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(71) Applicant: **Swedish Match North Europe AB**
118 85 Stockholm (SE)

(72) Inventors:
- **KRONVALL, Joakim**
  423 46 Torslanda (SE)
- **ASPGREN, Thom**
  422 57 Hisings Backa (SE)
- **HAFSTAD, Daniel**
  439 62 Frillesås (SE)

(74) Representative: **Valea AB**
Box 1098
405 23 Göteborg (SE)

(54) **METHOD AND APPARATUS FOR ASCERTAINING A ROTATIONAL POSITION**

(57) The present invention relates to a method (200) and an apparatus (300) for ascertaining a rotational position of a cover (11) of a container (1) relative to a body portion (10) of the container (1), in particular a container comprising a secured closure. The method comprises:
a) rotating the cover (11) relative to the body portion (10) by means of a rotating device (310) while directly or indirectly determining a torque until a torque associated with a predetermined rotational position is determined, and
b) thereafter rotating the cover by means of the rotating device (310) a selectable rotation angle (β) relative to the body portion (10).

The apparatus comprises a rotating device (310) and a torque measurement device (320).

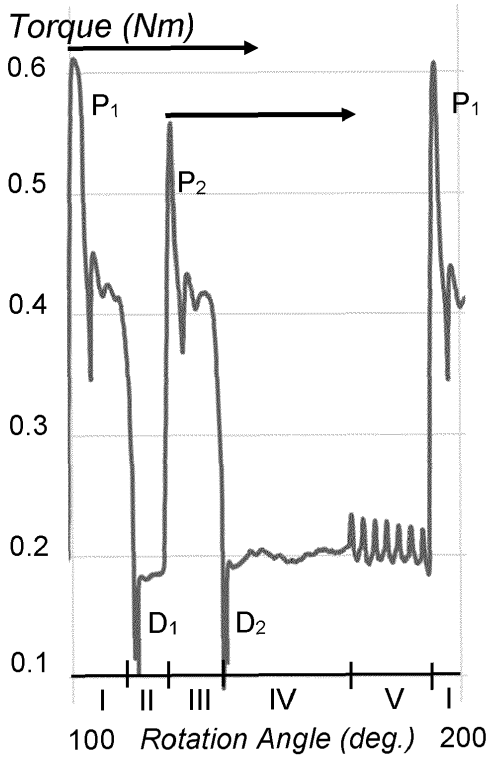

Fig. 11

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Description

[0001] The present invention relates to a method and an apparatus for ascertaining a rotational position of a cover of a container relative to a body portion of the container, in particular a container comprising a secured closure. The container comprises a body portion and a cover.

[0002] In the field of consumer products for authorized personnel, it is known to provide a packaging of the products with safety features in order to prevent unauthorized opening of the packaging. For example, hazardous liquids are provided in bottles comprising a safety closure, which is difficult to open, even for adults. Such closures are not suitable for consumer products, where access shall be made easy for an authorized user.

[0003] Therefore, it would be desirable to provide a container with secured closure to prevent unauthorized opening of the container, where an opening of the container is nevertheless simple and intuitive for authorized users.

[0004] According to the present invention, there is provided a method and an apparatus for ascertaining a rotational position of a cover of a container relative to a body portion of the container.

[0005] In preferred container embodiments, the container comprises a snap fastener for the body portion and the cover. The snap fastener comprises a ring element comprising a gap and a snap element interacting with the ring element.

[0006] The container may further comprise a haptic mechanism indicating a release condition of the snap fastener where the cover is detachable from the body portion, and the container in an openable state accordingly. The haptic mechanism comprises a haptic element arranged at the gap, for example flush with the gap, adjacent the gap or close to the gap. When the snap fastener is in the snapped condition where the cover is undetachable from the body portion, the haptic element is arranged above or below the snap element when viewed in relation to a detach direction of the cover.

[0007] Closures comprising a snap fastener are simple and effective fasteners for containers. The audible and haptic feedback of a snap fastener also indicates safe closure of a container also for visually and possibly also acoustically impaired user. Providing a snap fastener comprising one or more snap elements but only one interrupted ring element allows the manufacture of containers with a simple, secure and space saving fastener for a cover on a body portion.

[0008] In addition, the presence of a gap in a ring element interacting with a snap element allows for release of the snap fastener only in a specific rotational position of cover and body portion. Accordingly, cover and body portion have to be specifically aligned in order for the container to be opened. Advantageously, this configuration may reduce the risk of the container inadvertently being opened. It may also help to preserve one or more properties of the consumer products in the container.

[0009] The provision of a haptic mechanism in the container is an intuitive and supportive means to indicate that an opening position of the container has been reached or is about to be reached and that the cover may and can be removed from the body portion of the container in said opening position. A haptic mechanism makes a container also suitable for visually impaired or blind consumer, or for use in low light conditions, such as, for example, at night or in bars or night clubs.

[0010] Haptic mechanisms are typically correlated with audible feedback. However, haptic feedback may be tangible, even if acoustic feedback is hardly heard or not heard, for example too low for a user to be heard, for example in noisy conditions. Accordingly, also acoustically impaired users are intuitively guided to an opening position of the container with a haptic mechanism provided at the container.

[0011] Haptic mechanisms comprising a haptic element, in particular in the form of ribs, are simple to manufacture and effective.

[0012] A haptic element is arranged at the gap, thus indicating the location of the gap as soon as the haptic element has passed an according obstacle, or vice versa, causing a haptic signal, for example a vibration. For example, an obstacle, such as a separate element of the haptic mechanism passes the haptic element causing the haptic signal, and preferably also an acoustic signal.

[0013] A haptic mechanism typically causes a certain resistance when the cover and body portion are mutually rotated when an obstacle passes a haptic element. Human beings are very sensitive to haptic effects, in particular to changes in haptic experiences, such as a change in resistance when an obstacle passes the haptic element.

[0014] The haptic element may be arranged exactly at the gap or close to the gap, such that a haptic and possibly also an acoustic signal emitted by an element passing the haptic element indicates that the snap element is aligned with the gap or in proximity to the gap. The haptic element may, for example, be arranged flush with an end of a ring element, which end forms one end of the gap. The haptic element may be arranged to be displaced at an end of a ring element, which end forms one end of the gap. For example, a haptic element may be arranged within 0 to 5 millimeters to an end of the gap, however outside of the gap. Preferably, a haptic element is arranged distanced from an end of the ring element by 1 to 3 millimeters.

[0015] Preferably, a haptic element is arranged at one end of a gap.

[0016] Arranging a haptic element above or below the snap element in the snapped condition of the snap fastener, i.e. when the cover is mounted and attached to the body portion, allows to provide a haptic mechanism on a container independent of a fastening action of the snap fastener also provided on the container. In particular, by

arranging a haptic element on one side of the snap element or an opposite side of the snap element, when viewed in relation to a detach direction of the cover, the snap element and also the ring element may be provided independent of a haptic mechanism and in particular independent of a haptic and acoustic mechanism. In preferred container embodiments, the elements of the snap fastener and elements of the haptic mechanism do not mechanically interact with each other. As will be outlined in more detail below, in some preferred container embodiments, the snap element may interact with further elements of the container and contribute to the haptic mechanism of the container.

[0017] Preferably, a haptic element is arranged above the snap element and above the ring element, thus above the snap fastener.

[0018] Preferably, the haptic element is arranged above and adjacent the ring element. An adjacent arrangement of haptic element and ring element allows for a compact arrangement of the safety and opening aids of the closure and opening mechanism of a container. A space saving arrangement of these elements is particularly suitable for low-height covers or in general for containers with low heights, for example cans.

[0019] If the haptic element is arranged below the snap element, the haptic element is preferably arranged below the snap element such as to not intervene with a rotating movement of the snap element. However, preferably, a haptic element arranged below a snap element is arranged close to the snap element in a space saving manner.

[0020] Preferably, a ring element comprising a gap is an interrupted circular rib.

[0021] Preferably, a snap element is an elongate protrusion. Preferably, an elongate protrusion is in the form of a rib or a slide. Snap elements in the form of ribs or slides are easy to manufacture. In general, the snap elements are formed as slides that may conveniently slide along a ring element.

[0022] A length of a snap element is smaller than a width of a gap such that the snap element, when aligned with the gap, may pass the gap and may release the cover from the body portion counter to a snap direction such that the content in the body portion may be accessed. Namely, the alignment of snap element and gap may lead to the cover being detachable from the body portion in a release direction, which release direction is opposite to the snap direction of the cover.

[0023] In preferred container embodiments, the ring element is arranged at the body portion and the snap element is arranged at the cover. In these container embodiments, the ring element may, for example, be a radially outwardly protruding rib arranged at an upper region of a body portion side wall and the snap element may be a radially inwardly directing protrusion at a cover side wall. In the snapped condition of the snap fastener, the snap element formed by the protrusion may be moved circumferentially in rotational direction below and along the outwardly protruding rib forming the ring element.

[0024] In alternative container embodiments, the ring element is arranged at the cover and the snap element is arranged at the body portion, accordingly. In such container embodiments, the snap element may, for example, be a radially outwardly directing protrusion at an upper region of a body portion side wall and the ring element may be a radially inwardly protruding rib at a cover side wall. In these container embodiments, in the snapped condition of the snap fastener, the snap element formed by the protrusion of the body portion may be moved circumferentially in rotational direction above and along the outwardly protruding rib forming the ring element since the snap element is positioned above the ring element in the snapped condition of the snap fastener in these container embodiments.

[0025] A haptic element may comprise a haptic rib. The haptic element interacts with another element to generate a haptic and preferably also an acoustic or audible feedback. Preferably, a haptic rib interacts with another haptic rib or a ratchet rib. A ratchet rib preferably interacts with a group of haptic ribs.

[0026] The haptic rib may be an individual haptic rib or may be one of a group of haptic ribs. Thus, the haptic element may comprise a group of haptic ribs.

[0027] A group of haptic ribs may comprise, for example, three to 10 ten haptic ribs. Preferably, a group of haptic ribs comprises 5 to 8 haptic ribs.

[0028] In some container embodiments, a haptic mechanism comprises a ratchet rib interacting with a haptic rib. In these container embodiments, ratchet rib and haptic rib are accordingly not arranged at same parts of the container but at different parts of the container. Preferably, when a haptic rib is arranged at the body portion, the ratchet rib is arranged at the cover or vice versa, such that ratchet rib and haptic rib may interact when rotating the cover and body portion relative to each other.

[0029] In container embodiments comprising interacting haptic rib and ratchet rib, the ratchet rib and the snap element are preferably both arranged at the cover of the container or, alternatively, are both arranged at the body portion. Therein, ratchet rib and snap element are aligned, such that upon opening of a container, a haptic and preferably also an acoustic effect is generated when the ratchet rib passes the haptic rib and also such that the snap element is positioned or being positioned in the release condition of the snap fastener when the haptic feedback from the interacting ratchet rib and haptic rib has been generated.

[0030] Arranging ratchet rib and snap element at the same part of the container, allows to arrange the ring element with the gap and the haptic element at the corresponding other part of the container.

[0031] Preferably, the ratchet rib is adapted to interact with a group of haptic ribs.

[0032] The elements of the haptic mechanism, in par-

ticular the haptic element, may be arranged above or below the snap element, in particular above or below the snap fastener, when seen in the snapped condition of the snap fastener where the cover is undetachable from the body portion. Thus, the haptic element may also be arranged above the ring element of the snap fastener. In preferred container embodiments, the haptic element is arranged on the one side of the ring element opposite the snap element, thus above the ring element, when the snap fastener is in the snapped condition where the cover is undetachable from the body portion.

[0033] A container may be provided with two or more haptic elements, in particular with two groups of haptic ribs. Preferably, each one of the two groups of haptic ribs is arranged at an opposite end of the gap. By this, a haptic mechanism is provided irrespective if the container shall be opened or be brought into an openable position by rotating the cover in clockwise or in counter-clockwise direction. Two ratchet ribs may be provided on the other part of the container to interact with the two groups of haptic ribs. In an alternative variant, two ratchet ribs are arranged at opposite ends of the gap. Two haptic ribs or two groups of haptic ribs may accordingly be provided on the other part of the container to interact with the two ratchet ribs.

[0034] The container may comprise a surmountable end stop configured to interact with the snap element so that the snap element can pass over the surmountable end stop for the snap fastener to be brought from a snapped condition where the cover is undetachable from the body portion to a release condition of the snap fastener where the cover is detachable from the body portion.

[0035] Preferably, a surmountable end stop is provided at one end of a gap and arranged below the ring element. In a snapped condition of the snap fastener, the snap element and the surmountable end stop are arranged substantially at a same circumferential height of the container. In these container embodiments, snap element and surmountable end stop are both arranged below the ring element in the snapped condition of the snap fastener.

[0036] The surmountable end stop provides an obstacle for a further mutual rotation of cover and body portion thus hindering but not disabling to release the snap fastener. Release of the snap fastener may be achieved by surmounting the surmountable end stop. In particular, a surmountable end stop may be overcome by application of a release rotational force between cover and body portion. Advantageously, such configuration may ensure closure of a container and avoid accidental opening of a container. With the provision of a surmountable end stop, child safety of the container may further be improved. A user not provided with sufficient power to provide the releasable rotational force will not be able to overcome the surmountable end stop and therefore will not be able to bring the snap fastener into its release position.

[0037] In some container embodiments, a haptic mechanism comprises a ratchet rib interacting with at least a haptic rib, and the container is further provided with a surmountable end stop configured to interact with the snap element as described above. Thus, apart from the resistance imposed by the interaction between the ratchet rib and the at least one haptic rib generating a haptic and preferably also an acoustic feedback to a user, the surmountable end stop also provides a haptic and acoustic effect by imposing an additional resistance that has to be overcome by the snap element. Overcoming the surmountable end stop indicates that the release condition of the snap fastener and according opening position of the container have been reached.

[0038] A surmountable end stop may be formed, for example, by a rib, bead or wedge-shaped protrusion.

[0039] In some container embodiments, a haptic element is arranged at one side of the ring element, for example above the ring element, and the surmountable end stop is arranged at an opposite side of the ring element, for example below the ring element. With the help of a releasable rational force, the snap element overcomes the surmountable end stop and leads the snap fastener into its release condition, thereby preferably generating a haptic and audible feedback to a user. Thus, a surmountable end stop may be part of a haptic mechanism, that may also be audible.

[0040] In some container embodiments, the container may comprise two surmountable end stops, each surmountable end stop is arranged at an opposite end of the gap. The two surmountable end stops may be formed identically or differently.

[0041] Surmountable end stops arranged at either end of a gap may hinder a clockwise and a counter-clockwise rotation of cover and body portion, when the snap element comes close to the gap. However, in either rotational direction, the surmountable end stop may be overcome by providing the required release rotational force. The snap element may then pass the surmountable end stop at whichever end of the gap and may be guided into the gap and thereby to the release condition of the snap fastener.

[0042] In general, a snap fastener is brought into a snapped condition by moving cover and container against each other in a linear snap direction. The snap element snapped with the ring element in the snapped condition does generally not allow release of the snap fastener in the opposite snap direction of the snap fastener. However, a mutual rotation of the cover and the body portion in both rotational directions, thus in a clockwise and a counter-clockwise direction, may generally be allowed when the snap fastener is in the snapped condition. Thus, opening of the container may in general be achieved by clockwise rotation of the cover on the body portion or by counter-clockwise rotation of the cover on the body portion until a release condition of the snap fastener is reached and by this an opening position of the container. The cover may then be removed from the body portion by a simple lifting movement in a release direction

of the cover.

[0043] It may be preferred to allow rotation of the cover in one rotational direction only, or to allow to bring the container in an opening position by rotation of the cover in one rotational direction only.

[0044] Thus, mutual rotational direction of cover and body portion may be allowed in either clockwise direction or in counter-clockwise direction. Preferably, limitation of mutual rotational movement of cover and body portion is achieved by limiting or prohibiting rotation of a snap element.

[0045] Preferably, the container comprises an end stop for the snap element allowing mutual rotation of the cover and the body portion in one direction only in a snapped condition of the snap fastener. Allowing mutual rotation in one direction only may include a certain rotation also in an opposite direction, but never to the extent that a release condition of the snap fastener is reached by rotation in said opposite direction.

[0046] Preferably, the container comprises an end stop for the snap element prohibiting a rotation of the cover on the body portion in a counter-clockwise direction. Since containers in general, in particular bottles, jars or cans are openable by unscrewing a cover or a cap from a bottle, jar or can in a counter-clockwise rotational direction, allowing a rotation of the cover in a clockwise direction only may further enhance a security level of the container against unauthorized personal. Since any kind of end stops is preferably provided in the container to interact with a snap element of a snap fastener, a snap element and a surmountable end stop or an end stop are arranged at a same or substantially at a same circumferential height of the container in a snapped condition of the snap fastener, thus have a position on a same circumference of the container.

[0047] The container may comprise two or more gaps in the ring element and two or more snap elements.

[0048] While there may basically be any number of gaps in a ring element and corresponding snap elements, it is preferred to have more than one gap and more than one snap element. In particular with two, three or four gaps and snap elements, a rotational movement of the cover until a release position of the snap fastener is reached, may be limited to less than a full turn and preferably to less than half of a full turn. In addition, with more than one snap element, a symmetric container, in particular a symmetric snap fastener may be provided, where closing and opening forces may homogeneously be distributed over a circumference of the container.

[0049] Preferably, two or more gaps and snap elements are regularly arranged with equal distance along a circumference of the container.

[0050] A container may comprise more gaps than snap elements or a same number of gaps and snap elements.

[0051] Preferably, the container comprises a same number of gaps in the ring element and of snap elements.

[0052] In order to protect a content of the container from environmental influences, the container may be closable in a sealed manner. A sealed condition of the container is preferably achieved at the instance when the snap fastener snaps into the snapped condition.

[0053] Preferably, the products in the container are protected from environmental effects that might degrade the products stored in the container. However, a certain permeability of a container, in particular of a seal between cover and body portion may be beneficial to the shelf life of a product.

[0054] Preferably, a rim portion of the body portion and the cover are arranged in a sealed manner in a closed state of the container, in particular in a snapped condition of the snap fastener.

[0055] An inner side wall of the cover may, for example, comprise a circumferentially running sealing shoulder in abutment with an outer rim portion of the body portion in a closed state of the container, in particular in the snapped condition of the snap fastener.

[0056] The cover may comprise push elements for pushing a rim portion of the body portion against the cover in the closed state of the container, in particular in the snapped condition of the snap fastener. In particular, push elements may push a rim portion of the body portion against a circumferentially running sealing shoulder. Push elements may guarantee a correct position of the cover on the body portion. They may secure the rim of the body portion in an abutment position when the container is closed. In addition, push elements and sealing shoulder may provide a certain clamping of the rim of the body portion in the cover. Thus, a complete loose position of the cover on the body portion may be prevented as a certain resistance acts on the cover, even when the snap fastener is in a release condition. An easy falling off of the cover may thus be prevented.

[0057] It has been found, that few push elements are sufficient to achieve a reasonable sealing effect. Preferably, the cover comprises a regular circumferential arrangement of push elements.

[0058] For example, 2 to 8 push elements are arranged circumferentially along an inner top side of the cover, more preferably, 3 to 6 push elements, such as 4 push elements. Numbers of push elements in the above ranges have shown to provide an optimal balanced sealing effect.

[0059] A push element may have a circumferential extension, for example, between 5 millimeters and 50 millimeters, preferably between 5 millimeters and 30 millimeters, more preferably between 10 millimeters and 20 millimeters. A push element may, for example, have a substantially same circumferential extension as a snap element.

[0060] It has been found that by clamping a rim portion of the body portion between several push elements and a circumferentially running sealing shoulder of the cover, namely a clamping at discrete points along the circumference of the cover only, a tightness of the seal of the container may be designed according to characteristics of the products to be stored in the container.

[0061] For example, a complete circumferential sealing rib in the cover generally leads to a desired complete air-tight seal of the container.

[0062] The provision of a plurality of individual push elements, preferably arranged regularly along the circumference of the cover, may provide a complete or almost complete air-tight seal. A few individual push elements may provide an optimal balanced sealing effect. Thus, the goods in the container may be protected from environmental influences, for example excess humidity or dryness, by avoiding excessive air transport into or out of the container. On the other hand, a few push elements still allow a certain gaseous permeation in and out of the container to enhance, for example, flavour retention in the products and prevent goods degradation. This may particularly apply to high moisture-containing products, such as oral consumption goods.

[0063] In the container, the body portion forms a first compartment for accommodating fresh consumer products.

[0064] In some container embodiments, the container may comprise a preferably separate second compartment. The second compartment may advantageously be used for one or more of: storing used goods; storing a different type of consumer goods from those stored in the first compartment; and storing one or more accessories for use with the consumer goods stored in the first compartment, such as, for example a tool for picking the consumer goods from the container. Depending on the products to be stored in the container, these products may have to be correctly disposed of after use, for example, used nicotine containing products. For intermediate or final disposal, used products may thus be reinserted into the container, in particular into the second, preferably separate compartment. The second compartment may, for example, be a waste compartment.

[0065] Preferably, the second compartment is arranged in the cover of the container.

[0066] The cover may comprise a lid. The second compartment may be accessible by opening the lid.

[0067] The lid may be permanently attached to the cover. The lid may be removable from the cover. Preferably, a lid forms part of a top wall of the cover.

[0068] The container may comprise an indicator indicating a release position of the snap fastener.

[0069] An indicator may be embodied, for example, as optical indicator or as haptic indicator.

[0070] According indicator elements may be arranged at the cover and at the body portion.

[0071] Preferably, indicator elements are arranged such that an indicator element of the cover and an indicator element of the body portion are in alignment in a release condition of the snap fastener. Thus, by the indicator, a user is easily guided how to open a container.

[0072] Preferably, the indicator is an optical indicator.

[0073] Preferably, the indicator is a haptic indicator.

[0074] The indicator may be a combined optical and haptic indicator.

[0075] An indicator may comprise a grip element facilitating grip of the container. For example, an indicator may be embodied as structures on the cover or on the body portion or on both, the cover and the body portion.

[0076] Preferably, a same number of indicator elements are arranged on the cover as a number of gaps provided in the ring element. By this, each and every release position of the snap fastener and each and every opening position of the container is indicated by the indicator elements and visible or otherwise noticeable by a user of the container.

[0077] The container may basically comprise or be made of any material suitable for the desired products to be stored in the container. The container may, for example, comprise or be made of plastics materials, cellulose materials or metal.

[0078] Preferably, the container comprises polypropylene (PP), high-density polyethylene (HDPE), polyethylene terephthalate, acrylonitrile butadiene styrene (ABS), moulded pulp, cardboard or metal.

[0079] Preferably, the container is made of polypropylene (PP), high-density polyethylene (HDPE), polyethylene terephthalate, acrylonitrile butadiene styrene (ABS), moulded pulp, cardboard or metal.

[0080] Preferably, a height of a container is smaller than a diameter of the container.

[0081] A diameter of the container may, for example, be between 3 times to 10 times larger than a height of the container. Preferably, a diameter is between 5 times to 8 times larger than a height of the container.

[0082] Preferably, the container is a can.

[0083] While the container is basically suitable to contain any solid product, the container preferably contains products of the food industry, the tobacco industry, the pharma industry or the cosmetics industry.

[0084] Preferably, the container contains nicotine containing oral products, for example oral pouches. The nicotine containing oral products may comprise tobacco. The nicotine containing products may be tobacco-free and not comprise tobacco. The nicotine containing products may comprise a carrier material carrying nicotine.

[0085] A container may be realized in various variants. For example, a container may comprise a snap fastener and a haptic mechanism comprising a haptic rib or a group of haptic ribs interacting with a ratchet rib. In such containers, surmountable end stops or end stops may be omitted.

[0086] A container may comprise a snap fastener and a haptic mechanism comprising a haptic rib or a group of haptic ribs interacting with a ratchet rib, as well as a surmountable end stop arranged at one end of the gap in the ring element of the snap fastener.

[0087] A container may comprise a snap fastener and a haptic mechanism comprising a haptic rib or a group of haptic ribs interacting with a ratchet rib, as well as two surmountable end stops provided at opposite ends of the gap in the ring element of the snap fastener.

[0088] A container may comprise a snap fastener and a

haptic mechanism comprising a haptic rib or a group of haptic ribs interacting with a ratchet rib, as well as an end stop. Such a container is openable by rotating the cover in one rotational direction only.

[0089] A container may comprise a snap fastener and a haptic mechanism comprising a haptic rib or a group of haptic ribs interacting with a ratchet rib, as well as an end stop and a surmountable end stop provided at opposite ends of the gap in the ring element of the snap fastener.

[0090] A container may comprise a snap fastener and a haptic mechanism comprising two haptic ribs or two groups of haptic ribs arranged at opposite ends of the gap in the ring element interacting with two ratchet ribs. Such a container may additionally be provided with one or two surmountable end stops, with one end stop only or with a surmountable end stop and an end stop provided at opposite ends of the gap in the ring element. Such a container is preferably provided with one or two ratchet ribs interacting with the one or two groups of haptic ribs.

[0091] If several gaps in the ring element are provided, each gap may be provided with one or two haptic elements and with one or two surmountable end stops or with one end stop or one end stop and one surmountable end stop.

[0092] Further combinations of the elements of the container as described above may be made, in particular combination of elements of the snap fastener, elements of the haptic mechanism and both kinds of end stops. In particular, also containers comprising more than one snap element and with a ring element comprising more than one gap may be foreseen with a haptic mechanism combined or not combined with any kind of end stops. For example, snap elements and ring sections formed by more than one gap may be arranged partially at the body portion and partially at the cover.

[0093] Below there is provided a non-exhaustive list of non-limiting examples of the container. Any one or more of the features of these examples may be combined with any one or more features of another example, container embodiment, or aspect described herein.

[0094] Example Ex1: A container comprising a body portion and a cover,
wherein the container comprises a snap fastener for the body portion and the cover, wherein the snap fastener comprises a ring element comprising a gap and a snap element interacting with the ring element, and wherein the container further comprises a haptic mechanism indicating a release condition of the snap fastener where the cover is detachable from the body portion, wherein the haptic mechanism comprises a haptic rib arranged at the gap, and wherein the haptic element is arranged above or below the snap element when viewed in relation to a detach direction of the cover, when the snap fastener is in the snapped condition where the cover is undetachable from the body portion.

[0095] Example Ex2: The container according to example Ex1, wherein the ring element is an interrupted circular rib.

[0096] Example Ex3: The container according to any one of the preceding examples, wherein the snap element is an elongate protrusion.

[0097] Example Ex4: The container according to example Ex3, wherein the elongate protrusion is in the form of a rib or slide.

[0098] Example Ex5: The container according to any one of the preceding examples, wherein the ring element is arranged at the body portion and the snap element is arranged at the cover.

[0099] Example Ex6: The container according to example Ex5, wherein the ring element is a radially outwardly protruding rib arranged at an upper region of a body portion side wall and the snap element is a radially inwardly directing protrusion at a cover side wall.

[0100] Example Ex7: The container according to any one of examples Ex1 to Ex4, wherein the ring element is arranged at the cover and the snap element is arranged at the body portion.

[0101] Example Ex8: The container according to example Ex7, wherein the snap element is a radially outwardly directing protrusion at an upper region of a body portion side wall and the ring element is a radially inwardly protruding rib at a cover side wall.

[0102] Example Ex9: The container according to any one of the preceding examples, wherein the haptic element comprises a haptic rib.

[0103] Example Ex10: The container according to example Ex9, wherein the haptic element comprises a group of haptic ribs.

[0104] Example Ex11: The container according to example Ex10, wherein the group of haptic ribs comprises three to ten haptic ribs.

[0105] Example Ex12: The container according to any one of examples E10 to Ex11, wherein the group of haptic ribs comprises five to eight haptic ribs.

[0106] Example Ex13: The container according to any one of the preceding examples, wherein the haptic mechanism comprises a ratchet rib interacting with a haptic rib.

[0107] Example Ex14: The container according to example Ex13, wherein the ratchet rib and the haptic rib are arranged at different parts of the container.

[0108] Example Ex15: The container according to example Ex9 to Ex14, wherein the ratchet rib and the snap element are both arranged at the body portion or are both arranged at the cover of the container.

[0109] Example Ex16: The container according to any one of examples Ex10 to Ex15, wherein the ratchet rib is adapted to interact with the group of haptic ribs.

[0110] Example Ex17: The container according to any one of the preceding examples, wherein the haptic element is arranged on the one side of the ring element opposite the snap element when the snap fastener is in the snapped condition where the cover is undetachable from the body portion

[0111] Example Ex18: The container according to any one of the preceding examples, further comprising a

surmountable end stop configured to interact with the snap element so that the snap element can pass over the surmountable end stop for the snap fastener to be brought from the snapped condition where the cover is undetachable from the body portion to the release condition.

[0112] Example Ex19: The container according to example Ex18, wherein the surmountable end stop may be overcome by application of a release rotational force between cover and body portion.

[0113] Example Ex20: The container according to any one of examples Ex18 to Ex19, wherein the container comprises two surmountable end stops, each surmountable end stop arranged at an opposite end of the gap.

[0114] Example Ex21: The container according to any one of examples Ex18 to Ex20, wherein the haptic element is arranged at one side of the ring element and the surmountable end stop is arranged at an opposite side of the ring element.

[0115] Example Ex22: The container according to any one of the preceding examples, comprising two haptic elements, each haptic element arranged at an opposite end of the gap.

[0116] Example Ex23: The container according to any one of the preceding examples, comprising an end stop for the snap element allowing mutual rotation of the cover and the body portion in one direction only in the snapped condition of the snap fastener.

[0117] Example Ex24: The container according to any one of the preceding examples, comprising two or more gaps in the ring element and two or more snap elements.

[0118] Example Ex25: The container according to example Ex24, comprising a same number of gaps in the ring element and of snap elements.

[0119] Example Ex26: The container according to any one of examples Ex24 to Ex25, where the two or more gaps and two or more snap element are regularly arranged along a circumference of the container.

[0120] Example Ex27: The container according to any one of the preceding examples, wherein a rim portion of the body portion and the cover are arranged in a sealed manner in a closed state of the container, in particular in the snapped condition of the snap fastener.

[0121] Example Ex28: The container according to example Ex27, wherein an inner side wall of the cover comprises a circumferentially running sealing shoulder in abutment with an outer rim portion of the body portion in a closed state of the container, in particular in the snapped condition of the snap fastener.

[0122] Example Ex29: The container according to any one of examples Ex27 to Ex28, wherein the cover comprises push elements for pushing the rim portion of the body portion against the cover in the closed state of the container, in particular in the snapped condition of the snap fastener.

[0123] Example Ex30: The container according to any one of the preceding examples, comprising a second compartment.

[0124] Example Ex31: The container according to example Ex30, wherein the second compartment is arranged in the cover.

[0125] Example Ex32: The container according to any one of examples Ex30 to Ex31, wherein the cover comprises a lid, and wherein the second compartment is accessible by opening the lid.

[0126] Example Ex33: The container according to example Ex32, wherein the lid is permanently attached to the cover.

[0127] Example Ex34: The container according to example Ex32, wherein the lid is removable from the cover.

[0128] Example Ex35: The container according to any one of examples Ex32 to Ex34, wherein the lid forms part of a top wall of the cover.

[0129] Example Ex36: The container according to any one of the preceding examples, comprising an indicator indicating a release position of the snap fastener.

[0130] Example Ex37: The container according to example Ex36, wherein indicator elements are arranged at the cover and at the body portion.

[0131] Example Ex38: The container according to example Ex37, wherein an indicator element of the cover and an indicator element of the body portion are in alignment in a release condition of the snap fastener.

[0132] Example Ex39: The container according to any one of examples Ex36 to Ex38, wherein the indicator is an optical indicator.

[0133] Example Ex40: The container according to any one of examples Ex36 to Ex39, wherein the indicator is a haptic indicator.

[0134] Example Ex41: The container according to any one of examples Ex36 to Ex40, wherein the indicator comprises a grip element facilitating grip of the container.

[0135] Example Ex42: The container according to any one of the examples Ex36 to Ex41, wherein a same number of indicator elements are arranged on the cover as a number of gaps provided in the ring element.

[0136] Example Ex43: The container according to any one of the preceding examples, comprising or being made of plastics materials, cellulose materials or metal.

[0137] Example Ex44: The container according to example Ex43, comprising polypropylene (PP), high-density polyethylene (HDPE), polyethylene terephthalate, acrylonitrile butadiene styrene (ABS), moulded pulp, cardboard or metal.

[0138] Example Ex45: The container according to any one of examples Ex43 to Ex44, being made of polypropylene (PP), high-density polyethylene (HDPE), polyethylene terephthalate, acrylonitrile butadiene styrene (ABS), moulded pulp, cardboard or metal.

[0139] Example Ex46: The container according to any one of the preceding examples, wherein a height of the container is smaller than a diameter of the container.

[0140] Example Ex47: The container according to any one of the preceding examples, wherein a diameter is between 3 times to 10 times larger than a height of the container.

[0141] Example Ex48: The container according to example Ex47, wherein the diameter is between 5 times to 8 times larger than the height of the container.

[0142] Example Ex49: The container according to any one of the preceding examples being a can.

[0143] Example Ex50: The container according to any one of the preceding examples containing nicotine containing oral products.

[0144] Example Ex51: The container according to example Ex50, wherein the nicotine containing oral products are oral pouches.

[0145] Example Ex52: The container according to any one of examples Ex50 to Ex51, wherein the nicotine containing oral products comprise tobacco.

[0146] Example Ex53: The container according to any one of examples Ex50 to Ex51, wherein the nicotine containing oral products do not comprise tobacco.

[0147] As mentioned above, according to an aspect of the present invention, there is provided a method for ascertaining a rotational position of a cover of a container relative to a body portion of the container, in particular a container comprising a secured closure. The method comprises:

a) rotating the cover relative to the body portion by means of a rotating device while directly or indirectly determining a torque until a torque associated with a predetermined rotational position is determined, and
b) thereafter rotating the cover by means of the rotating device a selectable rotation angle relative to the body portion.

[0148] The container used in the method comprises a cover and a body portion. The container may be of any of the types described herein.

[0149] Step a) implies that the cover is rotated in relation to the body portion until a discernible relative position of the cover in relation to the body portion is obtained. The discernible relative position may e.g. be at and end stop and/or at an haptic element as is further described herein.

[0150] In step a) the torque is directly or indirectly determining, typically by measuring it, e,g., by a torque measurement device. The torque may be continuously or intermittently determined when performing step a). In some variants of the method, it may be sufficient to only determine a single torque value, e.g. at the end of step a).

[0151] In step b), the cover is further rotated a selectable rotation angle, which rotation angle has been selected based on the discernible relative position used in step a). Hence, this rotation angle is known before starting the rotation. The rotation in step b) starts at the discernible relative position of step a). The selectable rotation angle of step b) includes 0 degrees, i.e. deliberately making no further rotation. The rotation direction in step b) is typically the same as in step a), but, as an option, the rotation direction in step b) may be opposite to that of step a).

[0152] The rotation of the cover performed in the method is a pure rotational movement. The rotation performed by the rotating device according to the method thus mimics how a user of the container would rotate the cover in order to open the container. There is no axial translation of the cover when rotating relative to the body portion. There are no threads provided in the container, neither at the body portion, nor at the cover, since the rotation of the method of the invention is a pure rotational movement. The cover is neither a screw cap, nor a screw lid. The rotation may be performed in a clockwise and/or in a counter-clockwise direction. Most often a clockwise direction is preferred, since this direction will distinguish from unscrewing a cover or a cap from a bottle, jar or can, which normally is performed in a counter-clockwise rotational direction.

[0153] It may be desirable to use the method to ascertain that the cover is in such a rotational position relative to the body portion of the container, that the container cannot be opened or at least is difficult to open. This is e.g. applicable if there only is one or a few relative positions of the cover in relation to the body portion, in which the container is openable. Such a rotational position is an example of an undesirable rotation position.

[0154] As an alternative or a complement, it may be desirable to ascertain that the cover is in a rotational position relative to the body portion of the container, in which position the side wall of the cover does not bulge out in relation to the body portion and/or that the body portion does not bulge inwards. The bulging-out and/or bulging-in may e.g. be caused by a snap element of the container passing over an end stop. The bulging-out and/or bulging-in could compromise the sealing of the container, which in turn could lead to a moisture uptake or moisture loss of products in the container. There is also a risk that the cover and/or the body portion could be deformed due to plastic deformation of the materials they are made of, especially if the cover would stay in a bulging-out state and/or the body portion in an bulging-in state for a longer time. Consequently, it is desirable to make sure that the cover is not bulging out and/or the body portion is not bulging-in when the container is stored or transported after manufacturing. Such a rotational position is an example of an undesirable rotation position.

[0155] The selectable rotation angle in step b) may include a safety margin, which typically is a few degrees, such as in the range between 1 and 5 degrees, but the safety margin may also be 0 degrees.

[0156] In an embodiment of the method, the container comprises a snap fastener for the body portion and the cover. The snap fastener comprises a ring element, having a gap with a gap angle and a snap element configured to interact with the ring element, as for many of the containers described herein. In that case, step a) may comprise that the predetermined rotational position is at or adjacent to the gap and in step b), the selectable rotation angle is selected such that it is ascertained that the snap element leaves the gap and yet the snap element is not rotated so far that it reaches the following gap.

[0157] As described above, step a) implies that the cover is rotated in relation to the body portion until a discernible relative position of the cover in relation to the body portion is obtained. Hence, the predetermined rotational position "at the gap" may correspond to the snap element as a whole being in the gap, while the predetermined rotational position adjacent to the gap may correspond to the snap element having a first part in the gap and another part outside of the gap, i.e., the snap element being partly at the gap. Hence, the position "adjacent to the gap" would depend on the length of the snap element as taken in the circumferential direction, but is typically less than the gap width α, e.g. less than 5 degrees.

[0158] The term "following gap" relates to the gap coming next when performing the rotation. The ring element may have a single gap or a plurality of gaps. If there is only a single gap, "the following gap" is that single gap after having rotated the full revolution, i.e. 360 degrees. If there are two gaps located opposite to each other, the "following gap" comes after about 180 degrees. If there are three gaps evenly distributed around the circumference of the container, he "following gap" comes after about 120 degrees. If there are four gaps, evenly distributed around the circumference of the container, he "following gap" comes after about 90 degrees. In general terms, if there are n gaps, evenly distributed around the circumference of the container, he "following gap" comes after abouts 360/n degrees.

[0159] If assuming that the rotation direction in step b) is the same as in step a), this may be mathematically expressed as $\alpha + w < \beta < (\gamma - \alpha - w)$, α being the gap angle, w being the angular length of the snap element, β being the selectable rotation angle of step b) and γ being an inter-gap angle. If using a safety margin, $\alpha + w + m < \beta < (\gamma - \alpha - w) - m$, with m being the angular length of the safety margin m. The angles α, w, β, γ and, optionally, m are defined in relation to a central axis of the body portion, which typically has a cylindrical shape.

[0160] Typically, the ring element is arranged at the body portion and the snap element is arranged at the cover, but it would also be feasible to arrange the ring element at the cover and the snap element at the body portion. The snap element faces the ring element, such that they can interact with each other. The ring element and the snap element may be of the types further described herein.

[0161] The predetermined rotational position is at or adjacent to the gap. Hence, the torque associated with a predetermined rotational position may be exceeding a selectable threshold, e.g. caused by passing an end stop or a haptic element as further described herein. As an alternative or a complement, the torque associated with a predetermined rotational position may be a known pattern of a torque measurement curve, e.g. a peak, a downward peak or a ripple caused by a plurality of haptic elements, as further described herein. The torque measurement curve shows torque as a function of rotation angle.

[0162] The inter-gap angle γ is the angular distance from one gap to the following gap during rotation taken as c-c distance. If there is only one gap, the inter-gap angle γ is 360 degrees. If there are two gaps located opposite to each other, the inter-gap angle γ is 180 degrees. If there are three gaps evenly distributed around the circumference of the container, the inter-gap angle γ is 120 degrees. If there are four gaps, evenly distributed around the circumference of the container, the inter-gap angle γ is 90 degrees. In general terms, if there are n gaps, evenly distributed around the circumference of the container, the inter-gap angle γ is 360/n degrees.

[0163] By selecting $\alpha + w < \beta < (\gamma - \alpha - w)$, it is ascertained that the cover is rotated sufficiently far to ascertain that the snap element passes the gap, even if it started the rotation in step b) at the end of the gap. On the other hand, if starting at the opposite end of the gap, the cover is not rotated so many degrees that the snap element reaches the following gap.

[0164] In an embodiment of the method of the invention, the torque associated with the predetermined rotational position at or adjacent to the gap is a torque value exceeding a selectable threshold. This may be caused by the snap element passing an end stop marking an end of the gap or by a haptic element as further described herein. The threshold may be chosen to be sufficiently high such that small peaks of a ripple due to haptic elements are below the threshold. Further, the threshold may be selected to be sufficiently high to avoid irregularities caused by non-perfect geometry of the body portion and/or the cover.

[0165] The torque value exceeding the selectable threshold may be associated with a peak in the torque measurement curve determined during step a), which torque measurement curve shows torque as a function of rotation angle.

[0166] The torque value exceeding the selectable threshold may be obtained by the rotating device rotating the snap element over an end stop of the gap, wherein in step b), it is further ascertained that the snap element is not positioned at the end stop.

[0167] If assuming that the rotation direction in step b) is the same as in step a), this may be mathematically expressed as $(\alpha + s) < \beta < (\gamma - \alpha - s)$, α being the gap angle, s being an angular length of the snap element passing the end stop, β being the selectable rotation angle of step b) and γ being an inter-gap angle. The angular length s of the snap element passing the end stop is influenced both by the angular length of the snap element and the angular length of the end stop. If using a safety margin, $(\alpha + s + m) < \beta < (\gamma - \alpha - s - m)$, with m being the angular length of the safety margin m. The angles α, s, β, γ, and optionally m, are defined in relation to a central axis of the body portion, which typically has a cylindrical shape.

[0168] The end stop is located at a circumferential end of the gap. The end stop is configured to interact with the snap element in order for the snap fastener to be brought

from a snapped condition to a release condition. The end stop makes the cover bulge outwards and/or the body portion bulge inwards, such that the snap element can pass the end stop. In order to cause the bulging-out and/or bulging-in an extra force needs to be applied, i.e. being higher than a force just used for rotation, which is seen as the peak in the torque measurement curve.

[0169] If the container is provided with such an end stop, it is preferred to ascertain both that the cover is in such a rotational position relative to the body portion of the container, such that it cannot be opened or at least is difficult to open and that the cover is in such a rotational position relative to the body portion of the container that the side wall of the cover does not bulge out in relation to the body portion and/or the body portion does not bulge in.

[0170] When applying the relation $(\alpha + s) < \beta < (\gamma - \alpha - s)$, it is assumed that the rotation direction in step b) is the same as in step a). Hence, it is preferred that the end stop is a surmountable end stop, e.g. of the types described herein. In that case, the predetermined rotational position in step a) is the snap element reaching the surmountable end stop and starting "climbing" it. According to the mathematical expression, the cover is rotated sufficiently far to ascertain that it passes the gap and the end stop, even if it started the rotation in step b) at the end of the gap. On the other hand, if starting at the opposite end of the gap, the cover is not rotated so many degrees that it reaches the following gap or an end stop preceding the following gap.

[0171] If there is an end stop at either side of the gap, the sum of their angular lengths should be taken into account, since it is desirable to avoid both of them to avoid bulging-out of the cover and/or bulging-in of the body portion. Hence, in step b), it is ascertained that the snap element is not positioned at any of the end stops. If assuming that the rotation direction in step b) is the same as in step a), this may be mathematically expressed as $(\alpha + s_{tot}) < \beta < (\gamma - \alpha - s_{tot})$, s_{tot} being the sum of the angular lengths of the snap element passing the end stops. A safety margin m may be applied in a corresponding way as described above.

[0172] If the end stop is of the surmountable type, i.e. it has a surmountable abutment surface, e.g. a sloped surface, as seen in the rotation direction, the method may comprise indicating an intended rotation direction in step a) and/or b) by means of the end stop, e.g. by means of the surmountable abutment surface of the end stop.

[0173] The intended rotation direction is the rotation direction which the normal user is supposed to use when opening the container to be able to reach a product. Often a clockwise direction is preferred as the intended rotation direction, since this direction will distinguish from unscrewing a cover or a cap from a bottle, jar or can, which normally is performed in a counter-clockwise rotational direction.

[0174] If the end stop has an abutment wall as seen in the rotation direction, e.g. a step surface having a stop angle of about 90 degrees, the method may comprise indicating a non-intended rotation direction in step a) and/or b) by means of the end stop, e.g. by means of the abutment wall of the end stop. The abutment wall helps to prevent rotation in the non-intended rotation direction. Typically, it is still possible to pass the abutment wall if rotation in the non-intended direction if applying a sufficiently high force, but this would give a higher torque peak than the torque peak found when rotating in the intended rotation direction.

[0175] In a preferred embodiment of the method, the end stop is surmountable if rotating in the intended direction, e.g. having a sloped surface, but has an abutment wall to prevent rotation in the non-intended rotation direction, e.g. having a step surface. Hence, both the intended rotation direction and the non-intended rotation direction may be indicated by the same end stop.

[0176] As an alternative to the predetermined rotational position in step a) being the snap element reaching the surmountable end stop and starting "climbing" it, it would be possible to instead use the snap element reaching an abutment wall of the end stop as the predetermined rotational position. In that case, it is desirable in step b) that the cover is rotated sufficiently far to ascertain that it passes the gap if it starts at an abutment wall of an end stop at the far end of the gap, i.e. an abutment located where the cover is in a secure state, i.e. the snap element is in a snapped condition. On the other hand, if starting at an abutment wall of an end stop at the nearest end of the gap, i.e. an abutment wall located where the cover is in an openable state, the cover should not be rotated so many degrees that it reaches the preceding gap or an end stop preceding the preceding gap. In this embodiment of the method, the rotation direction when performing the method is in the non-intended rotation direction, i.e. opposite to the rotation direction used when opening the container by hand.

[0177] In some container embodiments, the container further comprises a haptic mechanism indicating a release condition of the snap fastener, in which the cover is detachable from the body portion, wherein the haptic mechanism comprises a haptic element arranged at the gap, and wherein the haptic element is arranged above or below the snap element when viewed in relation to a detach direction of the cover, when the snap fastener is in a snapped condition where the cover is undetachable from the body portion. In that case, the torque associated with the predetermined rotational position at or adjacent to the gap in step a) may comprise a torque pattern reflecting the configuration of the haptic element. The haptic mechanism may be used as a haptic signal to e.g. a user of the container, that if the rotation is continued, a gap will soon come, in which the cover can be opened. A peak of the torque measurement curve associated with the haptic element is typically much smaller than the peak associated with climbing over a surmountable end stop, e.g. less than a third, less than a fifth or less than a tenth.

[0178] The haptic element may comprise a first element located in one of the cover or the body portion and be configured to interact with a second element, located in the other of the cover or the body portion, at least one of the first and second elements being a male element, i.e. a protruding element. For example, the first element may be a haptic rib and the second element may be a ratchet rib. The peak of the torque measurement curve associated with the haptic element is then a result of the ratchet rib passing the haptic rib.

[0179] The haptic element may comprises a plurality of first elements and the torque associated with the predetermined rotational position at or adjacent to the gap may then be a torque pattern reflecting the angular distance between the first elements. Any number of first elements would be feasible, such as any number from 1 to 15, or from 3 to 10 or from 5 to 8. It would be feasible to have the first elements interspaced at the same or at different distances. If a single second element is provided, the number of small peaks of the torque measurement curve will reflect the number of first elements. If the plurality of first elements are interspaced with the same distance between the first elements, the torque associated with the predetermined rotational position at or adjacent to the gap may thus be a periodic pattern, which may be seen as a ripple in the torque measurement curve.

[0180] According to another variant of the method according to the invention, step a) comprises rotating the cover an angular length l_{ud} of undesirable rotational positions plus an optional safety margin by means of the rotating device. Step b) comprises comparing the torque value determined at the end of step a) to a selectable non-secured threshold and performing no further rotation of the cover, if the determined torque value is less than the non-secured threshold, but further rotating the cover the angular length of undesirable rotational positions plus the optional safety margin by means of the rotating device, if the determined torque value is greater than or equal to the non-secured threshold. The non-secured threshold is chosen such that it is associated with torque values normally obtained in the undesirable rotational positions. However, the non-secured threshold is typically lower than the torque value of a peak of the torque measurement curve.

[0181] The angular length l_{ud} of undesirable rotational positions may be determined before performing step a) of the method described herein. The angular length of undesirable rotational positions can be determined from the geometry of the container. Hence, it can be calculated for a certain type of container, such that it is calculated in general and not on individual basis. An example of undesirable rotational position is the cover being in an openable rotational position, e.g. the snap element being at the gap. Other undesirable positions may be a rotational position in which a side wall of the cover bulges out and/or in which the body portion bulges inwards, such as when the snap element passes an end stop. Typically, these undesirable rotational positions are next to each other, e.g. a respective end stop at each end of the gap and the gap therebetween. This may be mathematically expressed as $l_{ud} = \alpha + s_1 + s_2$, wherein α is the gap angle, s_1 being the angular length of the snap element passing the first end stop, s_2 being the angular length of the snap element passing the second end stop. The expression means that the rotational positions of the snap element being at the gap and at its preceding or succeeding end stop should preferably be avoided.

[0182] The safety margin is typically a few degrees, such as in the range between 1 and 5 degrees, but the safety margin may also be 0 degrees, i.e. no safety margin is used.

[0183] In this variant of the method according to the invention, it would be sufficient to only determine the torque once, i.e. when the cover has been rotated by the angular length l_{ud} of undesirable rotational positions plus the optional safety margin.

[0184] The determined torque value experienced at the angular length l_{ud} of undesirable rotational positions plus the optional safety margin is compared to a selectable non-secured threshold. The non-secured threshold has been chosen such that it is associated with torque values normally obtained in the undesirable rotational positions. Hence, if in an undesirable rotational position, the non-secured threshold is reached or exceeded.

[0185] If the determined torque value is less than the non-secured threshold, no further rotation of the cover is performed. This is not needed, since in that case it has been ascertained that the cover is not in an undesirable rotational position. On the other hand, if the determined torque value is greater than or equal to the non-secured threshold, further rotation is desirable. By choosing an angular rotation length of l_{ud} plus a safety margin, is ascertained that the cover is rotated sufficiently far to be out of the undesirable rotational positions. The safety margin is typically a few degrees, e.g. between 1 and 5 degrees, but may also be 0 degrees. The safety margin may be the same as in step a) or different.

[0186] In yet an embodiment of the method, step a) comprises rotating the cover in a non-intended rotation direction the gap angle α plus a safety margin by means of the rotating device, the safety margin being greater than zero in step a). Step b) comprises comparing the highest torque value determined during step a) to a selectable non-secured threshold and performing no further rotation of the cover, if the determined torque value is less than the non-secured threshold, but further rotating the cover in the intended rotation direction the angular length (l_{ud}) of undesirable rotational positions plus an optional safety margin by means of the rotating device, if the determined torque value is greater than or equal to the non-secured threshold. The safety margin in step b) is typically a few degrees, e.g. between 1 and 5 degrees, but may also be 0 degrees.

[0187] In yet another embodiment of the method, step a) comprises rotating the cover by means of the rotating

device in a non-intended rotation direction until a torque value exceeding a selectable non-secured threshold is detected or until the rotation has reached the gap angle α plus a safety margin, whichever occurs first, and step b) comprises performing no further rotation of the cover, if the determined torque values are less than the non-secured threshold, but further rotating the cover in the intended rotation direction the angular length (l_{ud}) of undesirable rotational positions plus an optional safety margin by means of the rotating device, if a torque value greater than or equal to the non-secured threshold has been determined in step a). The safety margin in step b) is typically a few degrees, e.g. between 1 and 5 degrees, but may also be 0 degrees.

[0188] According to another aspect of the present invention, there is provided an apparatus for ascertaining a rotational position of a cover of a container relative to a body portion of the container, the apparatus comprising a rotating device and a torque measurement device, the rotating device being configured to rotate the cover relative to the body portion while directly or indirectly determining a torque with the torque measurement device until a torque associated with a predetermined rotational position is determined, and the rotating device being configured to thereafter rotate the cover by a selectable rotation angle relative to the body portion of the container.

[0189] The container to be used in the apparatus comprises a cover and a body portion. It may be of any of the types described herein. The apparatus is suitable for performing the method described herein. The apparatus has the corresponding effects and advantages as the method described herein.

[0190] The apparatus may further comprise a control unit configured for determining a torque value exceeding a selectable threshold and/or for analysing a pattern of the determined torque. The effects and the advantages are the corresponding ones as for the method described herein.

[0191] Examples will now be further described with reference to the figures in which:

Figure 1 shows a perspective view of a container;
Figure 2 shows a cross-sectional view of a container, for example of Fig. 1;
Figure 3 shows a perspective view of the inside of a cover of a container;
Figure 4 shows a perspective view of a body portion of a container;
Figure 5 shows a detail of a partial cross section of a closure of a container;
Figure 6 shows a detail of the inside of the cover of Fig. 3;
Figure 7 shows a transparent view of a closed container;
Figure 8 shows a detail of the body portion of Fig. 4 and Fig. 7;
Figure 9 shows examples of end stops;
Figure 10 shows torque values determined during rotation of an exemplary cover over 720 degrees;
Figure 11 shows a detailed view of an exemplary 90-degree cycle of Fig. 10;
Figure 12 shows a method according to the invention;
Figure 13 shows an apparatus according to the invention.

[0192] **Fig. 1** shows a container 1 in the form of a can comprising a body portion 10 and a cover 11 mounted on the body portion 10.

[0193] The container 1 represents a can and has a circular cross section and rounded edges. The diameter of the container 1 is about three times the height of the container 1. The container 1 is preferably made of a plastic material, paper or cardboard or a combination of paper, cardboard and plastic material.

[0194] The cover 11 comprises a lid 110. The lid 110 may be opened at an opening section 111 to provide access to a waste compartment (not seen in Fig. 1) provided in the cover 11.

[0195] The cover 11 as well as the body portion 10 are provided with indicator elements 112, in Fig.1 in the form of painted arrows. When the indicator element 112 of cover 11 and body portion 10 are in alignment with each other, the container 1 is in an openable state, where the cover 11 may be lifted from the body portion 10 by a linear movement in a release direction of the cover 11. The container 1 comprises a child resistance feature in the form of snap fastener and assessment aids that will be described in more detail below.

[0196] **Fig. 2** shows a cross-section through a container 1, for example of the container of Fig. 1. The compartment 13 formed by the body portion 10 is provided to contain a product, for example an oral nicotine containing product such as oral pouches.

[0197] The cover 11 is attached to the body portion 10 by a snap fastener arranged between the cover 11 and the body portion 10. The snap fastener is formed by an interrupted circumferentially running rib 30 arranged at the outer surface of an upper portion of the body portion 10 and radially extending from said upper portion. The circumferentially running rib 30 interacts with at least one snap element 20 formed as a protrusion extending radially inwardly from the inner surface of the side wall 114 of the cover 11. The rib 30 has a smooth slanted top side for the snap element 20 to glide along the rib 30 when the cover 11 is pushed downwards onto the body portion 10 in a snap direction. The lower side of the rib 30 forms an undercut, a substantially planar side of the rib 30 essentially parallel to a top wall 115 of the cover 11, such that the snap element 20 is in a locked position under the rib 30 in the snapped condition of the snap fastener.

[0198] The inside of the body portion 10 forms a first compartment for holding the user products, for example oral pouches. The cover 11 comprises a second, waste compartment 12, for example, for used products such as used oral pouches, to be stored in the waste compart-

ment 12. The waste compartment 12 is closed by the lid 110 and accessible by opening the lid 110. The lid 110 is preferably removable from the cover 11 to access the waste compartment 12. However, the lid 110 may also be permanently connected to the lid 11, for example by a hinge. The bottom 113 of the waste compartment 112 is arranged parallel to the bottom of the body portion 10.

[0199] In the perspective views of **Fig. 3** and **Fig. 4,** the inside of a cover 11 comprising two snap elements 20 (encircled in Fig. 3) to be able to form a snap fastener with the interrupted circumferentially running rib 30 at the body portion (Fig. 4) is shown.

[0200] In Fig. 3 it may be seen that two snap elements 20 are arranged opposite each other, at 0/360 degree and at 180 degree at the inside of the circumference of the side wall 114 of the cover 11. The snap elements 20 are in the form of elongate protrusions extending from and along the inside of the side wall 114 of the cover 11. The elongate protrusion has a first end 21 and a second end 22.

[0201] The cover 11 comprises four push elements 50 arranged regularly at 90 degree circumferentially displaced and at the inside of the top wall 115 of the cover 11. The circumferential extension of the push elements 50 is slightly larger, for example 2 millimeters, than the circumferential extension of the snap elements 20. In the container embodiment shown in Fig. 3 the circumferential extension of snap element 20 and push element 50 is about 8 millimeter to 15 millimeter. The push elements 50 facilitate an alignment of cover 11 and body portion 10 by guiding the upper rim 100 of the body portion 10 upon assembling of cover 11 and body portion 10. In addition, the push elements 50 push the upper rim 100 of the body portion 10 against the circumferentially running shoulder 51 of the cover side wall 114. This ensures a contact area along the circumference between cover 11 and body portion 10, particularly at the regions where the upper rim 100 of body portion 10 is clamped between the push elements 50 and the shoulder 51, to seal the container 1 and to minimize a moisture uptake and moisture loss of products in the body portion 10. These features may also be seen in the detailed view of **Fig. 5.** In Fig. 5 the snapped condition of snap element 20 with circumferential rib 30, push element 50 with shoulder 51 is shown in an enlarged view.

[0202] The cover 11 in the container embodiment shown in Fig. 3 comprises a ratchet rib 40. The ratchet rib 40 is a short rib extending vertically along and protruding radially from the inside of the side wall 114 of the cover 11. The ratchet rib 40 is circumferentially aligned with one end of the snap element 20 but arranged above the snap element 20 and also above and adjacent the circumferentially running rib 30, when the snap fastener is in the snapped condition. The ratchet rib 40 is provided for interacting with a group of haptic ribs 41 arranged at the body portion 10 as may be seen in Fig. 4. The alignment of the ratchet rib 40 with the snap element 20 guarantees that the snap element 20 is or comes to the release condition of the snap fastener when the ratchet rib 40 has passed the corresponding haptic element on the body portion 10 and provided an according haptic feedback, as will be shown further below.

[0203] Alignment of snap element 20 and ratchet rib 40 is shown in the detailed view of a part of the cover 11 in **Fig 6.**

[0204] In the body portion 10 as shown in Fig. 4, the circumferentially running rib 30 is interrupted by four gaps 31. Each gap 31 has a width corresponding to a gap angle α, with the angle being defined in relation to a central axis X of the body portion 10 which has a cylindrical shape. The gaps 31 are spaced apart and arranged regularly at 90 degrees displaced in the circumferentially running rib 30, i.e. an inter-gap angle γ, taken from a center of a gap 31 to the center of the following gap 31 is in the illustrated container 90 degrees with the angle being defined in relation to the central axis X of the body portion 10. The four gaps 31 represent four release conditions of the snap fastener, where the cover 11 may be removed, i.e. lifted, from the body portion 10, as soon as the snap elements 20 of the cover 11 are circumferentially brought into alignment with the gaps 31. The provision of four gaps 31 reduces a maximum rotation of the cover 11 required to open the container 1 down to 90 degrees.

[0205] In order for the body portion of Fig. 4 to form a container 1 with the cover 11 of Fig. 3, the body portion 10 might be provided with two gaps 31 only, spaced by 180 degrees. In such container embodiments, a maximum rotation for opening the container 1 would be 180 degrees. In other container embodiments, accordingly, the cover 11 shown in Fig. 3 could be provided with four snap elements 20 circumferentially spaced by 90 degrees along the inner side wall of the cover.

[0206] As may be seen in Fig. 4, a haptic element in the form of a group of haptic ribs 41 is arranged close to the gap 31 and above but adjacent the circumferentially running rib 30. For example, the group of haptic ribs 41 is circumferentially distanced from the gap 31 by a few millimeters, for example 1 to 5 millimeter. However, the group of haptic ribs 41 may also be exactly aligned with the one end of the gap 31.

[0207] Below the circumferentially running rib 30 and on the opposite side of the group of haptic ribs 41, an end stop 45,46 is provided on each side of the gap 31. The end stops 45,46 are arranged flush with the circumferentially running rib 30 below the gap 31 on the lower side of the circumferentially running rib 30.

[0208] The end stop 46 arranged at the end of the gap 31, which is opposite to the side of the gap provided with the group of haptic ribs 41, is preferably embodied as end stop for the snap element 20. The snap element 20 in the snapped condition of the snap fastener is arranged below the rib 30 and may glide circumferentially below the circumferentially running rib 30 when cover 11 and body portion 10 are rotated against each other. When the snap element 20 abuts the end stop 46, the cover may not further rotate. By the end stop 46 of Fig. 4, a rotation of the

cover 11 is limited to a clockwise direction.

[0209] The end stop 45, arranged on the same side of the gap 31 as the group of haptic ribs 41, is formed as surmountable end stop. Thus, by application of a sufficient force, the snap element 20 may surmount the surmountable end stop 45 and may be brought into the release condition of the snap fastener where the cover 11 may be removed from the body portion 10. The cover 11 may be lifted from the body portion 20 along a linear release direction.

[0210] End stops 45,46 and group of haptic ribs 41 are indicated in Fig. 4 at one gap 31 only. However, it becomes clear from the description, that a group of haptic ribs and end stops 46 and surmountable end stops 45 may be arranged at one, two, several or all gaps 31 provided in a circumferentially running rib 30.

[0211] The cover 11 of Fig. 3 and 5 is provided with grips 155 at its external side. The grips 155 are four groups of grooves arranged equidistantly along the rounded edge of the cover 11. Two of the grips 155 are arranged at the same position external to the cover 11 as the snap elements 20 are arranged internal to the cover 11. By this, the two oppositely arranged grip elements 155 are also indicators, optically and haptically indicating a release position of the snap fastener of the container 1.

[0212] In the transparent view of a container of **Fig. 7,** the snap fastener of the container 1 is still in the snapped condition. However, by turning the cover 11 in a clockwise direction, the ratchet rib 40 of the cover 11 has passed the group of haptic ribs 41 of the body portion 10 and the snap element 20 of the cover 11 is abutting the surmountable end stop 45 at the body portion 10. The grip element 155 as well as the haptic and acoustic feedback from the ratchet formed by ratchet rib 40 and group of haptic ribs 41 indicates a user that the container 1 is close to its release position. By further turning the cover 11 in the clockwise direction and bringing up a release force in order for the snap element 20 to surmount the surmountable end stop 45, the snap fastener may be brought into its release position and the container may be opened by lifting the cover 11 from the body portion 10.

[0213] When seen in circumferential direction the haptic and acoustic effect generated by the ratchet formed by the group of haptic ribs 41 and interacting ratchet rib 40 and by the surmountable end stop 45 interacting with the snap element 20, are arranged in series or rather the according elements are arranged to generate a serial haptic and acoustic effect. The effect of the surmountable end stop 45 starts, when the ratchet rib 40 has passed the haptic rib closest to the gap 31 and the haptic and acoustic ratchet effect has ended.

[0214] In **Fig 8,** the gap 31 region of the body portion 10 of the container 1 is shown in more detail. In particular, the position and form of the group of haptic ribs 41 and of the end stop 46 and surmountable end stop 45 may be seen. The group of haptic ribs 41 and the end stops 45,46 are arranged respectively above and below the circumferentially running rib 30 and directly adjacent to the circumferentially running rib 30. The haptic ribs 41, the circumferentially running rib 30 and the end stops 45,46 may be integrally formed with the body portion 10.

[0215] In **Fig. 9** several embodiments of surmountable end stops 45 or combined end stops with surmountable end stops are shown.

[0216] An end stop 45 is provided with an abutment wall 461 that directs perpendicular from an object surface 101, for example a body portion outer wall or a cover side wall 114. Thus, an abutment wall 461 for the snap element 20 extends by a stop angle 460 of about 90 degrees from an according surface. In the container embodiment of Fig. 8 the end stops 45,46 extend from the outer surface of the body portion 10 side wall. A snap element 20 may be rotated until it abuts the abutment surface 461. No further rotation in said direction is possible and thus it is not possible to bring a cover 11 in a release position of the snap fastener by rotating the cover 11 in said rotational direction.

[0217] If the abutment surface 451 includes a surmountable angle 450 of more than 90 degree, preferably about 100 to 150 degree, a snap element 20 may glide on the surmountable abutment surface and surmount the surmountable end stop 45. Surmounting a surmountable end stop 45 by the snap element 20 may generate an acoustic and haptic effect.

[0218] The surmountable end stop 45 provides a further security mechanism against unauthorized opening of the container 1. An authorized user knows either by an indicator provided on the container or by a haptic mechanism, for example a ratchet possibly combined by a surmountable end stop 45, when and how to open the container 1.

[0219] The arrows 455,466,456 on the right-hand side of Fig. 9 indicate a counter-clockwise opening direction 455 only if a cover provided with the uppermost end stop 45 as shown in Fig. 9, a clockwise direction 466 only if provided with the end stop shown in the middle of Fig. 9, and in both rotation directions 456 if provided with a surmountable end stop 45 as shown in the lowermost drawing of Fig. 9, having two surmountable abutment surfaces 451 with according surmountable angles 450 of about 105 degrees. The end stops 45,46 illustrated in Fig. 8 have a respective angular length e_1, e_2, the angular lengths being defined in relation to the central axis X of the body portion 10.

[0220] As an example, shown in the container embodiment in Fig. 8, the respective end stops are provided at one or both ends of the gap 31 in order to allow a snap element 20 to pass or to insurmountably abut the respective end stop before the snap element 20 reaches the gap 31.

[0221] The terms 'above' or 'below' in the shown container are understood in a release or detach direction of cover and body portion or with respect to a common position of the container, thus cover forming the top of the container and body portion forming the bottom of the container.

[0222] The container has been illustrated with the example of snap element and ratchet rib arranged at an inner side wall of the cover and ring element with gap and group of haptic ribs arranged at an outer side wall of the body portion of the container. However, a ring element may also be arranged at the inner side wall of the cover and the corresponding snap element(s) at an outer side wall of the body portion. Also the elements of the haptic mechanism may basically be selected as desired, for example, a group of haptic ribs may be arranged at an inner side wall of the cover and a interacting ratchet rib at the outer side wall of the body portion, for example flush with a gap in a ring element or provided above or below but in a release direction of a cover aligned with a snap element. The position of the elements of the snap fastener and of the haptic mechanism may be adapted accordingly.

[0223] Exemplary data for the cover 11 are:
Diameter 35-85 mm, for example 70; Height: 4-35 mm, for example 9 mm.

[0224] Exemplary data for the lid 110 are:
Diameter 30-70 mm, for example 62; Height: 3.5-9 mm.

[0225] Exemplary data for the body portion 10 are:
Diameter 30-80 mm, for example 70; Height: 10-35 mm, for example 22 mm.

[0226] Exemplary materials for the container 1 are: polypropylene (PP), high-density polyethylene (HDPE), polyethylene terephthalate (PET), acrylonitrile butadiene styrene (ABS), moulded pulp.

[0227] For the purpose of the present description and of the appended claims, except where otherwise indicated, all numbers expressing amounts, quantities, percentages, and so forth, are to be understood as being modified in all instances by the term "about". Also, all ranges include the maximum and minimum points disclosed and include any intermediate ranges therein, which may or may not be specifically enumerated herein. In this context, therefore, a number A is understood as A $\pm$ 10% of A. Within this context, a number A may be considered to include numerical values that are within general standard error for the measurement of the property that the number A modifies. The number A may deviate by the percentages enumerated above provided that the amount by which A deviates does not materially affect the basic and novel characteristic(s) of the claimed invention. Also, all ranges include the maximum and minimum points disclosed and include any intermediate ranges therein, which may or may not be specifically enumerated herein.

[0228] **Fig. 10** shows rotation of the cover 11 relative to the body portion 10 for an exemplary container 1 over 720 degrees, i.e. two full revolutions. As may be gleaned from the diagram, the different zones repeat every 90 degrees, thereby forming 90-degree cycles. The container 1 may be similar to that illustrated in Figs. 1-9, except for that there is a snap element 20 located at every 90 degrees, which results in the 90-degree cycles of Fig. 10, instead of the 180 degree interspace, most easily seen in Fig. 3.

[0229] The different zones of the rotation are explained in the detailed view of **Fig. 11,** which shows one of the 90-degree cycles of Fig. 10 starting at 100 degrees in Fig. 10. The 90-degree cycle comprises five different zones, I-V described below. After 90 degrees, the zones repeat.

[0230] In zone I, the snap element 20 moves over the surmountable first end stop 45 at the side of the gap 31. The torque measurement curve has a first peak P_1 when the first end 21 of the snap element 20 has moved to the top of the surmountable abutment surface 451. See Figs. 8 and 9 and the description above for details of the surmountable first end stop 45, which is of the type illustrated in the middle of Fig. 9. Since the snap element 20 forms an elongate protrusion protruding from and extending along the inside of the side wall 114 of the cover 11 in the circumferential direction, the torque remains at a relatively high level during the continued rotation in zone I. This is a result of the side wall 114 of the cover 11 being forced to bulge outwards by the snap element 20 being positioned over the first end stop 45 and/or the body portion 10 being forced to bulge inwards. In Fig. 11, zone I corresponds to an angle of 15 degrees.

[0231] When the snap element 20 reaches the other end of the first end stop 45, i.e. the abutment wall 461 seen in the middle of Fig. 9, zone II is entered. The first downward peak D_1, corresponds to the second end 22 of the snap element 20 passing the abutment wall 461. In that moment, the bulging out of the side wall 114 of the cover 11 is abruptly put to an end and the snap element 20 moves back to a non-bulging position relative to the body portion 10 by the resiliency of the materials used for the cover 11 and the body portion 10. In zone II, the snap element 20 is in its release condition, in which the cover 11 may be removed from the body portion 10 by being lifted straight upwards and, accordingly, the container 1 is then in an openable state. In Fig. 11, zone II corresponds to an angle of 8 degrees. The length of zone II corresponds to the gap angle α. In zone II, after the first downward peak D_1, the torque is relatively low during the continued rotation. It just has to overcome the friction caused by the snap element 20 moving along the circumferentially running rib 30.

[0232] If the rotation of the cover 11 continues, the snap element 20 will move over the second end stop 46 at the opposite end of the gap 31, see zone III. The second end stop 46 has a surmountable abutment surface 451 when rotating in this direction as illustrated in the middle of Fig. 9, which is most easily gleaned in the detailed view of the body portion 10 in Fig. 8. A second peak P_2 is reached when the first end 21 of the snap element 20 has reached the top of the surmountable abutment surface 451. Similar as for zone I, the torque remains at a relatively high level during the continued rotation in zone III, when the elongate snap element 20 moves over the second end stop 46. This is a result of that the side wall 114 of the cover 11 is forced to bulge outwards and/or the body portion 10 being forced to bulge inwards, similar as for zone I. In Fig. 11, zone III corresponds to an angle of 15

degrees, similar as zone I, but dependent on the shapes of the two end stops 45, 46, the angular lengths of zones I and III may also be different.

[0233] At the side of the second end stop 46 facing away from the gap 31, there is another abutment wall 461. Zone IV begins with a second downward peak D_2 when the second end 22 of the snap element 20 passes the abutment wall 461 at the side of the second end stop 46. In zone IV, after the second downward peak D_2, the torque is relatively low during the continued rotation, similar as for zone II. It just has to overcome the friction caused by the snap element 20 moving along the circumferentially running rib 30. In Fig. 11, zone IV corresponds to 32 degrees.

[0234] In zone V, the torque measurement curve has a periodic pattern with small peaks and valleys, like a ripple. This occurs when the ratchet rib 40 interacts with the group of haptic ribs 41 arranged at the body portion 10, see Fig. 3 and Fig. 4, respectively, for details. Since there are seven haptic ribs 41 in the group of the exemplary container and only a single ratchet rib 40, there are seven small peaks in zone V, each small peak occurring when the ratchet rib 40 passes over a haptic rib 41. In the illustrated embodiment, the haptic ribs 41 are interspaced with the same distance between them, resulting in periodic pattern in zone V of the torque measurement curve. Any number of haptic ribs 41 would be feasible, such as any number from 1 to 15, or from 3 to 10 or from 5 to 8. It would be feasible to have the haptic ribs 41 interspaced at the same or at different distances. If a single ratchet rib 40 is provided, as is illustrated, the number of small peaks will reflect the number of haptic ribs 41. Zone V may be used as a haptic signal to e.g. a user of the container, that if the rotation is continued, a gap 31 will soon come, in which the cover 11 can be opened. In Fig. 11, zone V corresponds to 20 degrees.

[0235] If rotation continues, the next 90 degrees cycle will follow with a similar torque measurement curve and so on.

[0236] The above describes rotation in the intended rotation direction. If instead rotating in the opposite direction, i.e. in the non-intended rotation direction, the end stops 45, 46 have to be passed by the snap element 20 instead passing over the abutment wall 461 of the end stops 45, 46. The abutment wall 461 comprises a step surface having a stop angle 460 of about 90 degrees, typically perpendicular to the surface of the body portion 10, so in that case a much higher torque than the ones of the first peak P_1 and the second peak P_2 would be needed. This is an indication of that the wrong rotation direction, i.e. the non-intended rotation direction, is used. If the force is applied by a user, e.g., when trying to open the container 1, he/she would then understand that it is better to rotate the cover 11 in the other direction, i.e. the intended rotation direction.

[0237] As mentioned above, Fig. 10 and Fig. 11 describe rotation of the cover 11 relative to the body portion for a container 1 similar to that illustrated in Figs. 1-9, except for that there is a snap element 20 located at every 90 degrees, which results in the 90-degree cycles. Other intervals between the gaps 31 and the snap elements 20 would give another length of the cycle. Purely as an example, a 45-degree cycle, a 60-degree cycle, a 180-degree cycle or a 360-degree cycle may be used as well. The cycle length forms an integer fraction of 360 degrees. Further, the geometry of the snap element 20 and the end stops 45, 46 influence the heights and the widths of the peaks P_1, P_2 and the downward peaks D_1, D_2. The width of the gap 31, i.e. the gap angle α and the angular length w of the snap element 20 influences the length of zone II.

[0238] In case a single torque value is taken in isolation, it can in most cases not be determined where on the 90-degrees cycle the torque value was experienced. Purely as an example, a torque around 0.2 Nm could be anywhere in zone II or IV or at the valleys of zone V. Purely as another example, a torque value around 0.4 Nm could be in the later part of zone I or zone III.

[0239] However, for some parts of the 90-degrees cycle it can be determined where on the torque measurement curve the torque value was experienced:

- A torque value above 0.5 Nm indicates one of the peaks P_1, P_2, but which one is unknown with the illustrated geometry of the container 1. This corresponds to the first end 21 of the snap element 20 having reached the top of one of the end stops 45, 46.
- A torque value around 0.1 Nm indicates one of the downward peaks D_1, D_2, but which one is unknown with the illustrated geometry of the container 1. This corresponds to the second end 21 of the snap element 20 leaving one of the end stops 45, 46.
- A higher torque value than 0.6 Nm indicates that the cover 11 has been rotated in the non-intended direction, such that he second end 21 of the snap element 20 has reached the abutment wall of one of the end stops 45, 46, but which one is unknown with the illustrated geometry of the container 1.

[0240] In case a small part of the torque measurement curve is examined in order to look for a torque pattern, it can be determined:

- Small peaks and valleys indicate being in zone V. If the geometry of the container is known, the number of small peaks is also known, then it can be concluded when the end of zone V is reached.
- A first peak P_1 followed by a second peak P_2 not too far away indicates just having passed the gap 31, i.e. the beginning of zone III.
- A first downward peak D_1 followed by a second downward peak D_2 not too far away indicates arriving in zone IV.

[0241] When manufacturing or selling a container like the container illustrated in Figs. 1-9, it is desirable to make sure that the cover is not in such a position that

it can easily be opened or even fall off, in particular if the container is intended to be child resistant. Consequently, it is desirable to make sure that the cover 11 is not in zone II of the rotation cycle.

[0242] Further, it is desirable that the side wall 114 of the cover 11 does not bulge out in relation to the body portion 10 and/or the body portion 10 being forced to bulge inwards. This could compromise the sealing of the container, which in turn could lead to a moisture uptake or moisture loss of products in the container 1. There is also a risk that the cover 11 and/or the body portion 10 may be deformed due to plastic deformation of the materials they are made of. Consequently, it is desirable to make sure that the cover 11 is not in zone I or III of the rotation cycle. Hence, zones I-III represent undesirable rotational positions.

[0243] **Fig. 12** shows a method 200 according to the invention for ascertaining a rotational position of a cover of a container relative to a body portion of the container. The method 200 comprises:

a) rotating the cover relative to the body portion by means of a rotating device while directly or indirectly determining a torque until a torque associated with a predetermined rotational position is determined, and
b) thereafter rotating the cover by means of the rotating device a selectable rotation angle β relative to the body portion.

[0244] The method is applicable for containers of the types described herein, in particular for the container 1 illustrated in Figs. 1-9 and for the container having torque measurement curves like in Figs. 10-11. In that case, it may be desirable to ascertain that the cover 11 is not in such a rotational position relative to the body portion 10 that the container 1 can be opened. As an alternative or a complement, it may also be desirable to ascertain that the side wall 114 of the cover 11 does not bulge out in relation to the body portion 10 and/or the body portion 10 being forced to bulge inwards, since that might give sealing problems.

[0245] An apparatus 300 for ascertaining a rotational position of a cover 11 of a container 1 relative to a body portion 10 of the container 1 is schematically illustrated in **Fig. 13.** The apparatus 300 is suitable for performing the method 200 described herein. The apparatus 300 comprises a rotating device 310 and a torque measurement device 320. The rotating device 310 is configured to rotate the cover 11 relative to the body portion 10 while directly or indirectly determining a torque with the torque measurement device 320 until a torque associated with a predetermined rotational position is determined. The rotating device 310 is configured to thereafter rotate the cover 11 by the selectable rotation angle β relative to the body portion 10 of the container 1.

[0246] The apparatus 300 may further comprise a control unit 330 configured for determining a torque value exceeding a selectable threshold and/or for analysing a pattern of the determined torque.

[0247] Below the method 200 of Fig. 12 is described when applying the method on a container having torque measurement curves like in Figs. 10-11 using the apparatus of Fig. 13.

[0248] In an embodiment of the method 200, step a) comprises rotating the cover 11 relative to the body portion 10 by means of the rotating device 310, until the torque value exceeds a selectable threshold, i.e. a peak P_1, P_2 is reached, but which one of the peaks P_1, P_2 is unknown with the illustrated geometry of the container 1. This corresponds to the first end 21 of the snap element 20 having reached the top of one of the end stops 45, 46. In step b), is desirable to ascertain that the cover 11 is in such a rotational position relative to the body portion 10 of the container 1, that the container 1 cannot be opened or at least is difficult to open. In addition, it should be avoided that the side wall 114 of the cover 11 does not bulge out in relation to the body portion 10 and/or the body portion 10 being forced to bulge inwards, since such bulging-out might give sealing problems.

[0249] Hence, if starting in zone I, the selectable rotation angle β should exceed 15+8+15 degrees in the example, i.e. 38 degrees, to avoid the undesired relative rotational positions. On the other hand, if starting in zone III, the selectable rotation angle β should be less than 32+20 degrees, i.e. 52 degrees. Accordingly, by selecting a rotation angle β being larger than 38 degrees and smaller than 52 degrees it is ascertained that the cover is in a desirable rotational position, in which it neither can be opened, nor bulges out and/or the body portion 10 being forced to bulge inwards. See the two exemplifying arrows in Fig. 11. Hence, in this variant of the method, the angle β is selected such that 38 degrees < β < 52 degrees.

[0250] In general terms, $(\alpha + s_{tot}) < \beta < (\gamma - \alpha - s_{tot})$, with

α being the gap angle, in the example 8 degrees,
s_{tot} being the sum of s_1 and s_2, in the example 15+15=30 degrees,
s_1 being the angular length of the snap element 20 passing the first end stop 45, in the example 15 degrees,
s_2 being the angular length of the snap element 20 passing the second end stop 46, in the example 15 degrees,
β being the selectable rotation angle of step b),
γ being an inter-gap angle, in the example 90 degrees.

[0251] The angular lengths s_1, s_2 of the snap element 20 passing and end stop 45, 46 depends both on the angular length of the end stop e_1, e_2, see Fig. 8, and the angular length w of the snap element 20 as seen in the rotation direction, see Fig. 6.

[0252] If the very peaks P_1, P_2 can be determined by the torque measurement, the following is applicable: If starting at the first peak P_1, the selectable rotation angle β should exceed 15+8+15 degrees in the example, i.e. 38

degrees. On the other hand, if starting at the second peak P_2, the selectable rotation angle β should be less than 15+32+20, i.e. 67 degrees. Hence, in this variant of the method, the angle β is selected such that 38 degrees < β < 67 degrees.

[0253] In general terms, (α + s, + S2) < β < (γ - α - S2), with

α being the gap angle, in the example 8 degrees,
s_1 being the angular length of the snap element 20 passing the first end stop 45, in the example 15 degrees,
s_2 being the angular length of the snap element 20 passing the second end stop 46, in the example 15 degrees,
β being the selectable rotation angle of step b),
γ being an inter-gap angle, in the example 90 degrees.

[0254] The difference between these two calculations is that the first calculation also considers that the position in step a) can be anywhere in zone I or III, while in the second calculation, the position in step a) is at one of the peaks.

[0255] If instead using one of downward peaks D_1, D_2, but which one being unknown: If starting at the first downward peak D_1, the selectable rotation angle β should exceed 8+15 degrees in the example, i.e. 23 degrees. On the other hand, if starting at the second downward peak D_2, the selectable rotation angle β should be less than 32+20, i.e. 52 degrees. Hence, in this variant of the method, the angle β is selected such that 23 degrees < β < 52 degrees.

[0256] In general terms, (α + S2) < β < (γ - α - s_{tot}), with

α being the gap angle, in the example 8 degrees,
s_2 being the angular length of the snap element 20 passing the second end stop 46, in the example 15 degrees,
s_{tot} being the sum of s_1 and s_2, in the example 15+15=30 degrees,
β being the selectable rotation angle of step b),
γ being an inter-gap angle, in the example 90 degrees.

[0257] Figs. 10 and 11 illustrate rotating in the intended direction. If instead rotating in the non-intended direction during step a), such that an abutment wall 461 is reached, there are two possible relative positions in a 90-degrees cycle for a container 1 of the type having a torque measurement curve as illustrated in Figs. 10 and 11. In the detail of the container 1 as depicted in Fig. 8, the two possible relative positions are seen as abutment walls 461 at the right-hand sides of the two end stops 45, 46. A much larger force would be needed to pass an abutment wall 461 as compared to passing a surmountable abutment surface 451. A first abutment wall 461 is located at the very end of the gap 31, i.e. at the first end stop 45. When in this position, the cover 11 has to rotate at least 8+15=23 degrees in the intended rotation direction to move away from the gap and avoid bulging-out and/or bulging-in. On the other hand, it should not rotate more than 90-15=75 degrees in the intended rotation direction to avoid the next bulging-out position. A second abutment wall 461 is located at the opposite end of the gap 31, i.e. at the side of the second end stop 46 facing away from the gap 31. When in this position, the cover 11 does not need to rotate to move away from the gap and avoid bulging out, since it is already in such a position. On the other hand, it should not rotate more than 90-15-15-8=52 degrees in the intended rotation direction to avoid the next bulging-out position. Hence, if starting at an abutment wall, unknown which one, and rotating in the intended rotation direction, the rotation should be between 23 and 52 degrees, i.e. the angle β is selected such that 23 degrees < β < 52 degrees.

[0258] In general terms, (α + s_2) < β < (γ - α - s_{tot}), with

α being the gap angle, in the example 8 degrees,
s_2 being the angular length of the snap element 20 passing the second end stop 46, in the example 15 degrees,
s_{tot} being the sum of s_1 and s_2, in the example 15+15=30 degrees,
β being the selectable rotation angle of step b),
γ being an inter-gap angle, in the example 90 degrees.

[0259] If instead examining a small part of the torque measurement curve in order to look for a torque pattern, a single possible relative position can be determined in step a). In the illustrated example, these three examples were given above:

- Small peaks and valleys indicate being in zone V. If the geometry of the container is known, the number of small peaks is also known, then it can be concluded when the end of zone V is reached. In that case, the rotation in step b) should be at least 15+8+15=38 degrees in the intended rotation direction but less than 90 degrees.
- A first peak P_1 followed by a second peak P_2 not too far away indicates just having passed the gap 31, i.e. the beginning of zone III. In that case, the rotation in step b) should be at least 15 degrees in the intended rotation direction but less than 90-8-15=67 degrees.
- A first downward peak D_1 followed by a second downward peak D_2 not too far away indicates arriving in zone IV. In that case, no rotation is needed in step b) as a minimum rotation. Further the rotation should be less than 90-15-8-15=52 degrees in the intended rotation direction in step b).

[0260] According to another variant of the method according to the invention, step a) comprises rotating the cover 11 an angular length l_{ud} of undesirable rota-

tional positions plus an optional safety margin m by means of the rotating device 310. Step b) comprises comparing the torque value determined at the end of step a) to a selectable non-secured threshold and performing no further rotation of the cover 11, if the determined torque value is less than the non-secured threshold, but further rotating the cover 11 the angular length l_{ud} of undesirable rotational positions plus the optional safety margin m by means of the rotating device 310, if the determined torque value is greater than or equal to the non-secured threshold. The safety margin m is typically a few degrees, such as in the range between 1 and 5 degrees, but the safety margin may also be 0 degrees, i.e. no safety margin is used.

[0261] An example of undesirable rotational position is the cover 11 being in an openable rotational position, e.g. the snap element 20 being at the gap 31. Other undesirable positions may be a rotational position in which a side wall 114 of the cover 11 bulges out and/or in which the body portion 10 bulges inwards, such as when the snap element 20 passes an end stop 45, 46. In the example illustrated of Fig. 11, l_{ud} is 15+8+15=38 degrees. The safety margin may be in the range of 1 to 5 degrees, e.g. 2 degrees. The cover 11 would thus be rotated by 38+2=40 degrees in step a). In this case, it is assumed that the rotation is made in the intended rotation direction.

[0262] In this variant of the method according to the invention, it would be sufficient to only determine the torque once, i.e. when the cover 11 has been rotated by the angular length l_{ud} of undesirable rotational positions plus the optional safety margin m, in the example at 40 degrees rotation.

[0263] The determined torque value experienced at the angular length l_{ud} of undesirable rotational positions plus the optional safety margin is compared to the non-secured threshold, which in the example of Fig. 11 may be set to 0.3 Nm. The non-secured threshold has been chosen such that it is associated with torque values normally obtained in the undesirable rotational positions. Hence, if in an undesirable rotational position, the non-secured threshold is reached or exceeded, i.e. in zones I or III.

[0264] If the determined torque value is less than the non-secured threshold, no further rotation of the cover 11 is performed. This is not needed, since in that case it has been ascertained that the cover 11 is not in an undesirable rotational position. On the other hand, if the determined torque value is greater than or equal to the non-secured threshold, further rotation in the intended rotation direction is desirable. By choosing an angular rotation length of l_{ud} plus a safety margin m, is ascertained that the cover is rotated sufficiently far to be out of the undesirable rotational positions.

[0265] This can be exemplified with the help of Fig. 11: If starting the rotation of the cover in zones I or II, the rotation of step a), by e.g. the 40 degrees, would take the cover to zone IV. If starting the rotation of the cover in zone III, the rotation of step a) would take the cover to zone IV or V. If starting the rotation of the cover at the beginning of zone IV, the rotation of step a) would take the cover to zone V. These cases have in common, that after comparison of the measured torque value with the selectable threshold in step b) no further rotation would be performed, since it has been ascertained the cover is in secure state.

[0266] On the other hand, if starting the rotation of the cover at the end of zone IV or in zone V, the rotation of step a) would take the cover to one of the undesired rotational positions in zones I, II or III. In that case, after comparison of the measured torque value with the selectable threshold in step b), a further rotation by e.g. 40 degrees is performed, bringing the cover to zone IV or V, in which the cover will be in a secure state.

[0267] In another variant of the method, the rotation by means of the rotating device 310 in step a) is instead performed in the non-intended rotation direction, while rotation, if any, in step b) is performed in the intended direction. In that case, the rotation in step a) may be the gap length α plus a safety margin m, which in this variant is greater than zero for step a). The torque is determined while rotating in step a). Step b) comprises comparing the highest torque value determined during step a) to a selectable non-secured threshold and performing no further rotation of the cover 11, if the determined highest torque value is less than the non-secured threshold, but further rotating the cover 11 the angular length $\alpha + s_{tot}$ in the intended rotation direction, α being the gap angle, s_{tot} being the sum of s_1 and s_2, that is the angular length of the snap element passing the respective end stops, plus an optional safety margin m by means of the rotating device 310, if the determined highest torque value is greater than or equal to the non-secured threshold. The safety margin m in step b) is typically a few degrees, such as in the range between 1 and 5 degrees, but the safety margin in step b) may also be 0 degrees, i.e. no safety margin is used.

[0268] This can be exemplified with the help of Fig. 11, assuming the safety margin in step a) is 1 degree and 0 degrees in step b):
If starting the rotation of the cover in zone V, the far part of zone IV or the first part of zone I and rotating 8+1=9 degrees in the non-intended rotation, the rotation of step a) will end in zone IV or V. These zones have in common, that after comparison of the highest torque value, here about 0.2 Nm, with the selectable threshold in step b), e.g. above 0.3 Nm, no further rotation would be performed, since it has been ascertained the cover is in a secure state.

[0269] On the other hand, if starting the rotation of the cover in the far part of zone I, in zone II, in zone III, or in the first part of zone IV, the cover would be in an undesired bulging-out position or in an undesired openable position after rotating 9 degrees in the non-intended rotation. This is determined by a highest torque value being above the selectable threshold in step b), e.g. above 0.3 Nm. In that case, the cover is rotated 8+15+15=38 degrees in the intended rotation direction. Thereby, it is ascertained that

the cover is in a desired rotation position with the cover in a secure state after step b).

[0270] As yet a variant, being very similar to the preceding variant, the rotation in step a) in the non-intended rotation direction stops as soon as a torque value exceeding the selectable non-secured threshold is determined, since this indicates being in zone I or III. If no such value is detected, the rotation of step a) in the non-intended rotation direction anyway stops after the gap length α plus a safety margin m, which in this variant is greater than zero, in the example after 9 degrees. If no torque value exceeding the selectable non-secured threshold was determined in step a), no rotation is performed in step b). Otherwise, the cover is rotated 8+15+15=38 degrees in the intended rotation direction in step b). Thereby, it is ascertained that the cover is in a desired rotation position with the cover in a secure state after step b).

[0271] Further modifications of the invention within the scope of the appended claims are feasible. As such, the present invention should not be considered as limited by the embodiments and figures described herein. Rather, the full scope of the invention should be determined by the appended claims, with reference to the description and drawings.

Claims

1. A method (200) for ascertaining a rotational position of a cover (11) of a container (1) relative to a body portion (10) of the container (1), in particular a container comprising a secured closure, the method comprising:

   a) rotating the cover (11) relative to the body portion (10) by means of a rotating device (310) while directly or indirectly determining a torque until a torque associated with a predetermined rotational position is determined, and
   b) thereafter rotating the cover (11) by means of the rotating device (310) a selectable rotation angle (β) relative to the body portion (10).

2. The method according to claim 1,

   wherein the container (1) comprises a snap fastener for the body portion (10) and the cover (11), and wherein the snap fastener comprises a ring element (30), having a gap (31) with a gap angle (α), and a snap element (20) configured to interact with the ring element (30),
   wherein in step a), the predetermined rotational position is at or adjacent to the gap (31), and
   wherein in step b), the selectable rotation angle (β) is selected such that it is ascertained that the snap element (20) leaves the gap (31) and yet the snap element (20) is not rotated so far that it reaches the following gap (31).

3. The method according to claim 2, wherein in step a) the torque associated with the predetermined rotational position at or adjacent to the gap (31) is a torque value exceeding a selectable threshold.

4. The method according to claim 3, wherein in step a) the torque value exceeding the selectable threshold is associated with a peak in a torque measurement curve determined during step a), which shows torque as a function of rotation angle.

5. The method according to any one of claims 3-4, wherein in step a) the torque value exceeding the selectable threshold is obtained by the rotating device (310) rotating the snap element (20) over an end stop (45, 46) of the gap (31), wherein in step b), it is further ascertained that the snap element (20) is not positioned at the end stop (45, 46), preferably the container (1) comprises an end stop (45, 46) at each end of the gap (31) and wherein in step b), it is further ascertained that the snap element (20) is not positioned at any of the end stops (45, 46)

6. The method according to claim 5, wherein the end stop (45) has a surmountable abutment surface (451), e.g. a sloped surface, as seen in the rotation direction, wherein the method comprises indicating an intended rotation direction in step a) and/or b) by means of the surmountable abutment surface (451).

7. The method according to claim 5 or 6, wherein the end stop (45) has an abutment wall (461), e.g. a step surface, as seen in the rotation direction, wherein the method comprises indicating a non-intended rotation direction in step a) and/or b) by means of the abutment wall (461).

8. The method according to claim 2, wherein the container (1) further comprises a haptic mechanism indicating a release condition of the snap fastener, in which the cover (11) is detachable from the body portion (10), wherein the haptic mechanism comprises a haptic element (41) arranged at the gap (31), and wherein the haptic element (41) is arranged above or below the snap element (20) when viewed in relation to a detach direction of the cover (11), when the snap fastener is in a snapped condition where the cover (11) is undetachable from the body portion (10),
   wherein in step a) the torque associated with the predetermined rotational position at or adjacent to the gap (31) comprises a torque pattern reflecting the configuration of the haptic element.

9. The method according to claim 9, wherein the haptic element comprises a first element, e.g. a haptic rib

(41), located in one of the cover (11) or the body portion (10) and configured to interact with a second element (40), e.g. a ratchet rib (40), located in the other of the cover (11) or the body portion (10), at least one of the first (41) and second elements (40) being a male element.

10. The method according to claim 10, wherein the haptic element comprises a plurality of first elements (41), and the torque associated with the predetermined rotational position is a torque pattern reflecting the angular distance between the first elements (41).

11. The method according to claim 11 wherein the plurality of first elements (41) are interspaced with the same distance between the first elements (41), the torque associated with the predetermined rotational position at or adjacent to the gap (31) thus being a periodic pattern.

12. The method according to claim 2, wherein step a) comprises rotating the cover (11) an angular length (l_{ud}) of undesirable rotational positions plus an optional safety margin (m) by means of the rotating device (310), and step b) comprises comparing the torque value determined at the end of step a) to a selectable non-secured threshold and performing no further rotation of the cover (11), if the determined torque value is less than the non-secured threshold, but further rotating the cover (11) the angular length (l_{ud}) of undesirable rotational positions plus the optional safety margin (m) by means of the rotating device (310), if the determined torque value is greater than or equal to the non-secured threshold.

13. The method according to claim 2, wherein step a) comprises rotating the cover (11) in a non-intended rotation direction the gap angle (α) plus a safety margin by means of the rotating device (310), and step b) comprises comparing the highest torque value determined during step a) to a selectable non-secured threshold and performing no further rotation of the cover (11), if the determined torque value is less than the non-secured threshold, but further rotating the cover (11) in the intended rotation direction the angular length (l_{ud}) of undesirable rotational positions plus an optional safety margin by means of the rotating device (310), if the determined torque value is greater than or equal to the non-secured threshold.

14. The method according to claim 2, wherein step a) comprises rotating the cover (11) by means of the rotating device (310) in a non-intended rotation direction until a torque value exceeding a selectable non-secured threshold is detected or until the rotation has reached the gap angle (α) plus a safety margin, whichever occurs first, and step b) comprises performing no further rotation of the cover (11), if the determined torque values are less than the non-secured threshold, but further rotating the cover (11) in the intended rotation direction the angular length (l_{ud}) of undesirable rotational positions plus an optional safety margin by means of the rotating device (310), if a torque value greater than or equal to the non-secured threshold has been determined in step a).

15. An apparatus (300) for ascertaining a rotational position of a cover (11) of a container (1) relative to a body portion (10) of the container (1), the apparatus (300) comprising a rotating device (310) and a torque measurement device (320), the rotating device (310) being configured to rotate the cover (11) relative to the body portion (10) while directly or indirectly determining a torque with the torque measurement device (320) until a torque associated with a predetermined rotational position is determined, and the rotating device (310) being configured to thereafter rotate the cover (11) by a selectable rotation angle (β) relative to the body portion (10) of the container (1).

16. The apparatus (300) according to claim 15, further comprising a control unit (300) configured for determining a torque value exceeding a selectable threshold and/or for analysing a pattern of the determined torque.

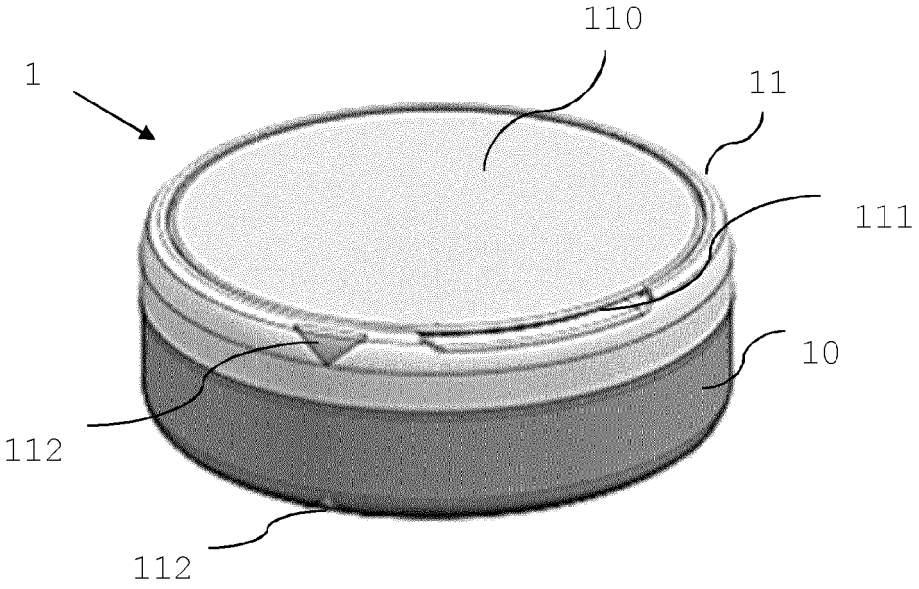


Fig. 1

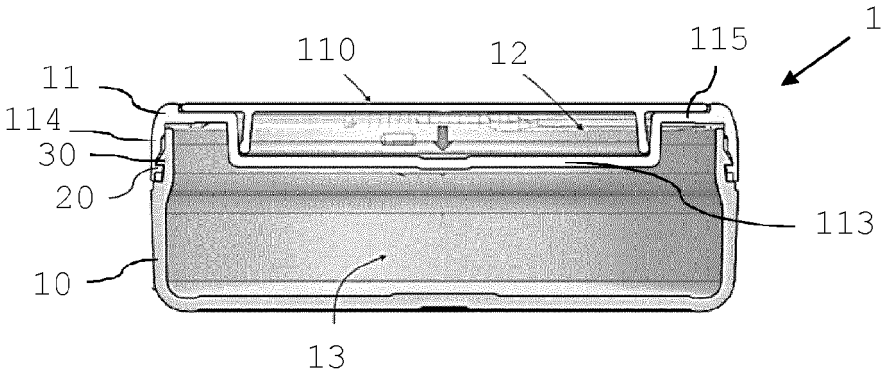


Fig. 2

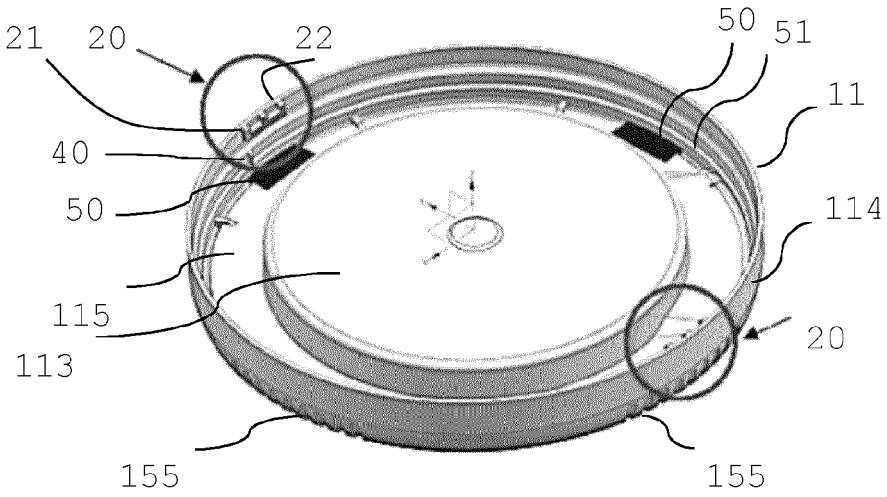


Fig. 3

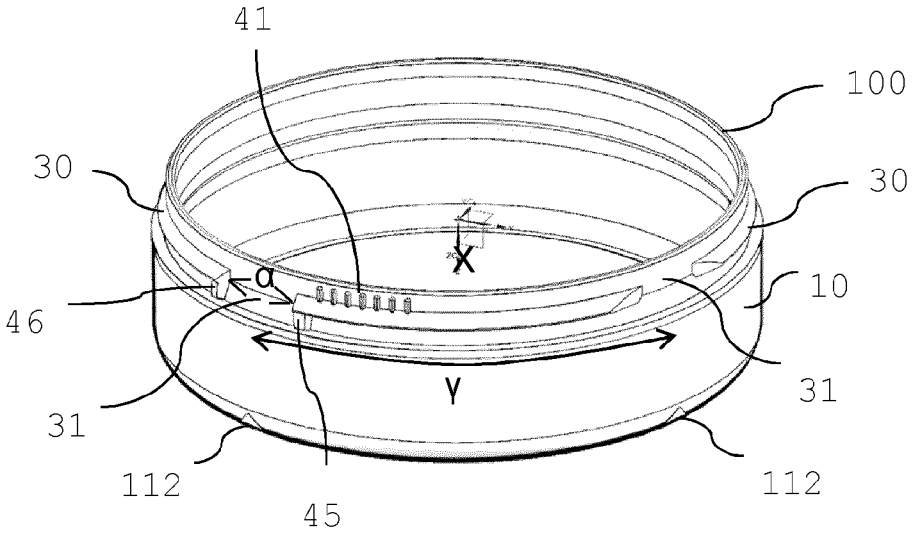


Fig. 4

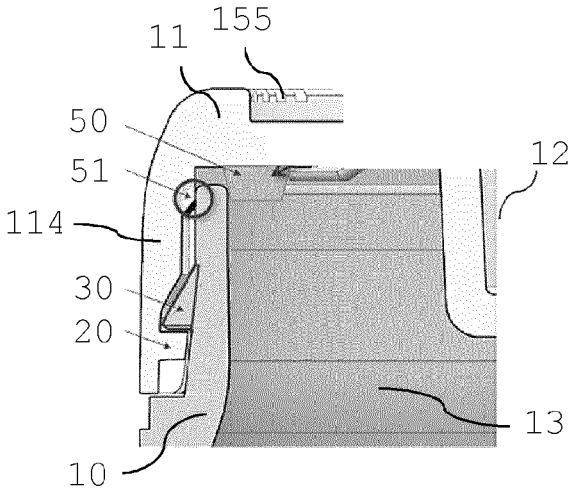


Fig. 5

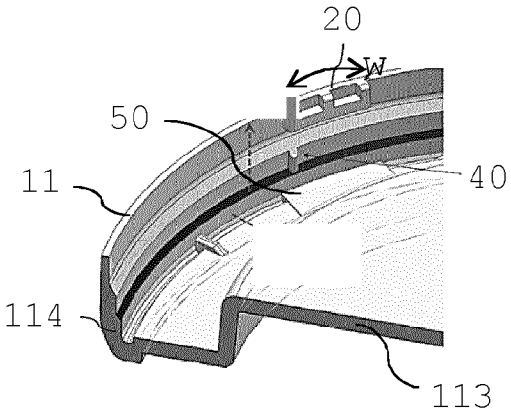


Fig. 6

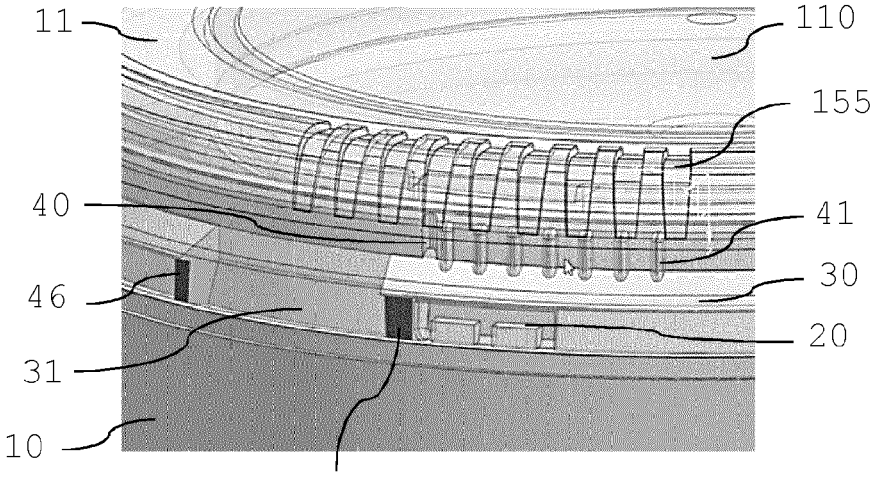
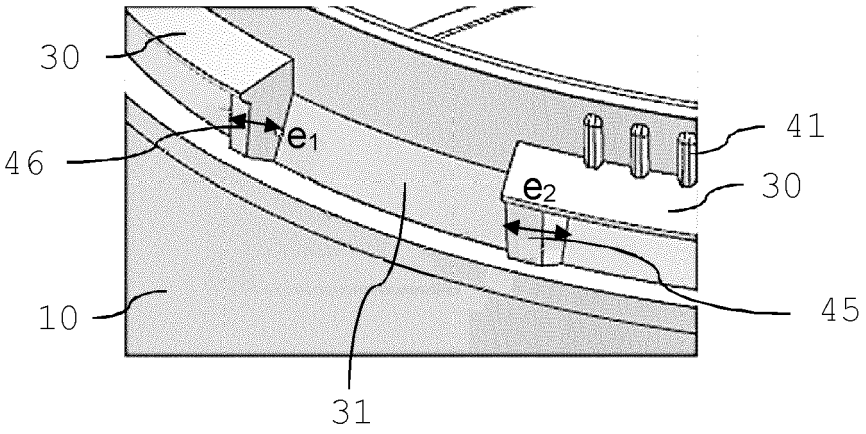


Fig. 7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46
e1
41
e2
30
10
45
31

Fig. 8

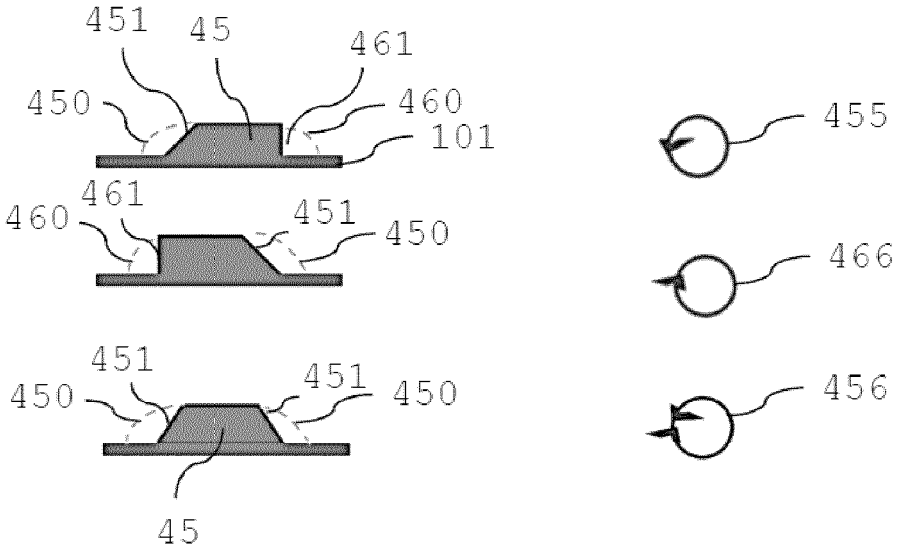
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Fig. 9

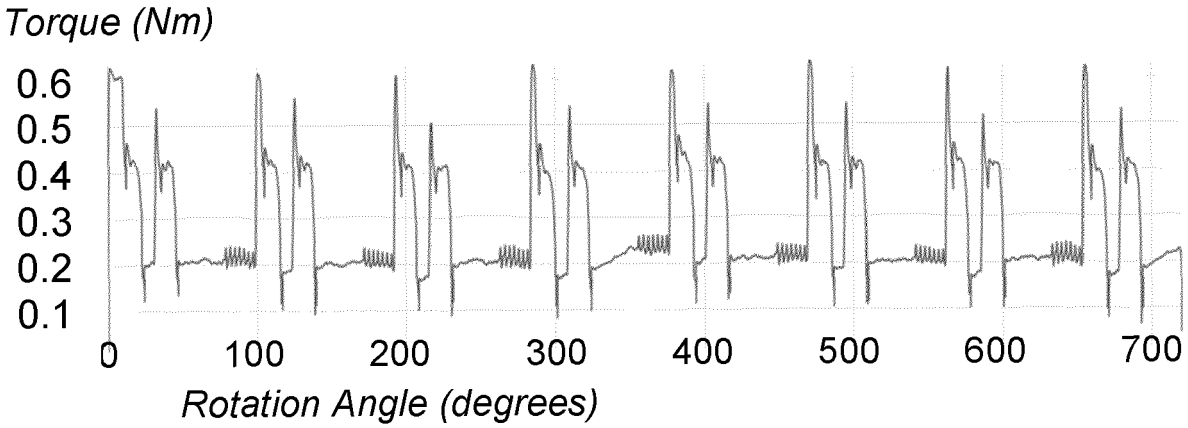

Fig. 10

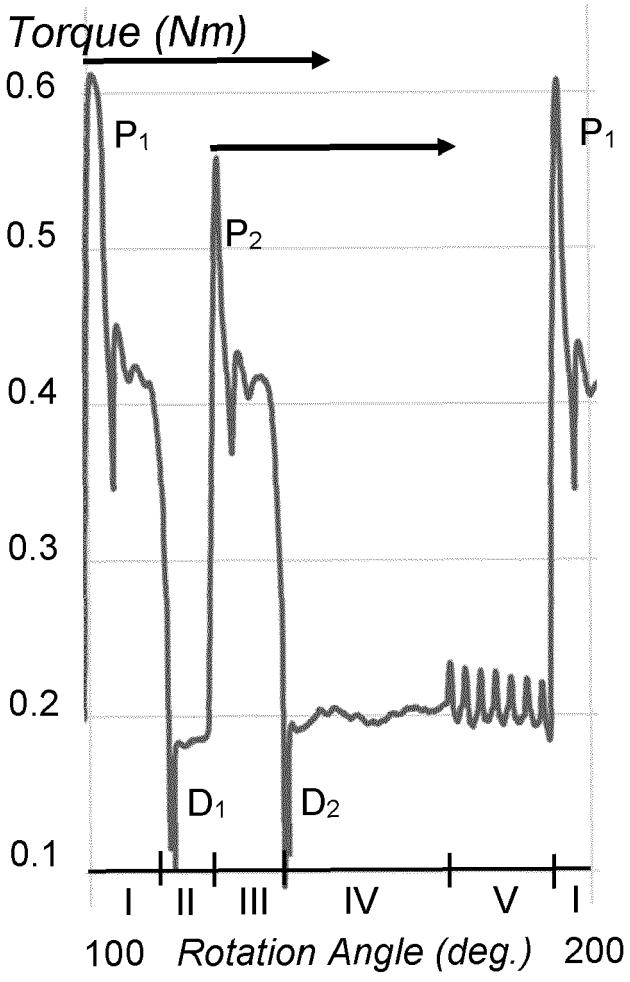

Fig. 11

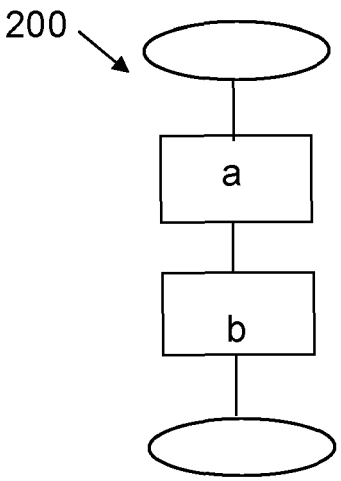

Fig. 12

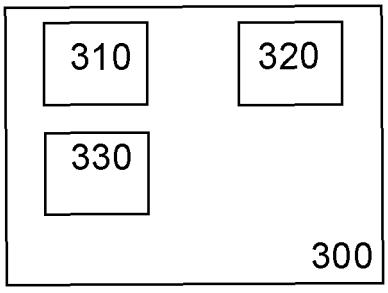

Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 0125

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 132 331 A1 (SHIBUYA KOGYO CO LTD [JP]) 12 September 2001 (2001-09-12) * paragraph [0030] - paragraph [0031] * * paragraph [0035] - paragraph [0037]; figures 1-8 *	1,15,16	INV. B67B3/26 B65D50/06
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			TECHNICAL FIELDS SEARCHED (IPC) B67B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 November 2023	Wartenhorst, Frank

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 0125

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29-11-2023

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