper-evident closure 201 incorporates a gap-generating mechanism (not shown) that is arranged such that during first opening of the second prior art tamper-evident closure 201, an irreversible G is generated between the first and second shell parts 203A and 203B. When the removable cap is replaced the gap G is evident, as can be seen in **Figure 2E** (no such gap can be seen in **Figure 1E**). The irreversible gap G thus provides an indication that the tamper-evident closure has been opened at least once.

[0051] An example of second prior art tamper-evident

closure 201 is described in International Patent Publication No. WO 2015/113851 A1.

[0052] The gap-generating mechanism of the second prior art tamper-evident closure 201 may be a gap-generating mechanism as described in International Patent Publication No. WO 2006/117505 A1. The irreversible gap may be an unobstructed gap.

[0053] A tamper-evident closure for a container neck, according to a first arrangement, is shown in **Figure 3**.

[0054] Tamper-evident closure 301 comprises a shell 302 comprising a first shell part 302A and a second shell part 302B, and a tamper-evident overcap 303 comprising a cap part 303A and a tamper-evident tear-band 303B.

[0055] The shell 302 may be formed from any suitable material, which may be a metal or a plastics material. In an example, the shell 302 is formed from a metal material.

[0056] The tamper-evident overcap 303 may be formed from any suitable material, which may be a metal or a plastics material. In an example, the tamper-evident overcap 303 is formed from a plastics material.

[0057] The tamper-evident overcap 303 is fitted over the shell 302, as shown. The cap part 303A is secured to the first shell part 302A in any suitable manner, which may utilise friction and/or an adhesive. The cap part 303A has a free end that is frangibly connected to the tamper-evident tear-band 303B. The tamper-evident tear band 303B is releasably located around the exterior of the second shell part 303B such that a removable cap portion of the tamper-evident closure 301, which comprises the cap part 303A and the first shell part 302A, is removable after the tamper-evident tear band 303B is released. The second shell part 303B remains on the container neck.

[0058] The tamper-evident tear band 303B includes a pull section 303C, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 303B. A frangible line 303D extends around a side of the pull section 303C and extends between upper and lower edges of the tamper-evident tear band 303B.

[0059] To open the tamper-evident closure 301, the tamper-evident tear band 303B must first be released. The tamper-evident tear band 303B and second shell part 302B are provided with co-operating axial ribs (ribs 304 of the second shell part 302B only are shown) to prevent the tamper-evident band 303B from rotating prior to being released.

[0060] To release the tamper-evident tear band 303B, the pull section 303C is lifted and pulled to break the frangible line 303D and tear the tamper-evident tear band 303B from the cap part 303A. The removable cap (cap part 303A and first shell part 302A) may then be removed).

[0061] Thus, the tamper-evident closure 301 is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

[0062] However, differences will now be described.

[0063] Tamper-evident closure 301 comprises a multi-

section tamper-evident element 304 incorporating an indelible visual indicium 305.

[0064] The term "indelible" is used herein to mean permanent and durable, and difficult to remove. Preferably the indelible visual indicium is resistant to the application of at least abrasion, heat and acids.

[0065] As shown, the cap part 30AB comprises a first section 304A of the multi-section tamper-evident element 304, the tamper-evident tear-band 303B comprises a second section 304B of the multi-section tamper-evident element 304, and the second shell portion 302B comprises a third section 304C of the multi-section tamper-evident element 304.

[0066] In the shown arrangement, the second section 304B of the multi-section tamper-evident element 304 is disposed, in an axial direction of the tamper-evident closure 301, between the first section 304A and the third section 304C.

[0067] Releasing the tamper-evident tear-band 303 B releases the second section 304B of the multi-section tamper-evident element 304 from the tamper-evident closure 301.

[0068] This will remove an intermediate section of the multi-section tamper-evident element 304, and provide an indication of first opening.

[0069] The tamper-evident closure 301 may a gap-generating mechanism, which causes an irreversible gap to be generated during first opening, such that when the removable cap (cap part 303A and first shell part 302A) is replaced, the distance between the upper edge of the third section 304C and the first section 304A of the multi-section tamper-evident element 304 is greater than before first opening, and therefore any attempt to glue the tamper-evident tear-band 303B back into place will not restore the original appearance of the tamper-evident closure 301 (due to the increase in separation in the axial direction).

[0070] As shown in **Figure 3**, when the overcap 303 is initially assembled over the shell 302, the first, second and third sections 304A, 304B and 304C of the multi-section tamper-evident element 304 are in an aligned condition.

[0071] The indelible visual indicium 305 may include one or more items of any suitable type, each of which may be a shape item, a pattern item, an alpha-numerical item, or a graphics item, and, as appropriate, an item may include a plurality of constituent portions.

[0072] An item may be presented in any suitable. An item may be presented in all raised, all recessed, or a combination of raised or recessed regions.

[0073] A shape item may, for example, be presented using a raised region to present a substantially solid shape or outlines the boundary or edge of a shape.

[0074] The shape may be, for example a shield shape, such as is shown in **Figure 3**, or any other regular or irregular shape. The shape may, for example, be a square, a triangle, an oval. A pattern item may present any suitable pattern. An alpha-numerical item may be a

code, a graphics item may be a logo.

[0075] A pattern item may be any suitable pattern, which may be example be or include a cross-hatching pattern or a regular or irregular display or dots or shapes.

[0076] An alpha-numeric item may be a name or a code.

[0077] A graphic item may be picture, which may be a logo.

[0078] The indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 by any suitable process, such as a moulding process, an etching process, or an engraving process. The indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 by laser marking. It is to be appreciated that the indelible visual indicium 305 may be incorporated in the multi-section tamper-evident element 304 as the tamper-evident closure 301 is being formed, or may be included as a post-initial production stage.

[0079] Although the arrangement of **Figure 3** shows the multi-section tamper-evident element 304 located diametrically opposite the pull section 303C, it is to be appreciated that any suitable relative radial and/or axial positioning may be utilised.

[0080] Different example arrangements of a multi-section tamper-evident element 304 will now be described, with reference to **Figures 4 to 6**.

[0081] Illustrated in **Figure 4** is an example in which the indelible visual indicium 305 comprises an item 401 distributed across the first, second and third sections 304A, 304B and 304C of the multi-section tamper-evident element 304, such that the first section 304A comprises a first constituent portion 401A of the item 401, the second section 304B comprises a second constituent portion 401B of the item 401, and the third section 304C comprises a third constituent portion 401C of the item 401. When the tamper-evident tear-band 303B is released, the second constituent portion 305B is removed, resulting in a visual interruption of the indelible visual indicium 305.

[0082] When the tamper-evident tear-band 303B has been disposed of, any attempt to replace the original tamper-evident tear-band 303B with a non-original tamper-evident tear band is now made more difficult as it must visually match the first constituent portion 305A of the cap part 304A and the third constituent portion 305C of the second shell part 304C, which remains on the container neck.

[0083] As illustrated in **Figure 5**, the indelible visual indicium 305 may comprise a unique identifier item 501, with at least the second section 304B and the third section 304C of the multi-section tamper-evident element 304 comprising a presentation of the unique identifier item 501 (in this illustration the first section 304A also comprises a presentation of the unique identifier item 501).

[0084] The use of a unique identifier item 501 advantageously increases the complexity of an attempt to replace the original tamper-evident tear-band 303B with a

non-original tamper-evident tear band (and in this illustration to replace the original cap part 303A with a non-original cap part) as there is a requirement for the unique identifier item 501 remaining on the container neck, by virtue of the presentation of the unique identifier item 501 on the third section 304C of the multi-section tamper-evident element 304) to be present also on the other parts being substituted.

[0085] A third example is illustrated in **Figure 6** in which the indelible visual indicium 305 includes a first item 601 and a second different item 602 distributed across the first, second and third sections 304A, 304B, 304C of the multi-section tamper-evident element 304, such that the first section 304A comprises a first constituent portion 601 A of the first item 306E, the second section 304B comprises a second constituent portion 601B of the first item 306E and a first constituent portion 602A of the second item 306F, and the third section 304C comprises a second constituent portion 602B of the second item 306F. When the tamper-evident tear-band 303B is released, the second constituent portion 305B is removed, resulting in a visual interruption of the indelible visual indicium 305.

[0086] Each section of the multi-section tamper-evident member may have any suitable dimensions. Each section may have the same, or a different depth dimension, in the axial direction of the tamper-evident closure, as one or more other sections of the multi-section tamper-evident member. In addition, a multi-section tamper-evident member may have more than three sections.

[0087] A tamper-evident closure may be provided with more than one multi-section tamper-evident member as described herein. Each multi-section tamper-evident member of a plurality of multi-section tamper-evident members may be the same as, or different from, one or more others of the plurality of multi-section tamper-evident members.

[0088] A tamper-evident closure for a container neck, according to a second arrangement, is shown in **Figures 7 & 8**.

[0089] Tamper-evident closure 701 comprises a shell 702 comprising a first shell part 702A and a second shell part 702B, and a tamper-evident overcap 703 comprising a cap part 703A and a tamper-evident tear-band 703B.

[0090] The shell 702 may be formed from any suitable material, which may be a metal or a plastics material. In an example, the shell 702 is formed from a metal material.

[0091] The tamper-evident overcap 703 may be formed from any suitable material, which may be a metal or a plastics material. In an example, the tamper-evident overcap 703 is formed from a plastics material.

[0092] The tamper-evident overcap 703 is fitted over the shell 702, as shown. The cap part 703A is secured to the first shell part 702A in any suitable manner, which may utilise friction and/or an adhesive. The cap part 703A has a free end that is frangibly connected to the tamper-evident tear-band 703B. The tamper-evident tear band 703B is releasably located around the exterior of the sec-

ond shell part 703B such that a removable cap portion of the tamper-evident closure 701, which comprises the cap part 703A and the first shell part 702A, is removable after the tamper-evident tear band 703B is released. The second shell part 703B remains on the container neck.

[0093] The tamper-evident tear band 703B includes a pull section 703C, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 703B. A frangible line (not visible) extends around a side of the pull section 703C and extends between upper and lower edges of the tamper-evident tear band 703 B.

[0094] To open the tamper-evident closure 701, the tamper-evident tear band 703B must first be released. The tamper-evident tear band 703B and second shell part are provided with co-operating axial ribs to prevent the tamper-evident band 703B from rotating prior to being released.

[0095] To release the tamper-evident tear band 703B, the pull section 703C is lifted and pulled to break the frangible line and tear the tamper-evident tear band 703B from the cap part 703A. The removable cap (cap part 703A and first shell part 702A) may then be removed.

[0096] Thus, the tamper-evident closure 701 is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

[0097] However, differences will now be described.

[0098] As shown in **Figures 7 & 8**, the tamper-evident closure 701 comprises a tamper-evident tear band engagement arrangement, in which a window 704 comprising a periphery 705 and at least one opening 706, within the area bounded by the periphery 705, is defined in the tamper-evident tear band 703B and a protrusion 707 extends radially outwardly from the second shell part 702B. As illustrated in **Figure 8**, when the tamper-evident tear overcap 703 is assembled with the shell 702, the tamper-evident tear band 703B is snapfitted over the protrusion 707, as the tamper-evident tear overcap 701 is applied downwardly around the first shell part 702A, such that the protrusion 707 extends into the opening 706.

[0099] When the tamper-evident overcap 703 is in snap-fit engagement with the second shell part 702B, the window 704 and protrusion 707 co-operate to provide an anti-tamper feature. The co-operating window 704 and protrusion 707 increase the difficulty of rotating the tamper-evident tear band 703B before it is removed. In addition, any attempt to unhook the window 704 of the tamper-evident tear band 703B from the protrusion 707 will result in irreversible deformation or distortion in, or damage to, the tamper-evident tear band 703B, if this does not cause the tamper-evident tear band 703B to break. The deformation, distortion or other damage provides evidence that an attempt has been made to open the tamper-evident closure 701 without detaching the tamper-evident tear band 703B from the cap part 703A.

[0100] The tamper-evident closure 701 may include a gap-generating mechanism, which causes an irreversible

gap to be generated during first opening, such that when the removable top part (cap part 703A and first shell part 702A) is replaced, there is an axial separation between the first shell part 702A and the second shell part 702B that was not present before the first opening event, which has the effect that any attempt to glue the tamper-evident tear-band 703B back into place will not restore the original appearance of the tamper-evident closure 701 and also the window 704 cannot be snapped back over the protrusion 707 thus enhancing the visual discrepancy.

[0101] Each of the window 704, periphery 705, and at least one opening 706, and the protrusion 707, may have any suitable shape and dimensions. The protrusion 707 may have any suitable profile, and may present more than one projection elements at a terminal end thereof for engaging an opening of the window 704.

[0102] The protrusion 707 may comprise or constitute at least one indelible visual indicium, which may comprise one or more item such as a shape item, a pattern item, an alphanumeric item or a graphic item as described above. An attempt to open the tamper-evident closure 701 without first releasing the tamper-evident tear band 703B may also result in damage to an indelible visual indicium of the protrusion, which again will provide visual evidence of tampering.

[0103] Although the arrangement of **Figures 7 & 8** shows the co-operating window 704 of the tamper-evident tear band 703B and the protrusion 707 of the second shell part 703B located diametrically opposite the pull section 703C that any suitable relative radial and/or axial positioning may be utilised.

[0104] In addition, although the arrangement of **Figures 7 & 8** shows the protrusion for engaging the tamper-evident tear band extending from a second shell part, it is to be appreciated that the protrusion could alternatively extend from a closure body portion, that comprises or otherwise effectively provides a shell part, and achieve the same effect.

[0105] Further, although the arrangement of **Figures 7 & 8** shows the opening extending all the way through the tamper-evident tear band, so that it is open to the internal side and the external side thereof, it is to be appreciated that the opening could alternatively extend partially through the tamper-evident tear band, so that it is open only to the internal side thereof.

[0106] A tamper-evident closure may be provided with more than one co-operating window and protrusion as described herein. Each co-operating window and protrusion of a plurality of co-operating windows and protrusions may be the same as, or different from, one or more others of the plurality of co-operating windows and protrusions.

[0107] A tamper-evident closure for a container neck, according to an embodiment, is shown in

Figures 9 & 10.

[0108] The tamper-evident closure comprises a shell comprising a first shell part and a second shell part 902B, and a tamper-evident overcap comprising a cap part and a tamper-evident tear-band 903B.

[0109] The shell may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the shell is formed from a metal material.

[0110] The tamper-evident overcap may be formed from any suitable material, which may be a metal or a plastics material. In an embodiment, the tamper-evident overcap is formed from a plastics material.

[0111] The tamper-evident overcap is fitted over the shell. The cap part is secured to the first shell part in any suitable manner, which may utilise friction and/or an adhesive. The cap part has a free end that is frangibly connected to the tamper-evident tear-band 903B. The tamper-evident tear band 903B is releasably located around the exterior of the second shell part 902B such that a removable cap portion of the tamper-evident closure, which comprises the cap part and the first shell part, is removable after the tamper-evident tear band 903B has been released. The second shell part 902B remains on the container neck.

[0112] The tamper-evident tear band 903B includes a pull section, which may have any suitable shape, such as a generally disc-like shape, to facilitate manual release of the tamper-evident tear band 903B. A frangible line extends around a side of the pull section and extends between upper and lower edges of the tamper-evident tear band 903B.

[0113] To open the tamper-evident closure, the tamper-evident tear band 903B must first be released. The tamper-evident tear band 903B and second shell part may be provided with co-operating axial ribs to prevent the tamper-evident band 903B from rotating prior to being released.

[0114] To release the tamper-evident tear band 903B, the pull section is lifted and pulled to break the frangible line and tear the tamper-evident tear band 903B from the cap part. The removable cap (cap part and first shell part) may then be removed).

[0115] Thus, the tamper-evident closure is similar to the first and second prior art tamper-evident closures described with reference to **Figures 1A to 1E** and **Figures 2A to 2E**.

[0116] However, differences will now be described.

[0117] As shown in **Figure 9**, the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which, a first circumferential ramp 904 and a block 905, spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band 903B, a second circumferential ramp 906 and a swing clip 907, spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part 902B and, as illustrated in **Figure 10**, rotation of the tamper-

evident tear band 903B in a first direction of rotation R forces the block 905 to abut against the swing clip 907 and forces the first circumferential ramp 904 to travel along the second circumferential ramp 906 to cause an arc of the tamper-evident tear band 903B to bend radially outwardly.

[0118] The co-operating ramps 904, 906 and co-operating block 905 and swing clip 907 increase the difficulty of rotating the tamper-evident tear band 903B before it is removed. In addition, rotation of the tamper-evident tear band 903B will result in irreversible deformation or distortion in, or damage to, the tamper-evident tear band 903B, if this does not cause the tamper-evident tear band 903B to break. The deformation, distortion or other damage provides evidence that an attempt has been made to open the tamper-evident closure without first tearing the tamper-evident tear band 903B from the cap part.

[0119] As shown in **Figures 9 & 10**, the tamper-evident tear band engagement arrangement may comprise a swing clip stopper 908, and the swing clip 907 may comprise an acute corner 909 with a sharp edge 910, and a slot 911 may be located adjacent the block 905, into which the acute corner 909 of the swing clip 907 extends.

[0120] As shown in **Figure 10**, in response to rotation of the tamper-evident tear band 903B before removal from the overcap, the block 905 catches the acute corner 909 and causes the swing clip 907 to swing against the swing clip stopper 908, with the acute corner 909 acting on the tamper-evident tear band 903B to force the tamper-evident tear band 903B outwards. The swing clip stopper 908 prevents overbending of the swing clip 907. In addition, the sharp edge 910 of the swing clip 907 is forced into the tamper-evident tear band 903B. At the same time, the first ramp 904 rides along the second ramp 906, and the second ramp 906 acting on the tamper-evident tear band 903B to force the tamper-evident tear band 903B outwards. The regions of contact between the swing clip 907 and the tamper-evident tear band 903B and between the second ramp 906 and the first ramp 905 result in concentrated stress in the tamper-evident tear band 903B. The interaction between the first ramp 904 and the block 905 of the tamper-evident tear band 703B and the second ramp 906 and swing clip 907 of the second shell part 902B imparts tension into an arc, indicated generally at 912, of the tamper-evident tear band 903B that irreversibly stretches the tamper-evident tear band 903B to a larger diameter.

[0121] The tamper-evident closure may include a gap-generating mechanism, which causes an irreversible gap to be generated during initial opening, such that when the removable cap (cap part and first shell part) is replaced, there is an axial separation between the first shell part and the second shell part that did not exist prior to the initial opening.

[0122] The tamper-evident closure may include more than one block and swing clip, and more than one first ramp and second ramp.

[0123] The embodiment of **Figures 9 & 10** may include

the first arrangement of **Figures 3 to 6** and/or the second arrangement of **Figures 7 & 8**.

[0124] An example gap-generating mechanism that may be incorporated into a tamper-evident closure according to the first arrangement of **Figures 3 to 6**, the second arrangement of **Figures 7 & 8** or the embodiment of **Figures 9 & 10** will now be described with reference to **Figures 11 to 20**.

[0125] The example gap-generating mechanism is shown in **Figures 11 to 20** incorporated in an example closure, for the purpose of facilitating the understanding of the construction and operation of the example gap-generating mechanism.

[0126] Referring to **Figure 11**, there is shown a closure generally indicated 10 secured onto a container neck 15.

[0127] The closure 10 comprises a main body 20, an inner part 25 and an outer part 30. A shell 35, in this example a metal shell, forms an outer casing to the closure 10 and is divided into a cylindrical lower shell part 36 and a cup-shape second shell part 37.

[0128] Together the main body 20 and the cylindrical lower shell part 36 comprise a second portion and the inner part 25, outer part 30 and the cup-shape second shell part 37 comprise a cap-like first portion.

[0129] The cylindrical lower shell part 36 and cup-shape second shell part 37 are separated at a split line 40 formed by a cutting process once the shell 35 has been applied to the first and second portions of the closure 10.

[0130] The main body 20 is fixed onto the container neck 15 by clips 45, which project inwardly and engage under a shoulder 50 of the container neck 15.

[0131] In this example, the closure 10 comprises a valve arrangement. A valve housing 55 is clipped into the main body 20, and includes a sealing lip 57 which seals against the top surface 16 of the container neck 15. A float valve 65 is housed in the valve housing 55, and can seal against a valve seat 60 to prevent re-filling of the container. A valve control ball 70 is located on top of the float valve 65.

[0132] In use, to open the closure 10, the cup-shape second shell part 37 of the shell 35 is rotated. This unscrews the outer part 30 from the inner part 25. The outer part 30 unscrews until a locking mechanism described in more detail below locks it to the inner part 25. With the outer 30 and inner part 25 locked together, the inner part 25 can then be unscrewed from the main body 20.

[0133] When the cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) is screwed back onto the main body 20, a gap G is formed between the cup-shape second shell part 37 and the cylindrical lower shell part 36, as shown in **Figure 12**. This is because the outer part 30 cannot be screwed completely back down onto the inner part 25 by virtue of the locking mechanism. In addition, in this example, the bottom of the inner part 25 protrudes below the bottom of the outer part 30 so as to be visible in the gap G, as can be seen in **Figure 13**.

[0134] The gap G formed between the cup-shape second shell part 37 and the cylindrical lower shell part 36 is unobstructed in the sense that there is no obstruction member trapped between the cup-shape second shell part 37 and the cylindrical lower shell part 36.

[0135] Referring now to **Figures 14 & 15**, the main body 20 is shown in more detail.

[0136] The main body 20 comprises a lower engagement portion 21 and an upper flow regulation portion 22 defining an aperture.

[0137] The lower engagement portion 21 comprises a generally cylindrical body having two diametrically opposed windows 21a, each of which has at a lower edge a ledge 45 for engagement under the shoulder 50 of the container neck 15 as shown in **Figures 11 & 12**.

[0138] In addition, the interior surface of the lower portion 21a has a plurality of mutually spaced axial ribs 21b which, in use, lock onto the outer surface of the container neck 15 to prevent relative rotation between the main body 20 and the container neck 15.

[0139] The upper flow regulation portion 22 of the main body 20 is generally frusto-conical in shape and has external screw threads 22a. At the base of the portion upper flow regulation portion 22 where it joins the lower engagement portion 21, two sets of ratchet teeth 23 are positioned. The ratchet teeth 23 engage corresponding ratchet teeth 25c on the inner part 25 to prevent the inner part 25 from rotating whilst the outer part 30 is being rotated for the first time, to open the closure 10 for the first time. Only after the outer part 30 has locked against the inner part 25 can the inner part 25 be rotated relative to the main body 20. At the opposite end of the upper flow regulation portion 22 a dome-shape flow regulator 22b is positioned in the aperture. The aperture itself is defined by a circumferential pouring lip 22c.

[0140] Referring now to **Figures 16 to 18**, the inner part 25 is shown in more detail.

[0141] The inner part 25 is generally cup-shape with a cylindrical side wall 25a closed at one end by a top plate 25b.

[0142] The interior surface of the open end of the cylindrical side wall 25a includes a continuous series of ratchet teeth 25c which engage the ratchet teeth 23 on the main body portion 22.

[0143] The exterior of the cylindrical side wall 25a includes two inclined side ramps 26. At the start of each inclined side ramp 26 is a locking step 26a, the purpose of which will be described in more detail below.

[0144] The cylindrical side wall 25a also comprises a pair of ratchet members 27a, 27b adjacent the top plate 25b.

[0145] The exterior surface of the cylindrical side wall 25a also comprises a circumferential bead 25d, the purpose of which will be described in more detail below.

[0146] The top plate 25b comprises a pair of opposing arcuate ramps 28a, 28b each of which terminates with a locking recess 29a, 29b.

[0147] Referring now to **Figures 19 & 20**, the outer

part 30 is shown in more detail.

[0148] The outer part 30 is generally cup-shape and comprises a cylindrical side wall 30a and a top plate 30b.

[0149] The exterior of the outer part 30 comprises a plurality of knurls 30c which help to lock the cup-shape second shell part 37 and to prevent relative rotation.

[0150] The interior of the cylindrical side wall 30a comprises a circumferential bead 31 for preventing the outer part 30 being lifted off the inner part by engagement with the corresponding bead 25d.

[0151] The interior of the cylindrical side wall 30a also comprises a pair of drive dogs 32 which engage in the inclined side ramps 26 of the inner part 25 and ride up them as the outer part 30 is rotated relative to the inner part 25.

[0152] The interior of the cylindrical side wall 30a also comprises a pair of diametrically opposed ratchet arrangements 33a, 33b designed and positioned to run over and lock onto the corresponding ratchet arrangements 27a, 27b on the inner part 25 to prevent counter rotation.

[0153] The underside of the top plate 30b includes a pair of drive dogs 34a, 34b each of which comprises a main body 38a, 38b and a locking tooth 39a, 39b.

[0154] The operation of the gap-generating closure 10 will now be described in more detail.

[0155] Initially the main body 20 is locked onto the container neck 15 by the ribs 21b to prevent axial and rotational movement. The inner part 25 cannot rotate relative to the main body 20 by virtue of the ratchets 23, 25c. The cup-shape second shell part 37 cannot rotate relative to the outer part 30 by virtue of the knurls 30c. The outer part 30 cannot be lifted off the inner part 25 by virtue of the locking beads 25d, 31 and by virtue of the drive dogs 32 engaging under the steps 26a.

[0156] The cup-shape second shell part 37 is grasped by a user and turned. This causes the outer part 30 to rotate relative to the inner part 25. The drive dogs 32 in the outer part rise up the inclined side ramps 26 in the inner part 25 and the drive dogs 34a rise up the ramps 28a, 29a. The ratchets 33a, 33b pass over the ratchets 27a, 27b.

[0157] The outer part 30 is caused to rise, in this example by 2mm. At this point continued rotation causes the locking teeth 39a, 39b to drop into the locking recesses 29a, 29b. In addition, the ratchets 33a, 33b have rotated beyond the ratchets 27a, 27b. The inner part 25 drops back down, in this example by 0.5mm.

[0158] Continued rotation of the outer part 30 relative to the inner part 25 is not possible because the drive dogs 32 abut against the end of the inclined side ramps 26 and the drive dogs 34a, 34b abut against the end of the ramps 28a, 28b.

[0159] In this second position the open end of the outer part 30 has moved axially away from the open end of the inner part 25 to expose the free end of the cylindrical side wall 25a.

[0160] Continued rotation of the cap-like first portion

(inner part 25, outer part 30 and the cup-shape second shell part 37) overcomes the torque required to allow the ratchets 25c to pass over the ratchets 23 which causes the inner part 25 to rotate relative to the main body 20.

5 The internal screw threads 25e on the inner part 25 rise up the external screw threads 22a of the main body 20.

[0161] The cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) can now be lifted off the main body 20 to allow the contents of the container to be dispensed.

10 [0162] The contents are dispensed through the valve housing 55. The valve 65 lifts off the seat 60 as the container is upturned and contents flow out. The valve 65 re-seals against the seat 60 under the weight of the ball 70 when the container is returned to an upright position. This prevents re-filling of the container.

[0163] When the cap-like first portion (inner part 25, outer part 30 and the cup-shape second shell part 37) is returned the inner part 25 is screwed back onto the body 20. The inner part 25 screws back down to its original position, but the outer part 30 cannot because it is locked in position both by the axial locking means provided by the drive dogs 34a, 34b and the lateral locking means provided by the ratchets 33a, 33b and 27a, 27b. This means that the gap G is formed between the first and second shell parts 36, 37 with the bottom of the inner part 25 visible through it. This irreversible opening event provides visual evidence that the closure 10 has been opened at least once. The gap G cannot be closed without destroying the closure 10.

[0164] Because the gap G between the first and second shell parts 36, 37 is not generated by placing an obstruction directly between them, it is not possible to close the gap G by a simple cutting operation.

35 [0165] By providing the dual axial and lateral ratchet arrangements, re-setting the closure 10 back to its original position to close the gap G is prevented. In an alternative example (not shown) a similar closure 10 is provided with just an axial ratchet arrangement. A similar closure 10 may also have an alternative valve or pourer arrangement.

40 [0166] A tamper-evident closure according to the first arrangement of Figures 3 to 6, the second arrangement of Figures 7 & 8 or the embodiment of Figures 9 & 10 may therefore include a first portion including an inner part and an outer part, a second portion, and a locking mechanism, the first portion removably engaged with the second portion; and the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part is adjacent the second shell part in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap between the first shell part and the second shell part, the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first shell part and the second shell part.

[0167] The gap may be an unobstructed gap.

[0168] The first portion may be removably engaged with the second portion by a screw-thread arrangement.

[0169] The first and second shell parts may be initially joined by a plurality of frangible bridges which will break if either: i) the second shell part is rotated before initial opening; or ii) an attempt is made to pull the removable cap-portion off without unscrewing. These frangible bridges therefore serve as an additional tamper-evident feature.

[0170] It is to be appreciated that a tamper-evident closure may comprise a combination of a multi-section tamper-evident member as described herein with reference to the first arrangement (**Figures 3 to 6**) and/or a co-operating opening and protrusion as described herein with reference to the second arrangement (**Figures 7 & 8**) with the tamper-evident tear band engagement arrangement of the embodiment described herein (**Figures 9 & 10**).

[0171] The tamper-evident closure may include a gap-generating mechanism, and may include further tamper-evident features not specifically described herein.

[0172] According to an embodiment of a tamper-evident closure, the tamper-evident closure comprises at least one multi-section tamper-evident member as described herein (with reference to **Figures 3 to 6**) and at least one co-operating opening and protrusion as described herein (with reference to **Figures 7 & 8**). The tamper-evident closure may be a gap-generating or a non-gap-generating closure.

[0173] A container having a neck provided with a tamper-evident closure according to the embodiment of **Figures 9 & 10**, optionally including the first arrangement of **Figures 3 to 6** and/or the second arrangement of **Figures 7 & 8**, is also provided by the present invention.

[0174] The container may be a bottle. The bottle may be a glass bottle. The glass bottle may be a spirits bottle.

[0175] Although illustrative embodiments and examples of the invention have been disclosed in detail herein, with reference to the accompanying drawings, it is to be understood that the invention is not limited to the precise embodiment and examples shown and/or described and that various changes and modifications can be effected therein by one skilled in the art without departing from the scope of the invention as defined by the appended claims.

Claims

1. A tamper-evident closure for a container neck, the tamper-evident closure comprising:

a shell comprising a first shell part and a second shell part (902B), and
a tamper-evident overcap comprising a cap part and a tamper-evident tear band (903 B);
the cap part fixed to the exterior of the first shell

part, and the tamper-evident tear band (903B) releasably connected to the cap part and releasably located around the exterior of the second shell part (902B) such that a removable cap portion of the tamper-evident closure, the removable cap portion comprising the cap part and the first shell part, is removable after the tamper-evident tear band (903B) is released; **characterised in that:**

the tamper-evident closure further comprises a tamper-evident tear band engagement arrangement in which,
a first circumferential ramp (904) and a block (905), spaced in a peripheral direction of the tamper-evident closure, extend radially inwardly from the tamper-evident tear band (903B),
a second circumferential ramp (906) and a swing clip (907), spaced in the peripheral direction of the tamper-evident closure, extend radially outwardly from the second shell part (902B), and
rotation of the tamper-evident tear band (903B) in a first direction of rotation forces the block (905) to abut against the swing clip (907) and forces the first circumferential ramp (904) to travel along the second circumferential ramp (906) to cause an arc of the tamper-evident tear band (903B) to bend radially outwardly.

2. A tamper-evident closure as claimed in claim 1, wherein the tamper-evident closure (301) further comprises a multi-section tamper-evident element (304) incorporating an indelible visual indicium (305);
the cap part (303A) comprises a first section (304A) of the multi-section tamper-evident element (304), the tamper-evident tear band (303B) comprises a second section (304B) of the multi-section tamper-evident element (304), and the second shell part (303B) comprises a third section (304C) of the multi-section tamper-evident element (304); and
releasing the tamper-evident tear band (303B) releases the second section (304B) of the multi-section tamper-evident element (304) from the tamper-evident closure (301).
3. A tamper-evident closure as claimed in claim 2, wherein the indelible visual indicium (305) is incorporated in the multi-section tamper-evident element (304) by one of: a moulding process, an etching process, an engraving process.
4. A tamper-evident closure as claimed in claim 2 or claim 3, wherein: the first section (304A) of the multi-

section tamper-evident element (304) comprises a first constituent portion (401A) of the indelible visual indicium (305),

the second section (304B) of the multi-section tamper-evident element (304) comprises a second constituent portion (401B) of the indelible visual indicium (305), and

the third section (304C) of the multi-section tamper-evident element (304) comprises a third constituent portion (401C) of the indelible visual indicium (305).

5. A tamper-evident closure as claimed in any of claims 2 to 4, wherein the indelible visual indicium (305) comprises at least one of: a shape item, a pattern item, an alpha-numerical item, a graphics item.

6. A tamper-evident closure as claimed in claim 2 or claim 3, wherein: the indelible visual indicium (305) comprises a unique identifier item (501), and at least the second section (304B) and the third section (304C) of the multi-section tamper-evident element (304) comprises a presentation of the unique identifier item (501).

7. A tamper-evident closure as claimed in any of claims 1 to 6, wherein the tamper-evident closure (701) further comprises a tamper-evident tear band engagement arrangement in which, a window (704) comprising at least one opening (706) is defined in the tamper-evident tear band (703B), a protrusion (707) extends radially outwardly from the second shell part (702B), and the tamper-evident tear band (703B) is engaged with the protrusion (707) by a snap-fit engagement in which the protrusion (707) extends into the at least one opening (706).

8. A tamper-evident closure as claimed in any preceding claim, wherein the tamper-evident closure (10) further comprises:

a first portion including an inner part (25) and outer part (30),

a second portion, and

a locking mechanism;

the first portion removably engaged with the second portion;

the outer part movable relative to the inner part upon first opening of the tamper-evident closure from a first position in which the first shell part (36) is adjacent the second shell part (37) in an axial direction of the tamper-evident closure to a second position in which the first shell part is spaced from the second shell part in the axial direction of the tamper-evident closure, to generate a gap (G) between the first shell part and the second shell part,

the locking mechanism configured to lock the outer part in the second position to maintain the gap between the first shell part and the second shell part.

9. A tamper-evident closure as claimed in claim 8, wherein the locking mechanism comprises a ratchet mechanism.

10. A tamper-evident closure as claimed in claim 8 or claim 9, wherein the gap (G) is an unobstructed gap.

11. A tamper-evident closure as claimed in any of claims 8 to 10, wherein the first portion is removably engaged with the second portion by a screw-thread arrangement.

12. A container having a neck provided with the tamper-evident closure as claimed in any preceding claim.

Patentansprüche

1. Originalitätsverschluss für einen Behälterhals, wobei der Originalitätsverschluss aufweist:

einen Mantel, der eine erste Mantelkomponente und eine zweite Mantelkomponente (902B) aufweist, und

eine Originalitätsschutzkappe, die eine Kappenkomponente und ein Originalitäts-Abreißband (903B) aufweist;

wobei die Kappenkomponente an einer Außenseite der ersten Mantelkomponente befestigt ist, und das Originalitäts-Abreißband (903B) lösbar mit dem Kappenteil verbunden ist und lösbar um die Außenseite der zweiten Mantelkomponente (902B) angeordnet ist, sodass ein entfernbarer Kappenbereich des Originalitätsverschlusses, wobei der entfernbare Kappenbereich die Kappenkomponente und die erste Mantelkomponente aufweist, entfernbar ist, nachdem das Originalitäts-Abreißband (903B) gelöst ist;

dadurch gekennzeichnet, dass

der Originalitätsverschluss weiterhin eine Eingriffsanordnung des Originalitäts-Abreißbands aufweist, in dem

eine erste Umfangsschräge (904) und ein Block (905), die in der Umfangsrichtung des Originalitätsverschlusses beabstandet sind, vom Originalitäts-Abreißband (903B) radial nach innen verlaufen,

eine zweite Umfangsschräge (906) und ein Schwenkclip (905), die in der Umfangsrichtung des Originalitätsverschlusses beabstandet sind, radial von der zweiten Mantelkomponente (902B) nach außen verlaufen, und

die Rotation des Originalitäts-Abreißbands

- (903B) in einer ersten Rotationsrichtung den Block (905) dazu treibt, gegen den Schwenkclip (907) anzuliegen, und die erste Umfangsschräge (904) dazu treibt, sich entlang der zweiten Umfangsschräge (906) zu bewegen, um zu bewirken, dass sich ein Bogen des Originalitäts-Abreißbands (903B) radial nach außen biegt.
2. Originalitätsverschluss nach Anspruch 1, wobei der Originalitätsverschluss (301) weiterhin ein Originalitätselement (304) mit mehreren Abschnitten aufweist, das eine unauslöschbare visuelle Kennzeichnung (305) beinhaltet; die Kappenkomponente (303A) einen ersten Abschnitt (304A) des Originalitätselements (304) mit mehreren Abschnitten aufweist, das Originalitäts-Abreißband (303B) einen zweiten Abschnitt (304B) des Originalitätselements (304) mit mehreren Abschnitten aufweist, und die zweite Mantelkomponente (303B) einen dritten Abschnitt (304C) des Originalitätselements (304) mit mehreren Abschnitten aufweist; und das Lösen des Originalitäts-Abreißbands (303B) den zweiten Abschnitt (304B) des Originalitätselements (304) mit mehreren Abschnitten von dem Originalitätsverschluss (301) löst.
 3. Originalitätsverschluss nach Anspruch 2, wobei das unauslöschbare visuelle Kennzeichen (305) im Originalitätselement (304) mit mehreren Abschnitten durch eines integriert ist von: einem Formungsprozess, einem Ätzprozess, einem Gravurprozess.
 4. Originalitätsverschluss nach Anspruch 2 oder Anspruch 3, wobei der erste Abschnitt (304A) des Originalitätselements (304) mit mehreren Abschnitten einen ersten konstituierenden Bereich (401A) des unauslöschbaren visuellen Kennzeichens (305) aufweist, der zweite Abschnitt (304A) des Originalitätselements (304) mit mehreren Abschnitten einen zweiten konstituierenden Bereich (401B) des unauslöschbaren visuellen Kennzeichens (305) aufweist, und der dritte Abschnitt (304C) des Originalitätselements (304) mit mehreren Abschnitten einen dritten konstituierenden Bereich (401C) des unauslöschbaren visuellen Kennzeichens (305) aufweist.
 5. Originalitätsverschluss nach einem der Ansprüche 2 bis 4, wobei das unauslöschbare visuelle Kennzeichen (305) wenigstens eines aufweist von: einem Formelement, einem Musterelement, einem alphanumerischem Element, einem Grafikelement.
 6. Originalitätsverschluss nach Anspruch 2 oder Anspruch 3, wobei das unauslöschbare visuelle Kennzeichen (305) ein eindeutiges Kennzeichnerelement (501) aufweist, und wenigstens der zweite Abschnitt (304B) und der dritte Abschnitt (304C) des Originalitätselements (304) mit mehreren Abschnitten eine Darstellung des eindeutigen Kennzeichnerelements (501) aufweisen.
 7. Originalitätsverschluss nach einem der Ansprüche 1 bis 6, wobei der Originalitätsverschluss (701) weiterhin eine Eingriffsanordnung des Originalitäts-Abreißbands aufweist, in der ein Fenster (704), das wenigstens eine Öffnung (706) aufweist, im Originalitäts-Abreißband (703B) definiert ist, ein Vorsprung (707) radial von der zweiten Mantelkomponente (702B) nach außen verläuft, und das Originalitäts-Abreißband (703B) in den Vorsprung (707) durch einen Einschnappeingriff eingegriffen ist, in dem der Vorsprung (707) in die wenigstens eine Öffnung (706) verläuft.
 8. Originalitätsverschluss nach einem der vorhergehenden Ansprüche, wobei der Originalitätsverschluss weiterhin aufweist: einen ersten Bereich, der eine Innenkomponente (25) und eine Außenkomponente (30) aufweist, einen zweiten Bereich und einen Sperrmechanismus; wobei der erste Bereich entfernbar in den zweiten Bereich eingegriffen ist; die Außenkomponente bezüglich der Innenkomponente beim ersten Öffnen des Originalitätsverschlusses von einer ersten Position, in der sich die erste Mantelkomponente (36) neben der zweiten Mantelkomponente (37) in einer axialen Richtung des Originalitätsverschlusses befindet, in eine zweite Position bewegbar ist, in der die erste Mantelkomponente von der zweiten Mantelkomponente in der axialen Richtung des Originalitätsverschlusses beabstandet ist, um einen Zwischenraum (G) zwischen der ersten Mantelkomponente und der zweiten Mantelkomponente zu erzeugen, der Sperrmechanismus ausgestaltet ist, um die Außenkomponente in der zweiten Position zu sperren, um den Zwischenraum zwischen der ersten Mantelkomponente und der zweiten Mantelkomponente beizubehalten.
 9. Originalitätsverschluss nach Anspruch 8, wobei der Sperrmechanismus einen Einrastmechanismus aufweist.
 10. Originalitätsverschluss nach Anspruch 8 oder 9, wobei der Zwischenraum (G) ein unbeschädigter Zwischenraum ist.

11. Originalitätsverschluss nach einem der Ansprüche 8 bis 10, wobei der erste Bereich entfernable in den zweiten Bereich durch eine Schraubengewindeanordnung eingegriffen ist.
12. Behälter mit einem Hals, der mit dem Originalitätsverschluss wie nach einem der vorhergehenden Ansprüche beansprucht vorgesehen ist.

Revendications

1. Fermeture inviolable destinée à un col de contenant, la fermeture inviolable comprenant :

une enveloppe comprenant une première partie d'enveloppe et une seconde partie d'enveloppe (902B), et

un capuchon inviolable comprenant une partie de capuchon et une bande d'invio-
labilité à déchirer (903B) ;

la partie de capuchon étant fixée sur l'extérieur de la première partie d'enveloppe, et la bande d'invio-
labilité à déchirer (903B) étant reliée de manière détachable à la partie de capuchon et située de manière détachable autour de l'exté-
rieur de la seconde partie d'enveloppe (902B) de telle sorte qu'une partie de capuchon amovible de la fermeture inviolable, la partie de ca-
puchon amovible comprenant la partie de capuchon et la première partie d'enveloppe, est amovible après que la bande d'invio-
labilité à déchirer (903B) est libérée ; **caractérisée en ce que** :

la fermeture inviolable comprend en outre un agencement d'engagement de bande d'invio-
labilité à déchirer dans lequel, une première rampe circonférentielle (904) et un bloc (905) espacés dans une direction pé-
riphérique de la fermeture inviolable, s'étendent radialement vers l'intérieur depuis la bande d'invio-
labilité à déchirer (903B),

une seconde rampe circonférentielle (906) et un élément à enclenchement par pivote-
ment (907), espacés dans la direction pé-
riphérique de la fermeture inviolable, s'étendent radialement vers l'extérieur depuis la seconde partie d'enveloppe (902B), et
une rotation de la bande d'invio-
labilité à déchirer (903B) dans un premier sens de ro-
tation force le bloc (905) à buter contre l'élé-
ment à enclenchement par pivotement (907) et force la première rampe circonfé-
rentielle (904) à se déplacer le long de la seconde rampe circonférentielle (906) pour
amener un arc de la bande d'invio-
labilité à déchirer (903B) à se courber radialement

vers l'extérieur.

2. Fermeture inviolable selon la revendication 1, où la fermeture inviolable (301) comprend en outre un élément d'invio-
labilité multi-section (304) incorpo-
rant un indicateur visuel indélébile (305) ;
la partie de capuchon (303A) comprend une première section (304A) de l'élément d'invio-
labilité multi-section (304),
la bande d'invio-
labilité à déchirer (303B) comprend une deuxième section (304B) de l'élément d'invio-
labilité multi-section (304), et
la seconde partie d'enveloppe (303B) comprend une troisième section (304C) de l'élément d'invio-
labilité multi-section (304) ; et
la libération de la bande d'invio-
labilité à déchirer (303B) libère la deuxième section (304B) de l'élé-
ment d'invio-
labilité multi-section (304) de la ferme-
ture inviolable (301).

3. Fermeture inviolable selon la revendication 2, dans laquelle l'indicateur visuel indélébile (305) est incor-
poré dans l'élément d'invio-
labilité multi-section (304) au moyen d'un procédé parmi : un procédé de mou-
lage, un procédé de gravure chimique, un procédé de gravure physique.

4. Fermeture inviolable selon la revendication 2 ou la revendication 3, dans laquelle :

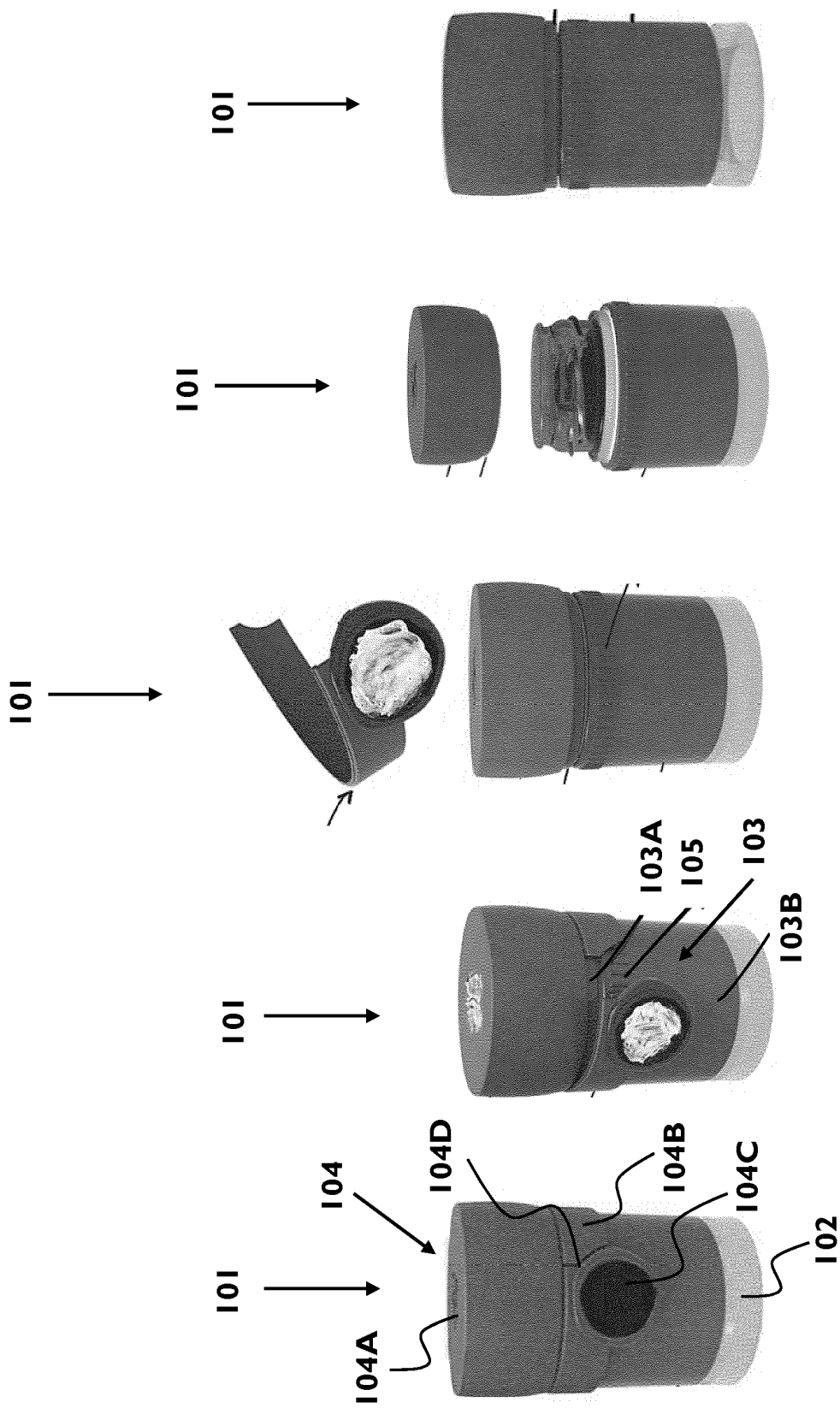
la première section (304A) de l'élément d'invio-
labilité multi-section (304) comprend une pre-
mière partie constitutive (401A) de l'indicateur visuel indélébile (305),
la deuxième section (304B) de l'élément d'invio-
labilité multi-section (304) comprend une deuxième partie constitutive (401B) de l'indica-
teur visuel indélébile (305), et
la troisième section (304C) de l'élément d'invio-
labilité multi-section (304) comprend une troisiè-
me partie constitutive (401C) de l'indicateur vi-
suel indélébile (305).

5. Fermeture inviolable selon l'une quelconque des re-
vendications 2 à 4, dans laquelle l'indicateur visuel indélébile (305) comprend au moins un élément parmi : un élément de forme, un élément de motif, un élément alphanumérique, un élément graphique.

6. Fermeture inviolable selon la revendication 2 ou la revendication 3, dans laquelle :

l'indicateur visuel indélébile (305) comprend un élément d'identifiant unique (501), et
au moins la deuxième section (304B) et la troi-
sième section (304C) de l'élément d'invio-
labilité multi-section (304) comprennent une présenta-
tion de l'élément d'identifiant unique (501).

7. Fermeture inviolable selon l'une quelconque des revendications 1 à 6, où la fermeture inviolable (701) comprend en outre un agencement d'engagement de bande d'inviolabilité à déchirer dans lequel, 5
une fenêtre (704) comprenant au moins une ouverture (706) est définie dans la bande d'inviolabilité à déchirer (703B),
une protubérance (707) s'étend radialement vers l'extérieur depuis la seconde partie d'enveloppe (702B), et 10
la bande d'inviolabilité à déchirer (703B) est engagée avec la protubérance (707) par un engagement d'emboîtement où la protubérance (707) s'étend dans la au moins une ouverture (706). 15
8. Fermeture inviolable selon l'une quelconque des revendications précédentes, où la fermeture inviolable (10) comprend en outre : 20
une première partie incluant une partie intérieure (25) et une partie extérieure (30),
une seconde partie, et
un mécanisme de verrouillage ;
la première partie étant engagée de manière amovible avec la seconde partie ; 25
la partie extérieure mobile par rapport à la partie intérieure lors de la première ouverture de la fermeture inviolable d'une première position dans laquelle la première partie d'enveloppe (36) est adjacente à la seconde partie d'enveloppe (37) dans une direction axiale de la fermeture inviolable à une seconde position dans laquelle la première partie d'enveloppe est espacée de la seconde partie d'enveloppe dans la direction axiale de la fermeture inviolable, de sorte à générer un intervalle (G) entre la première partie d'enveloppe et la seconde partie d'enveloppe, le mécanisme de verrouillage étant configuré pour verrouiller la partie extérieure dans la seconde position afin de maintenir l'intervalle entre la première partie d'enveloppe et la seconde partie d'enveloppe. 30
35
40
9. Fermeture inviolable selon la revendication 8, dans laquelle le mécanisme de verrouillage comprend un mécanisme d'encliquetage. 45
10. Fermeture inviolable selon la revendication 8 ou la revendication 9, dans laquelle l'intervalle (G) est un intervalle non obstrué. 50
11. Fermeture inviolable selon l'une quelconque des revendications 8 à 10, dans laquelle la première partie est engagée de manière amovible avec la seconde partie par le biais d'un agencement de filetage à visser. 55
12. Contenant présentant un col doté de la fermeture inviolable selon l'une quelconque des revendications précédentes.



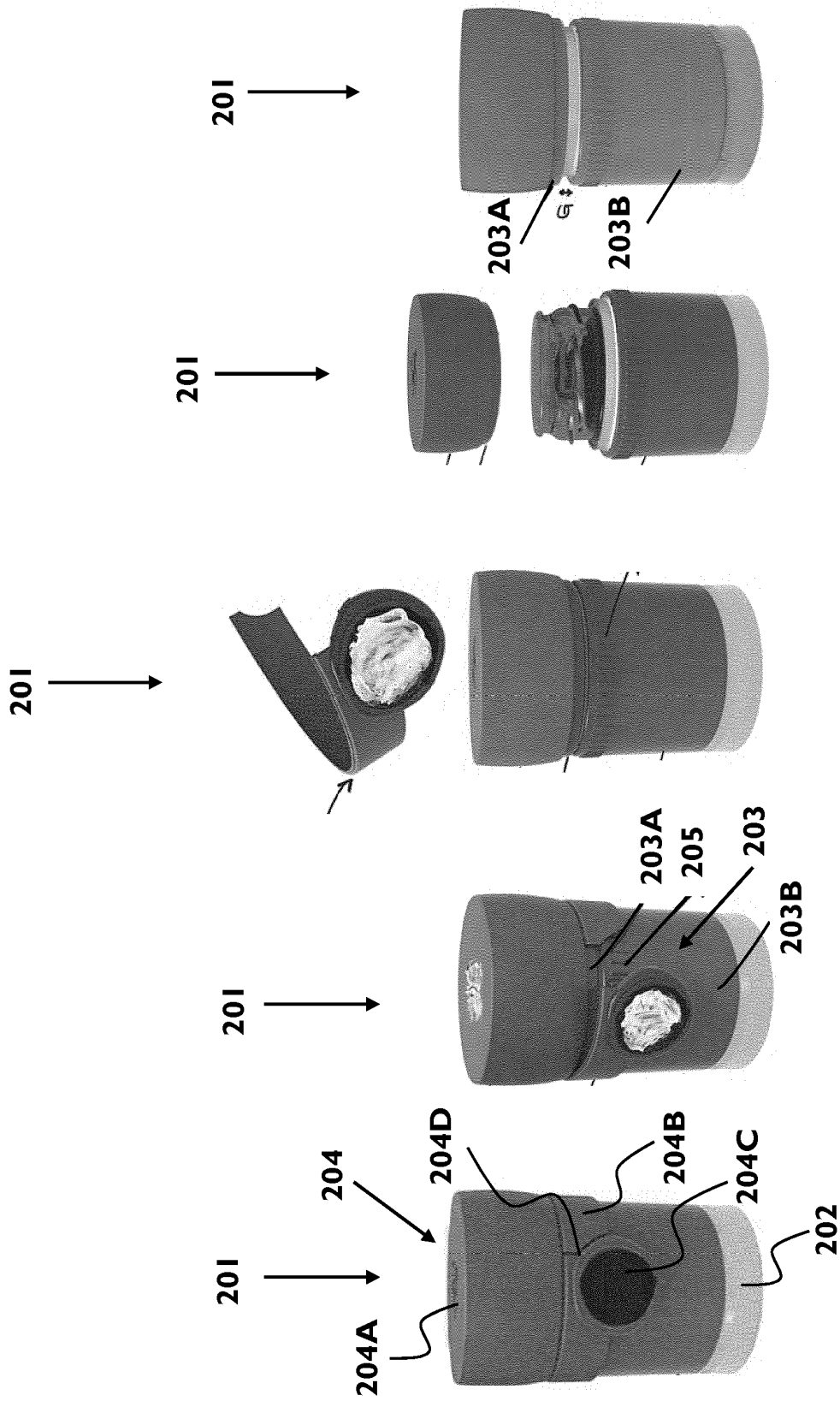


FIGURE 2A
(Prior Art)

FIGURE 2B
(Prior Art)

FIGURE 2C
(Prior Art)

FIGURE 2D
(Prior Art)

FIGURE 2E
(Prior Art)

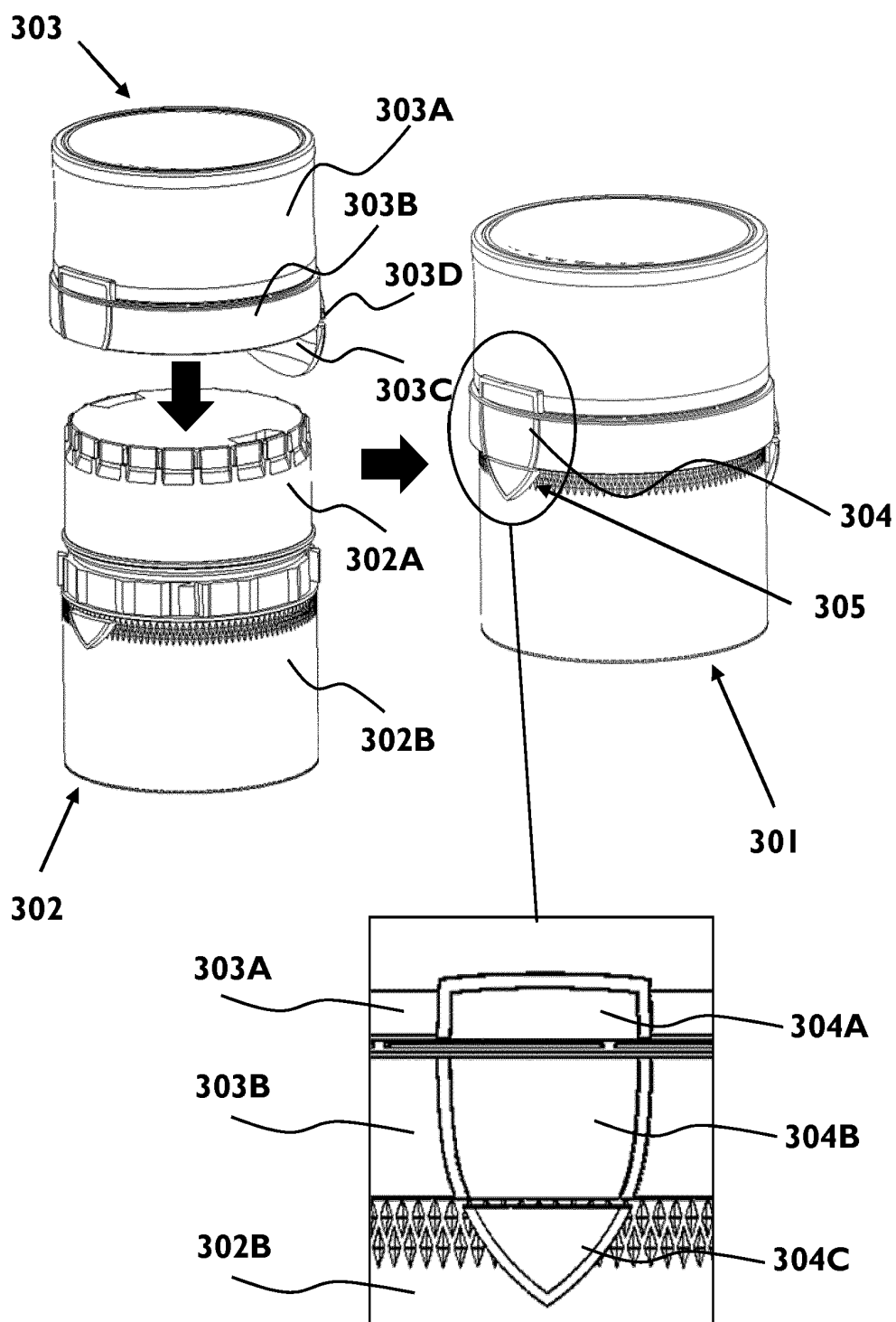


FIGURE 3

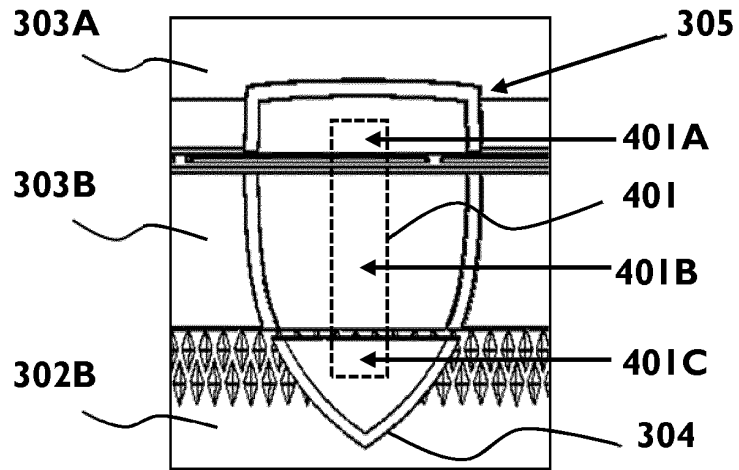


FIGURE 4

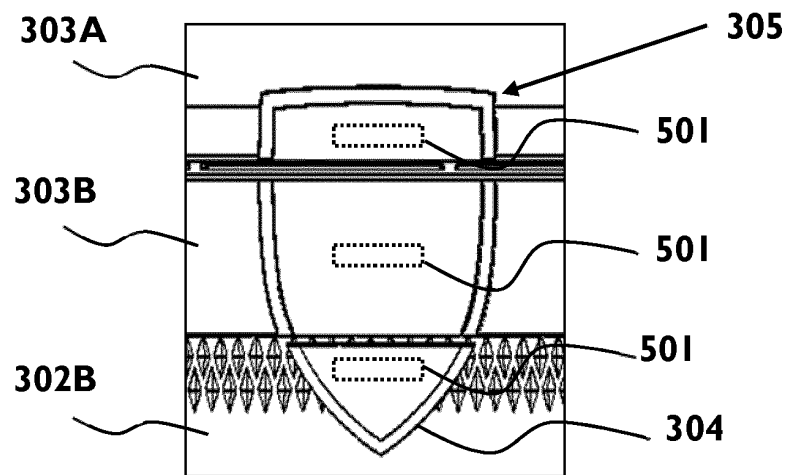


FIGURE 5

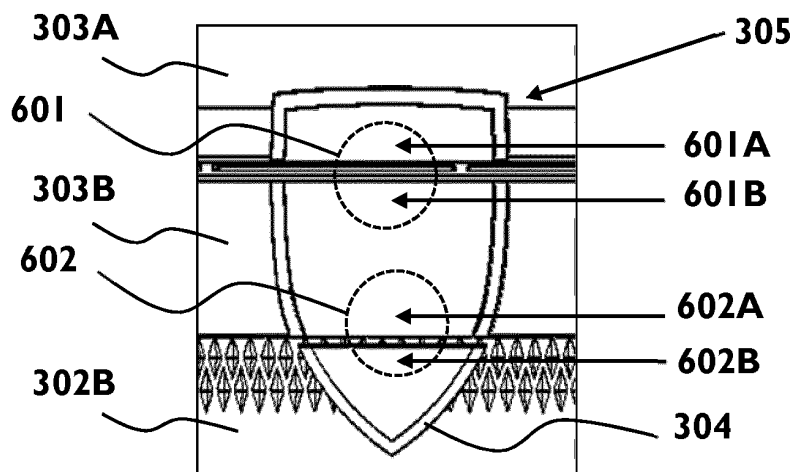


FIGURE 6

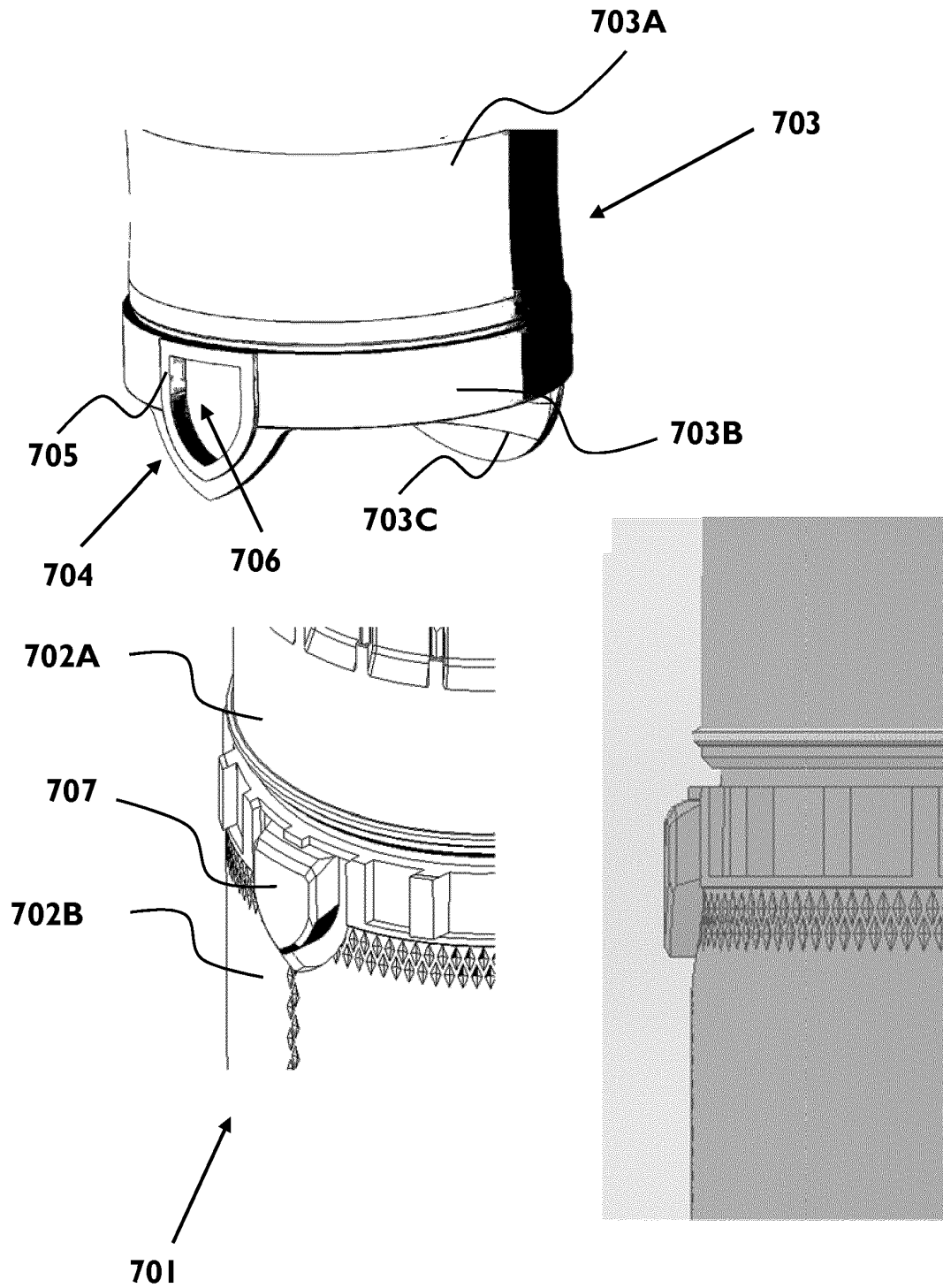


FIGURE 7

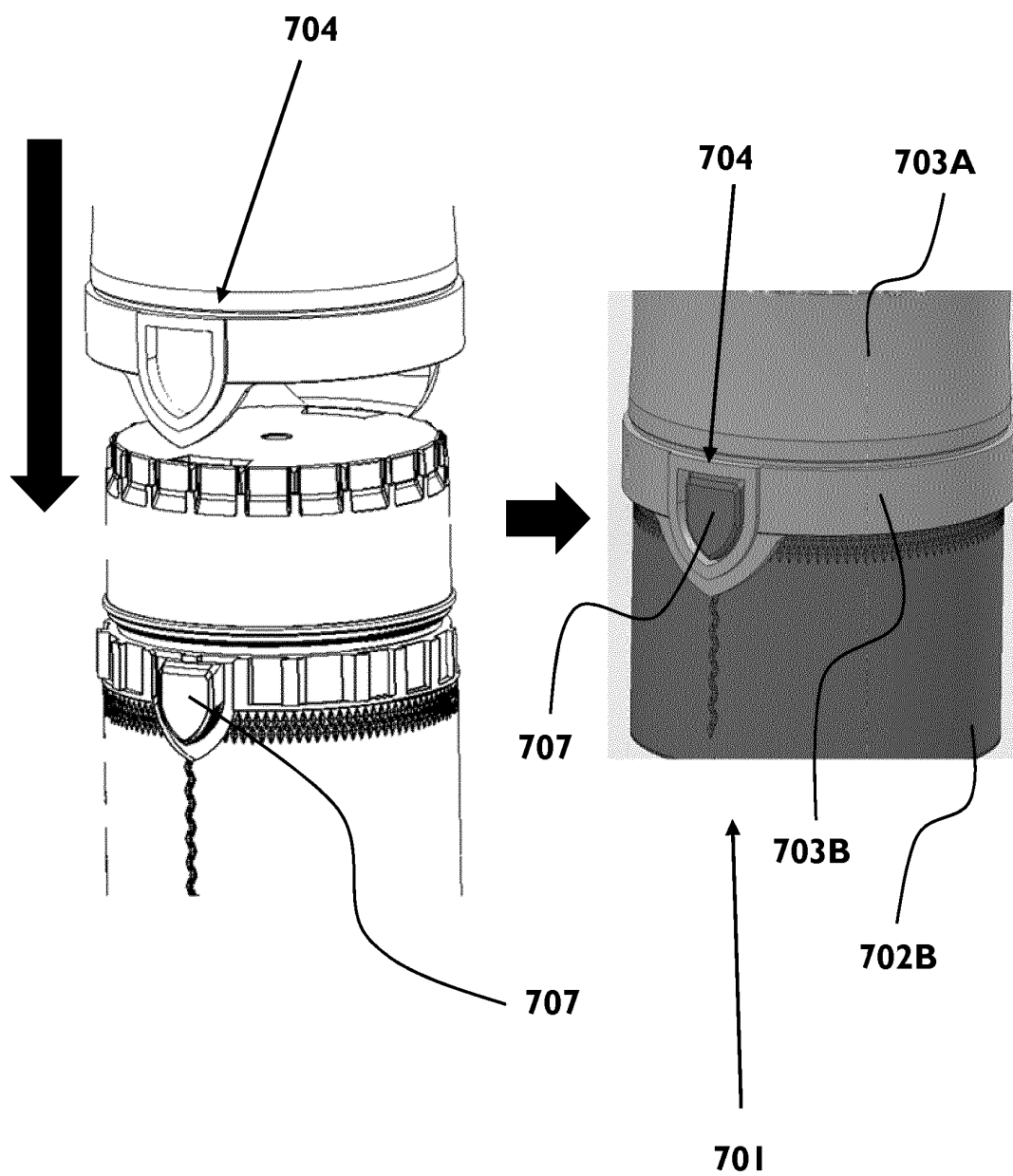


FIGURE 8

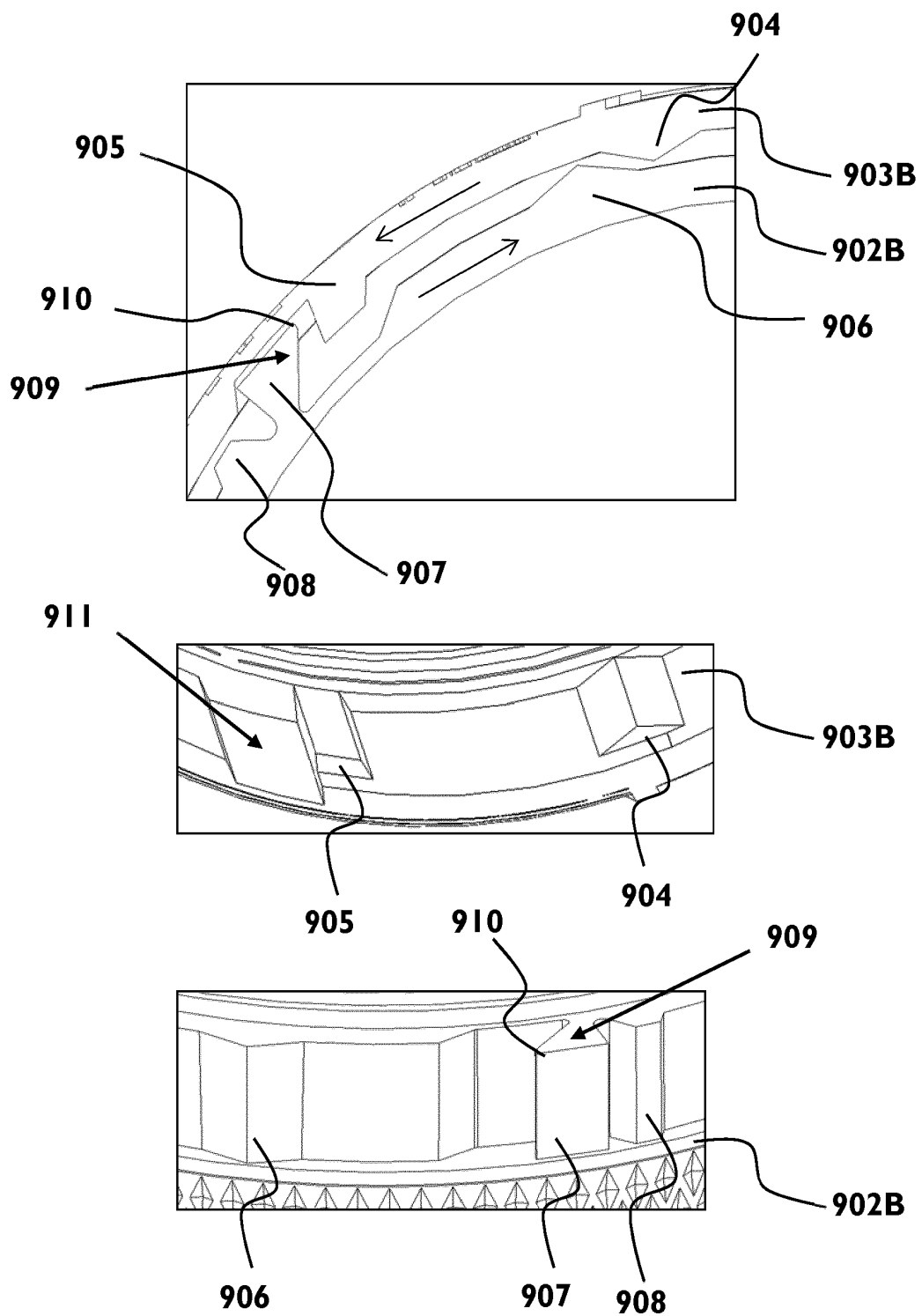


FIGURE 9

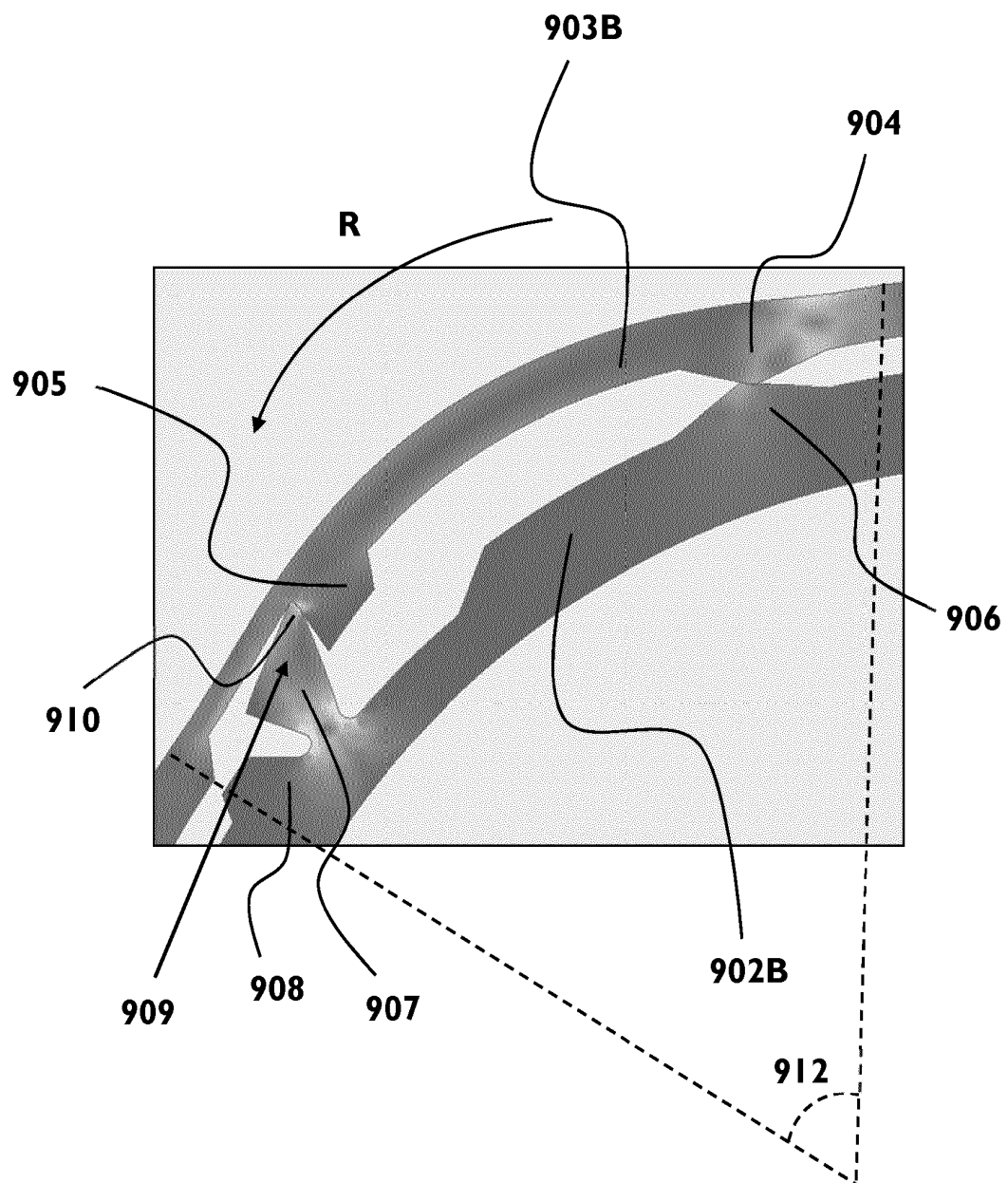


FIGURE 10

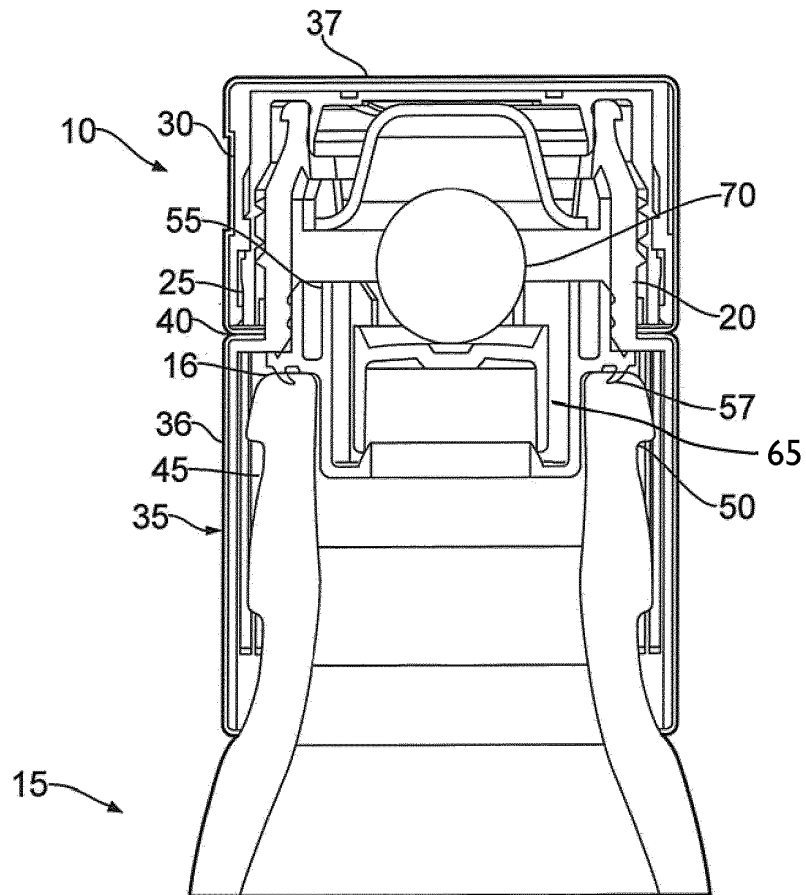


FIGURE 11

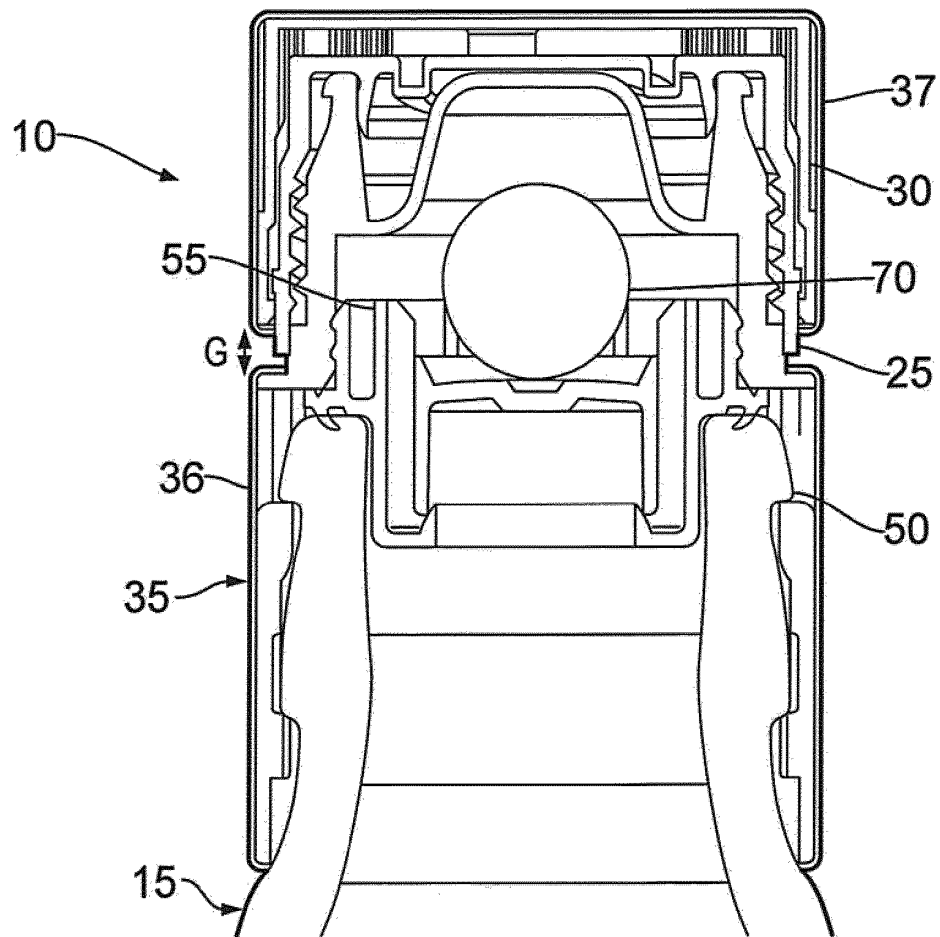


FIGURE 12

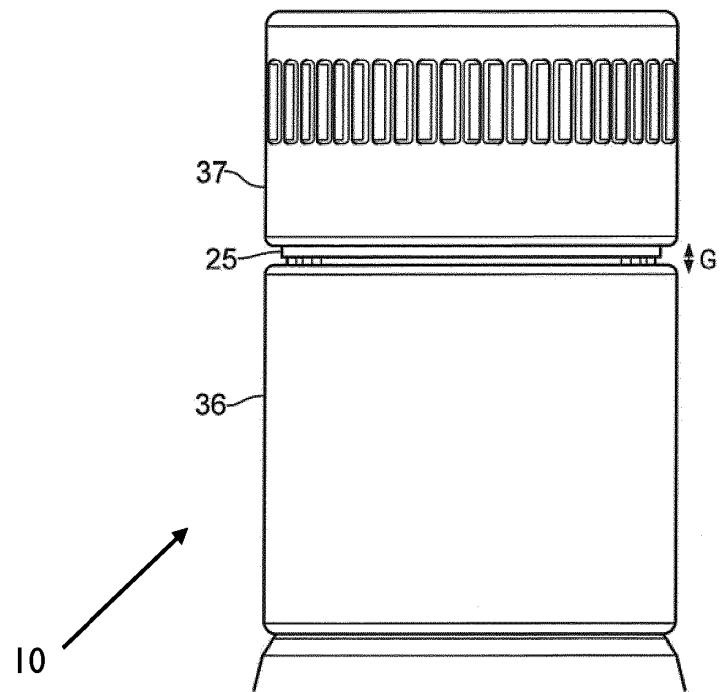


FIGURE 13

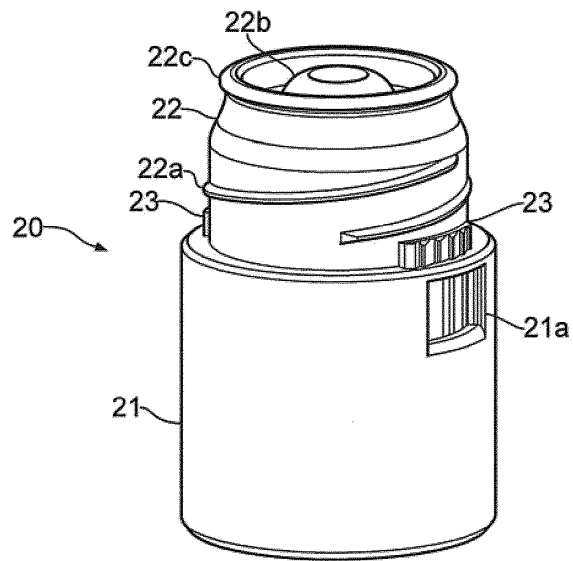


FIGURE 14

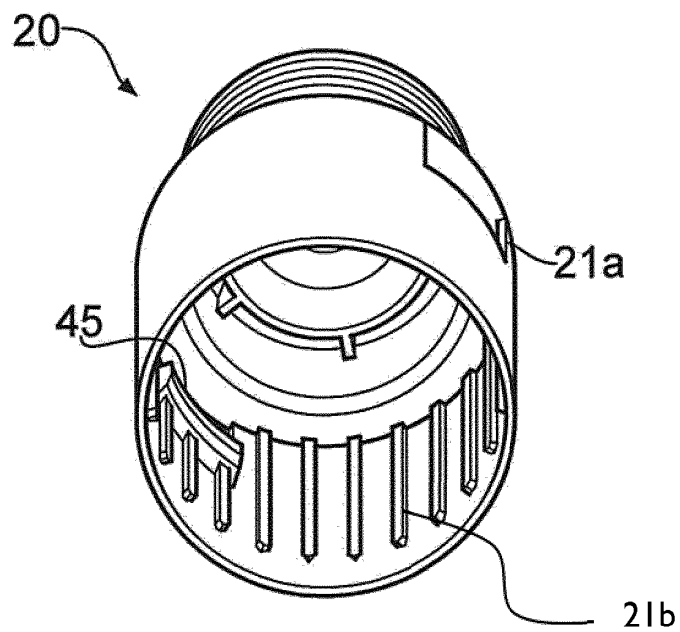


FIGURE 15

FIGURE 16

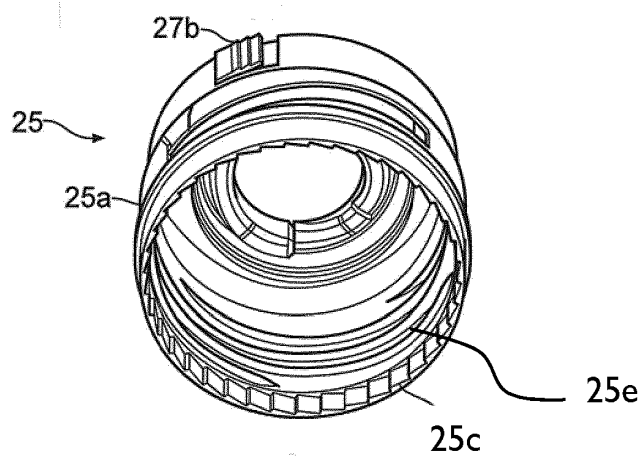
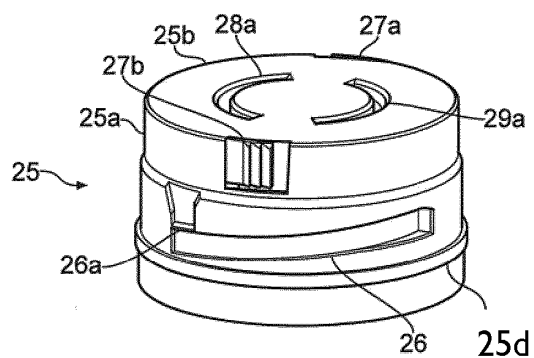


FIGURE 17

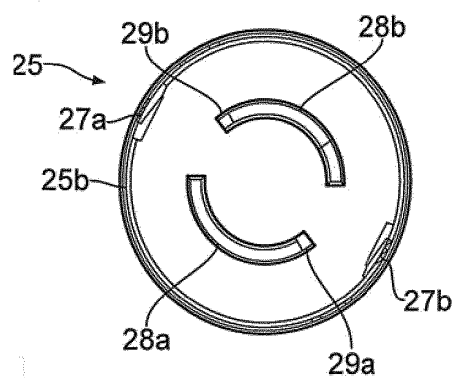


FIGURE 18

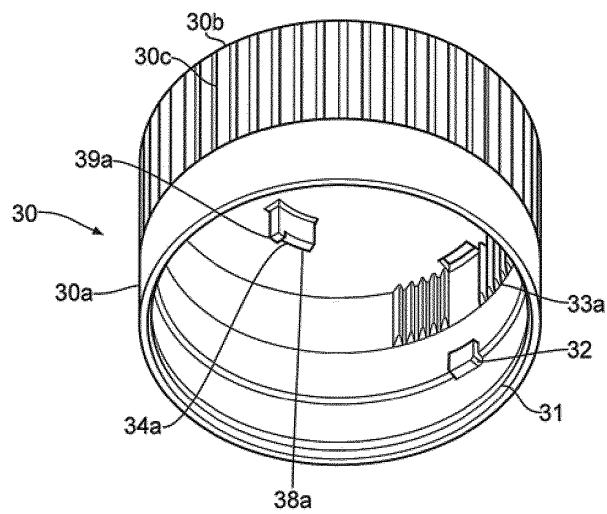


FIGURE 19

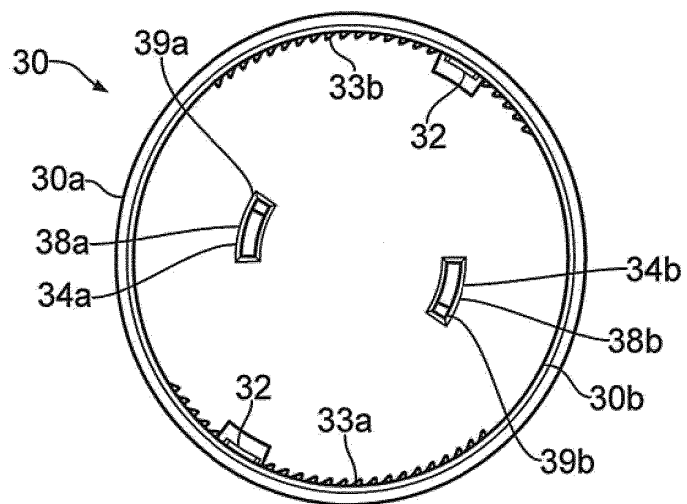


FIGURE 20

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2015113851 A1 [0003] [0041] [0051]
- WO 2006117505 A1 [0052]