

Securing device for a tapping armature

The present invention relates to a securing device for the placement of a tapping armature on a tapping neck formed integrally on a container wall of a plastic container, the tapping armature having an armature housing comprising a screw flange formed concentrically with an inlet neck on said inlet neck, the screw flange having an internal thread for being screwed to an external thread formed on a threaded extension of the tapping neck in such a manner that the tapping neck engages into an annular neck receiving space formed between the inlet neck and the screw flange, a securing ring being disposed between the container wall and the screw flange, the securing ring having a fixing means for fixing it to the screw flange and a locking means for connecting it to the container, the securing ring having locking protrusions for forming the locking means which are disposed on an inner circumference and which are directed radially inward and whose locking ends, for locking with a stop means formed on the container, are disposed on a locking circumference, whose diameter is greater than the diameter of the external thread of the tapping neck or equal to said diameter.

Securing devices for the placement of a tapping armature typically serve to secure the original association of a tapping armature intended for a container with said container in order to prevent manipulation once a container has been provided with a tapping armature, such as manipulations in which a tapping armature suitable for the container or for a liquid held in said container might be replaced with an unsuitable tapping armature.

Typically, securing devices of this kind are designed as a securing ring which, while not being able to prevent the tapping armature from being removed from the container by force, still makes any undesired manipulation visible by being at least partially destroyed.

In order to install the conventionally used tapping armatures, which have a union nut formed independently of the armature housing and serving to screw the tapping armature to a tapping neck formed on the container, the securing ring has to be placed between the union nut and a container wall of the container during installation of the tapping armature. This involves a correspondingly complex handling action because in addition to holding the armature housing of the tapping armature in position and screwing the union nut onto the threaded tapping neck of the container, the securing ring, which has locking protrusions at its inner circumference that serve to lock with a stop means formed on the tapping neck, has to be positioned with the locking protrusions axially on the tapping neck across the thread of the tapping neck in order to be able only then to screw the tapping armature on.

When the securing ring is placed on the tapping neck, the fact that a diameter of the locking circumference defined by the locking protrusions is smaller than the outer diameter of the tapping neck causes the locking protrusions to at least partially catch on the ridge of the external thread of the tapping neck, which causes the securing ring to jam on the tapping neck when the securing ring is axially slid onto the tapping neck.

The mounting process, which is thus complex on the whole, is at odds with automated mounting of tapping armatures provided with securing rings in which a mounting robot positions the armature housing coaxially with the tapping neck, followed merely by a screwing action.

Hence, the object of the present invention is to propose a securing device for a tapping armature that allows tapping armatures provided with such a securing device to be automatically mounted on a container.

To attain said object, the securing device according to the invention has the features of claim 1.

Owing to the combination of the screw flange formed integrally on the inlet neck and thus not being a component that is independent of the inlet neck with the defined positioning of the securing ring relative to the armature housing via the fixing means formed on the securing ring and
5 owing to the locking circumference of the securing ring being dimensioned such that its diameter is equal to the outer diameter of the external thread of the tapping neck or greater than the outer diameter of the tapping neck, the securing device according to the invention allows the tapping armature to be mounted on the container in a way in which the
10 armature housing of the tapping armature has to be handled merely in order to be screwed to the tapping neck of the container without the risk of the securing ring becoming jammed, which would jeopardize the necessary coaxial alignment of the armature housing with the tapping neck.

Thus, the securing device according to the invention allows automatic
15 mounting of the tapping armature.

Preferably, an axial stop designed to come into contact with a front end of the tapping neck is formed in the neck receiving space, allowing a defined mounting torque to be set during mounting independently of the sealing force acting in the radial sealing space owing to the axial impact
20 of the front end of the tapping neck against the axial stop formed in the neck receiving space of the armature housing. Thus, automatic mounting by means of a mounting robot as a function of the desired mounting torque is possible.

According to another preferred embodiment, the stop means is formed on
25 a neck base of the tapping neck, said neck base being formed adjacent to the container wall, which means that the stop means can be produced together with the tapping neck in a molding process, such as the blow molding technique typically employed to produce plastic containers.

Preferably, the neck base is realized as a collar formed in the area of transition from the container wall to the threaded extension of the tapping neck, said collar having latching protrusions which are distributed across its circumference and which each have a latching surface extending substantially parallel to a longitudinal axis of the tapping armature, a clear relative position of the securing ring relative to the tapping neck being defined by the locking protrusions latching behind the latching protrusions.

If the latching protrusions are realized as latching ramps that have a ramp surface rising from the circumference of the neck base and forming a latching shoulder with the latching surface, the locking protrusions are deformed in a continuously increasing and thus material-friendly manner during latching.

If the length of the tapping neck, the design of the external thread on the tapping neck and the distribution of the latching protrusions on the circumference of the neck base are selected such that when the axial stop of the armature housing comes into contact with the front end of the tapping neck with a defined preload force, at least one locking protrusion of the securing ring elastically latches behind the stop surface of a latching protrusion, a defined preload force is associated with the locked position of the securing ring on the tapping neck, which allows the tapping armature to be mounted on the tapping neck with accuracy of position and with the position of the tapping armature on the tapping neck being effectively secured at the same time solely as a function of the mounting torque generating the preload force. It can be ensured in particular that a valve shaft of the tapping armature, which allows the tapping armature to be actuated, is located in the desired vertical orientation.

For forming a radially acting sealing means, a sealing space is preferably provided which has an inner sealing surface, which is formed by an outer wall of the inlet neck, and an outer sealing surface, which is formed by an inner wall of the tapping neck, and which is provided with an O-ring

seal accommodated in the sealing space so as to come into contact with the inner sealing surface and with the outer sealing surface so that the preload force between the tapping armature and the tapping neck does not affect the sealing means owing to the radially acting sealing means.

- 5 For forming the sealing space, a circumferential recess is preferably formed on an inner opening edge at the front end of the tapping neck in such a manner that a limiting surface which axially limits the sealing space and which is axially recessed relative to a stop surface serving to come into contact with the axial stop of the neck receiving space at the front end is formed by the recess. Thus, if needed, the O-ring seal can be
10 form-fittingly inserted into the tapping neck in order to mount the tapping armature.

It is particularly advantageous if the inner sealing surface and/or the outer sealing surface conically taper in the axial direction in such a manner that the height of the sealing space decreases in the direction of the tapping neck, which means that the sealing force is generated during the mounting process, but the preload force generated during the mounting process is not transmitted via the sealing means.
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Preferably, the fixing means has a driver pocket formed at a securing ring front side facing the screw flange, said driver pocket serving to be engaged by a driver tab formed on the screw flange in such a manner that a form-fitting engagement of the driver tab in the driver pocket allows the coaxial alignment of the securing ring with the tapping armature to be produced in a particularly simple manner.
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- 25 If the securing ring has, in addition to the driver pocket, at least one other driver element which allows a torque to be transmitted from the screw flange to the securing ring in the mounting direction only, this ensures that the torque is transmitted via multiple contact points in a manner that is easy on the securing ring; however, the other driver element

cannot support the screw flange during rotation in the dismounting direction, which allows the driver pocket to be simultaneously used as a tamper-evident element because a torque is exclusively transmitted via the driver pocket when the screw flange is being detached from the tapping
 5 neck.

For transmitting the torque, the driver element preferably has a radial stop surface which serves to come into contact with a web flank of a driver web formed on the screw flange and extending in the axial direction.

10 If the driver element has a latching protrusion for axially latching with a mating latching element formed on the screw flange, defined axial fixation of the securing ring to the screw flange can take place during the mounting process in addition to radial fixation.

It is particularly advantageous if the driver pocket is realized as a tamper-evident element in such a manner that a visible wall connected to a
 15 base wall formed on the securing ring via a predetermined breaking means is provided, a receiving space for the driver tab of the screw flange being formed between the base wall and the visible wall so as to realize the driver pocket.

20 Preferably, the visible wall has at least two visible-wall portions which are connected to the base wall via the predetermined breaking means, the front visible-wall portion in the dismounting direction of the screw flange having a stop edge for the driver tab and the rear visible-wall portion in the dismounting direction having a stop edge for a driver web of
 25 the screw flange, said driver web following in the dismounting direction.

Owing to this two-part design of the tamper-evident element, which allows complete destruction of the tamper-evident element in two motion phases of a rotation of the screw flange, a visible wall whose dimensions

are large on the whole can be removed, manipulation of the tapping armature thus being clearly visible from great distance.

Hereinafter, a preferred embodiment of the securing device is explained in more detail based on the drawing.

- 5 **Fig. 1** shows an isometric view of a tapping armature mounted on a tapping neck of a container;
- Fig. 2** shows another view of the tapping armature illustrated in **Fig. 1**;
- 10 **Fig. 3** shows the tapping armature as illustrated in **Figs. 1** and **2** in a mounting configuration with a securing ring placed on a screw flange;
- Fig. 4** shows the tapping armature as illustrated in **Fig. 2** in a partial section view according to section line IV-IV in **Fig. 2**;
- 15 **Fig. 5** shows an enlarged part of **Fig. 4**;
- Fig. 6** shows a securing ring placed on the tapping neck of the container;
- Fig. 7** shows a top view of the securing ring illustrated in **Fig. 6**;
- 20 **Fig. 8** shows an isolated view of the securing ring illustrated in **Fig. 6**;
- Fig. 9** shows an isometric illustration of the securing ring illustrated in **Fig. 8**.

In **Figs. 1, 2** and **4**, a tapping armature 10 mounted on a tapping neck 11 of a plastic container 12 is illustrated. Plastic containers 12 of this kind
25 are used in particular as inner containers of intermediate bulk containers (IBCs), the plastic containers 12 in this case being accommodated in a

protective shell which is fixed on a transport pallet and often configured as a cage.

As shown in **Fig. 3**, in particular, the tapping neck 11 is located at a container wall 13 of the plastic container 12 and has, directly adjacent to the container wall 13, a collar-shaped neck base 14, adjacent to which a threaded extension 15 is formed, said threaded extension 15 having an external thread 16 which serves to be screwed to an internal thread 17 of a screw flange 18 which is formed on an inlet neck 19 of an armature housing 20 of the tapping armature 10.

The armature housing 20 is provided with a valve which, in the case at hand, is realized as a flap valve 21 and which has a valve flap 23 disposed on a valve shaft 22, said valve flap 23 having a valve handle 24 at its end protruding from the armature housing 20 in such a manner that the valve flap 23 can be displaced from the closed position illustrated in **Fig. 3** into an open position (not illustrated) by pivoting the valve shaft 22 by means of the valve handle 24. An outlet neck 25 of the armature housing 20 is provided with a screw cap 26 to protect the tapping armature 11 against dirt.

Fig. 3 shows the tapping armature 10 in a mounting configuration in which the screw flange 18, which is formed integrally on the armature housing 20 and made of the same material as the inlet neck 19, is connected to a securing ring 28 via a driver tab 27 radially projecting from the screw flange 18. To connect the securing ring 28 to the driver tab 27 of the screw flange 18, the securing ring 28 has a driver pocket 29 into which the driver tab 27 form-fittingly engages, which means that during mounting, the securing ring 28 together with the tapping armature 10 is coaxially aligned relative to the tapping neck 11 and forms a mounting unit with the tapping armature 10 which can be screwed onto the tapping neck 11.

As **Fig. 3** further shows, when the tapping armature 10 is in the mounting configuration on the inlet neck 19, the armature housing 20 is provided with an O-ring seal 30 which is disposed on an outer wall 32 of the inlet neck 19, said outer wall 32 conically tapering toward a neck end 31, and
 5 which thus forms another component of the mounting unit.

Fig. 4 shows the tapping armature 10 after having been mounted on the tapping neck 11 in a use configuration connected to the plastic container 12, in which the screw flange 18 is screwed on far enough for an axial stop 34 formed at the bottom of an annular neck receiving space 33
 10 formed between the inlet neck 19 and the screw flange 18 to come into contact with a front end 35 of the tapping neck 11 until the desired mounting preload force is achieved.

As can be seen from a combined view of **Figs. 8** and **9**, the securing ring 28 is provided with a locking means 36 at its inner circumference, said
 15 locking means 36 having a plurality of locking protrusions 37 which are directed radially inward and which, in the embodiment example illustrated here, additionally have an orientation inclined at a latching angle α relative to the radius r in the in the dismounting direction 38. Furthermore, at its front side 40 facing the screw flange 18 in the mounting po-
 20 sition illustrated in **Fig. 3**, the securing ring 28 has two driver elements 41 which are oriented axially and each of which has, at a driver end 42, a latching protrusion 43 which, as shown in **Fig. 2** in particular, serves to latch with a web edge 44 of the screw flange 18.

Moreover, the driver elements 41 have a radial stop surface 45 which
 25 serves to come into contact with a web flank 46 of a driver web 47 which is formed on the screw flange 18 and which extends in the axial direction.

In the mounting configuration of the tapping armature 10 as illustrated in **Fig. 3**, the securing ring 28 is fixed in both its radial and axial relative
 30 position relative to the screw flange 18 by the driver tab 27 of the screw

flange 18 being received in the driver pocket 29 of the securing ring 28 and by the driver elements 41 being latched, as also illustrated in **Fig. 2**. This results in a corresponding coaxial alignment of the securing ring 28 with the tapping armature 10, which means that the tapping armature 10
 5 can be screwed onto the tapping neck 11 together with the securing ring 28 and with the O-ring seal 30 mounted on the inlet neck 19 of the armature housing 20 in the neck receiving space 33 as a mounting unit.

As shown in **Fig. 3**, the neck base 14 of the tapping neck 11 is provided with a stop means 48 which, in the case at hand, has four latching protrusions which are distributed across the circumference of the neck base 14
 10 and realized as latching ramps 49. The latching ramps 49 have a ramp surface 50 which rises from the circumference of the neck base 14 and ends with a latching surface 51 at a latching shoulder.

As can be seen from a combined view of **Figs. 6** and **7**, which, in order to
 15 explain the interaction of the locking means 36 of the securing ring 28 with the stop means 48 formed on the tapping neck 11, show the securing ring 28 disposed on the tapping neck 11 in an illustration separate from the tapping armature 10, locking ends 52 of the locking protrusions 37 of the securing ring 28 are disposed on a locking circumference 53 whose
 20 diameter D is greater than the diameter d of the external thread 16 formed on the tapping neck 11. This allows the securing ring 28 mounted on the tapping armature 10 to form the mounting unit to be screwed onto the tapping neck 11 together with the tapping armature 10 without the locking protrusions 37 of the securing ring 28 colliding with a ridge 54
 25 of the external thread 16 and thus potentially affecting the coaxial alignment of the tapping armature 10 with the tapping neck 11 as required for screwing.

As shown in **Fig. 3**, in the embodiment example illustrated, the stop means 48 has the latching ramps 49 positioned in such a manner that the
 30 distance between the stop means 48 and the front end 35 of the tapping neck 11 is substantially equal to the length l of the tapping neck 11. The

length l of the tapping neck 11 and the design of the external thread 16, i.e. in particular the radial position of a start of the ridge 54 and the pitch of the ridge 54, and the position of the latching surfaces 51 of the stop means 48 in relation to the position of the locking ends 52 on the locking circumference 53 of the securing ring 28 are selected such that, as shown in **Fig. 4**, when the axial stop 34 of the armature housing 20 is in contact with the front end 35 of the tapping neck 11, the armature housing 20 is in contact with the tapping neck 11 with a defined preload force while the locking ends 52 of the locking means 36 of the securing ring 28 are elastically latched behind the latching surfaces 51.

Thus, it is ensured that once the securing ring 28 is latched with the stop means 48, a defined preload force is transmitted from the armature housing 20 to the tapping neck 11.

As can be seen from a combined view of **Figs. 4, 5 and 6**, to form a radially acting sealing means 55, an inner sealing surface 56 formed by the outer wall 32 of the inlet neck 19 and an outer sealing surface 58 formed by the inner wall 57 of the tapping neck 11 are provided, which radially limit a sealing space 59. For axially limiting the sealing space 59, which serves to receive the O-ring seal 30, a circumferential recess 60 is formed on an inner opening edge at the front end 35 in such a manner that a limiting surface 62 which axially limits the sealing space 59 and which is axially recessed relative to a stop surface 61 formed at the front end 35 and serving to come into contact with the axial stop 34 of the neck receiving space 33 is formed by the recess 60.

In the case at hand, to support the radial sealing effect, the outer sealing surface 58 formed by the inner wall 57 of the tapping neck 11 tapers conically in the axial direction in such a manner that the height of the sealing space 59 decreases in the mounting direction 39 of the tapping armature 10.

As shown in **Fig. 9** in particular, to configure the driver pocket 29 as a tamper-evident element, a base wall 63 formed on the securing ring 28 is connected to a visible wall 64 disposed opposite the base wall 63 via a first predetermined breaking means 66 and a second predetermined
 5 breaking means 67, a corresponding axial distance a being provided between the base wall 63 and the visible wall 64 in order to form a receiving space 65 of the driver pocket 29.

As **Fig. 9** further shows, the visible wall 64 has two visible-wall portions 69, 70, which are connected to each other via another predetermined
 10 breaking means 68. As can best be gathered based on the illustration in **Fig. 1**, the driver tab 27, which is realized as a tamper-evident element, is destroyed if the tapping armature 10 is turned in the dismounting direction 38 because, first, a stop edge 71 formed on the front visible-wall portion 69 is caught by the driver tab 27, which penetrates a radial re-
 15 cess 72 of the driver pocket 29 when turned in the dismounting direction 38, and connecting webs 73, 74 of predetermined breaking means 66 and connecting webs 75, 76 of predetermined breaking means 68 are destroyed, the front visible-wall portion 69 thus being removed from the securing ring 28. If the tapping armature 10 continues to be turned in the
 20 dismounting direction 38, a stop edge 78 formed on the second visible-wall portion 70 is caught by the driver web 47 of the screw flange 18 following the driver tab 27, causing connecting webs 79, 80, 81 and 82 of the predetermined breaking means 66 to rip off and the second visible-wall portion 70 to be removed from the securing ring 28 as well.

Claims

1. A securing device for the placement of a tapping armature on a tapping neck formed integrally on a container wall of a plastic container, the tapping armature having an armature housing comprising a screw
5 flange formed concentrically with a plastic inlet neck on said inlet neck, the screw flange having an internal thread for being screwed to an external thread formed on a threaded extension of the tapping neck in such a manner that the tapping neck engages into an annular neck receiving space formed between the inlet neck and the screw flange, a
10 securing ring being disposed between the container wall and the screw flange, the securing ring having a fixing means for fixing it to the screw flange and a locking means for connecting it to the container, the securing ring having locking protrusions for forming the locking means which are disposed on an inner circumference and directed
15 radially inward and whose locking ends for locking with a stop means formed on the container are disposed on a locking circumference, whose diameter D is greater than the diameter d of the external thread of the tapping neck or equal to said diameter d , wherein
20 in order to set a defined mounting torque an axial stop for coming into contact with a front end of the tapping neck is formed in the neck receiving space.
2. The securing device according to claim 1,
wherein
25 the stop means is formed on a neck base of the tapping neck formed adjacent to the container wall.
3. The securing device according to claim 2,
30 wherein
the neck base is realized as a collar formed in the area of transition from the container wall to the threaded extension of the tapping neck,

said collar

having latching protrusions distributed across its circumference, each latching protrusion having a latching surface which extends substantially parallel to a longitudinal axis of the tapping armature.

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4. The securing device according to claim 3,
wherein

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the latching protrusions are realized as latching ramps having a ramp surface which rises from the circumference of the neck base and which forms a latching shoulder with the latching surface.

5. The securing device according to any one of claims 1 to 4,
wherein

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the length of the tapping neck, the design of the external thread on the tapping neck, and the distribution of the latching protrusions at the circumference of the neck base are selected such that when the axial stop of the armature housing comes into contact with the front end of the tapping neck with a defined preload force, at least one locking protrusion of the locking means of the securing ring elastically latches behind the latching surface of a latching protrusion.

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6. The securing device according to any one of claims 1 to 5, wherein in order to form a radially acting sealing means, a sealing space is formed which has an inner sealing surface, which is formed by an outer wall of the inlet neck, and an outer sealing surface, which is formed by an inner wall of the tapping neck, and which is provided with an O-ring seal accommodated in the sealing space so as to come into contact with the inner sealing surface and with the outer sealing surface.

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7. The securing device according to claim 6,
wherein

for forming the sealing space, a circumferential recess is formed at an

inner opening edge at the front end of the tapping neck in such a manner that a limiting surface which axially limits the sealing space and which is axially recessed relative to a stop surface which serves to come into contact with the axial stop of the neck receiving space is formed by the recess.

8. The securing device according to claim 6 or 7,
wherein

the inner sealing surface and/or the outer sealing surface conically taper in the axial direction in such a manner that the height of the of the sealing space decreases in the direction of the tapping neck.

9. The securing device according to any one of claims 1 to 8,
wherein

the fixing means has a driver pocket formed at a front side of the securing ring, said front side facing the screw flange, said driver pocket serving to be engaged by a driver tab, which is formed on the screw flange, in such a manner that the tapping armature and the securing ring are disposed coaxially when driver tab is engaged in the driver pocket in a form-fitting manner.

10. The securing device according to claim 9,
wherein

in addition to the driver pocket, the securing ring has at least one other driver element which allows a torque to be transmitted from the screw flange to the securing ring in the mounting direction only.

11. The securing device according to claim 10,
wherein

the driver element has a radial stop surface serving to come into contact with a web flank of a driver web which is formed on the screw flange and which extends in the axial direction.

12. The securing device according to claim 11,

wherein

5 the driver element has a latching protrusion for axially latching on a mating latching element formed on the screw flange so as to fix the securing ring to the screw flange in a coaxial mounting position.

13. The securing device according to any one of claims 1 to 12,

wherein

10 the driver pocket is configured as a tamper-evident element in such a manner that a visible wall connected to a base wall formed on the securing ring via a predetermined breaking means is provided, a receiving space for the driver tab of the screw flange being formed between the base wall and the visible wall so as to form the driver
15 pocket

14. The securing device according to claim 13,

wherein

20 the visible wall has at least two visible-wall portions connected to the base wall via the predetermined breaking means, the front visible-wall portion in the dismounting direction of the screw flange having a stop edge for the driver tab and the rear visible-wall portion in the dismounting direction having a stop edge for a following driver web of the screw flange in the dismounting direction.