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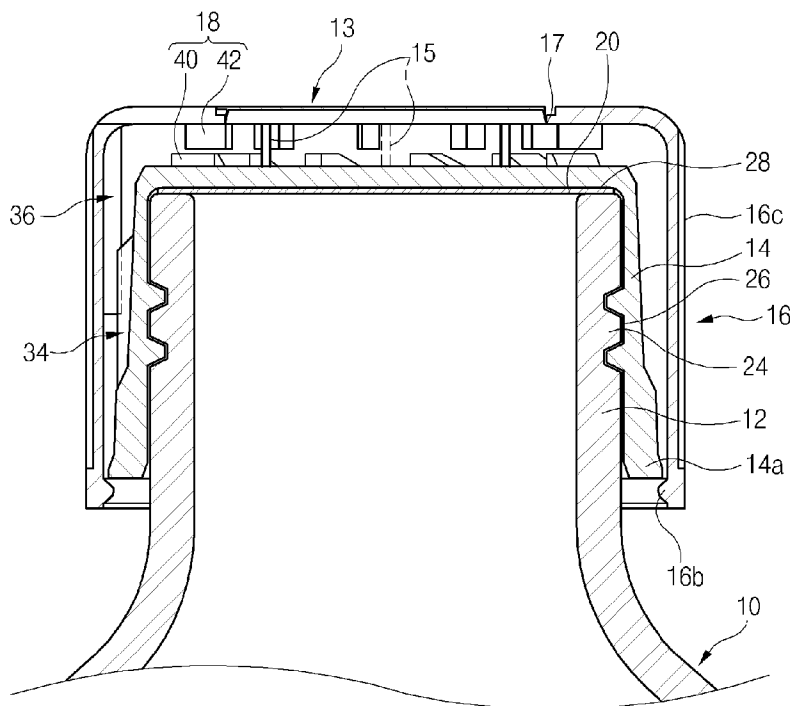
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[Fig. 4]



(57) Abstract: Disclosed is a closure of a vessel that is prevented from being arbitrarily opened. The closure of a vessel comprises: an inner closure mounted to a vessel inlet of a vessel; an outer closure disposed on an outer circumferential surface of the inner closure so as to perform an idle rotation with respect to the inner closure; a rotation force transmitting portion formed between the inner closure and the outer closure for transmitting a rotation force of the outer closure in an opening direction to the inner closure only when the outer closure is downwardly pressed by force more than a predetermined force; and a protection plate supported by a spacer that maintains a gap between the inner closure and the outer closure by being disposed therebetween, and detachably installed to the outer closure with constituting a part of an upper surface of the outer closure, for allowing the outer closure to perform only an idle rotation with

respect to the inner closure in an opening direction, and for transmitting a rotation force of the outer closure to the inner closure when the protection plate is detached from the outer closure and the outer closure is downwardly moved by a force more than a predetermined force from the rotation force transmitting portion.

Description

CLOSURE OF VESSEL

Technical Field

- [1] The present invention relates to a closure of a vessel, and more particularly, to a closure of a vessel that is prevented from being arbitrarily opened.

Background Art

- [2] Generally, vessels for storing poisonous drugs, vessels for storing detergents, vessels for storing domestic medicine, etc. are required to be equipped with child-resistant closures that can prevent an easy opening operation by children.
- [3] FIG. 1 is a sectional view of a child-resistant closure in accordance with the conventional art.
- [4] The conventional child-resistant closure comprises an inner closure 154 mounted to a vessel inlet 152 of a vessel 150 through which contents inside the vessel 150 are discharged, an outer closure 156 disposed outside the inner closure 154 for moving the inner closure 154 in upper and lower directions within a certain range, and a rotation force transmitting portion 160 formed between the inner closure 154 and the outer closure 156 for transmitting a rotation force of the outer closure 156 to the inner closure 154 only when the outer closure 156 is downwardly pressed and thereby rotating the inner closure 154.
- [5] A sealing member 170 for protecting the contents inside the vessel 150 is attached to an upper surface of the vessel inlet 152 of the vessel 150.
- [6] A female screw portion 174 screw-coupled to a male screw portion 172 formed on an outer circumferential surface of the vessel inlet 152 is formed at a lower portion of the inner closure 154. Also, a protrusion 178 for preventing the inner closure 154 from being separated from the outer closure 156 is protruding from an inner circumferential surface of a lower end of the outer closure 156.
- [7] The rotation force transmitting portion 160 comprises first locking protrusions 164 radially disposed on an outer upper surface of the inner closure 154 with a certain gap, the first locking protrusions 164 being upwardly protruding by a certain width, and second locking protrusions 166 radially disposed on an inner upper surface of the outer closure 156 with a certain gap, the second locking protrusions 166 being downwardly protruding by a certain width thus to be locked by the first locking protrusion 164.
- [8] According to the conventional child-resistant closure, the outer closure 156 performs an idle rotation on the outer circumferential surface of the inner closure 154 under a state that the inner closure 154 is mounted to the vessel inlet 152. Therefore, even when the outer closure 156 being rotated, the rotation force of the outer closure 156 is

not transmitted to the inner closure 154 and thereby the child can not easily open the outer closure 156.

- [9] When the outer closure 156 is downwardly pressed so as to open the closure, the second locking protrusions 166 of the outer closure 156 are inserted into a gap between the first locking protrusions 164 of the inner closure 154 thus to be engaged with the first locking protrusions 164. Under the state, if the outer closure 156 is rotated, the rotation force of the outer closure 156 is transmitted to the inner closure 154. As a result, the inner closure 154 is also rotated thus to be separated from the vessel inlet 152.
- [10] The closure is separated from the vessel inlet 152, and then the sealing member 170 sealing the vessel inlet 152 is removed by a user's hand or an additional tool such as a knife. Then, the contents stored in the vessel 150 are discharged out through the vessel inlet 152.
- [11] However, in the conventional child-resistant closure, since the sealing member 170 attached to the vessel inlet 152 has to be removed by a user's hand or an additional tool such as a knife after separating the vessel closure from the vessel 150, a user's inconvenience is caused.
- [12] Especially, when removing the sealing member 170 by the user's hand, the sealing member 170 is not smoothly separated from an edge of the vessel inlet 152 due to a strong adhesive force therebetween. As a result, the user has to remove the sealing member 170 again by his/her hand. As the user's hand comes in contact with the vessel inlet 152, sanitary problems may be caused.
- [13] Furthermore, in the conventional child-resistant closure, the locking protrusions 164 and 166 are respectively formed at upper portions of the inner closure 154 and the outer closure 156, and there is no structure to upwardly lift the outer closure 156. Accordingly, the outer closure 156 is downwardly moved by a self weight, and the second locking protrusions 166 of the outer closure 156 are engaged with the first locking protrusions 164 of the inner closure 154. This may cause the closure to be opened by a child.
- [14] In the conventional child-resistant closure, whether the closure is opened or not under a state a child has opened the closure can not be checked.
- [15] Furthermore, when the conventional child-resistant closure has been opened, expensive contents such as whisky may be substituted by forged contents. The forged contents may be sold as expensive liquors, thus causing unexpected damages to good suppliers or consumers.

Disclosure of Invention

Technical Problem

[16] Therefore, it is an object of the present invention to provide a closure of a vessel capable of allowing a user to check whether the closure of a vessel have been opened or not when the closure is arbitrarily opened.

[17] It is another object of the present invention to provide a closure of a vessel capable of being protected from an arbitrary opening, and capable of allowing a user to check whether the closure of a vessel have been opened or not by leaving opening marks after being mounted to the vessel and being opened.

Technical Solution

[18] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a closure of a vessel, comprising: an inner closure mounted to a vessel inlet of a vessel; an outer closure disposed on an outer circumferential surface of the inner closure so as to perform an idle rotation with respect to the inner closure; a rotation force transmitting portion formed between the inner closure and the outer closure for transmitting a rotation force of the outer closure in an opening direction to the inner closure only when the outer closure is downwardly pressed by force more than a predetermined force; and a protection plate supported by a spacer that maintains a gap between the inner closure and the outer closure by being disposed therebetween, and detachably installed to the outer closure with constituting a part of an upper surface of the outer closure, for allowing the outer closure to perform only an idle rotation with respect to the inner closure in an opening direction, and for transmitting a rotation force of the outer closure to the inner closure when the protection plate is detached from the outer closure and the outer closure is downwardly moved by a force more than a predetermined force from the rotation force transmitting portion.

[19] According to another aspect of the present invention, there is provided a closure of a vessel, comprising: an inner closure mounted to a vessel inlet of a vessel; an outer closure disposed on an outer circumferential surface of the inner closure so as to perform an idle rotation with respect to the inner closure; a rotation force transmitting portion formed between the inner closure and the outer closure for transmitting a rotation force of the outer closure in an opening direction to the inner closure only when the outer closure is downwardly pressed by a force more than a predetermined force; and a spacer for maintaining a gap between the inner closure and the outer closure by being disposed therebetween, such that the outer closure performs an idle rotation with respect to the inner closure in an opening direction even when the outer closure is downwardly moved by a force more than a predetermined force.

Advantageous Effects

[20] The closure of a vessel according to the present invention has an advantage in that

the closure of a vessel is prevented from being arbitrarily opened under a configuration that the closure having been mounted to a vessel is opened only after removing the protection plate.

- [21] The closure of a vessel according to the present invention has an advantage in that since the closure of a vessel is configured to be opened only after removing the protection plate, whether the closure is opened or not can be checked through a opened mark of the protection plate.

Brief Description of Drawings

- [22] FIG. 1 is a sectional view of a child-resistant closure in accordance with the conventional art;
- [23] FIG. 2 is a view showing an operation state of a child-resistant closure in accordance with the conventional art;
- [24] FIG. 3 is a perspective view of a closure of a vessel according to a first embodiment of the present invention;
- [25] FIG. 4 is a sectional view of the closure of a vessel of FIG. 3;
- [26] FIG. 5 is a perspective view of an inner closure of the closure of a vessel of FIG. 3;
- [27] FIG. 6 is a perspective view of an outer closure of the closure of a vessel of FIG. 3;
- [28] FIG. 7 is a perspective view of a first key and a second key formed at the inner closure and the outer closure of the closure of a vessel of FIG. 3, respectively;
- [29] FIG. 8 is a sectional view of the first and second keys of FIG. 7;
- [30] FIG. 9 is a sectional view of the closure of a vessel of FIG. 3 having a protection plate removed therefrom;
- [31] FIGS. 10 and 11 are sectional views taken along line A-A' in FIG. 3, which show operations of the closure of a vessel of FIG. 3;
- [32] FIGS. 14 to 16 are conceptual views showing operation procedures of the first and second keys of the closure of a vessel of FIG. 3;
- [33] FIG. 17 is a perspective view of a closure of a vessel according to a second embodiment of the present invention;
- [34] FIG. 18 is a perspective view of an inner closure of the closure of a vessel of FIG. 17;
- [35] FIG. 19 is a perspective view of a cutter of a sealing member removing unit of the closure of a vessel of FIG. 17;
- [36] FIG. 20 is a perspective view of a locking portion of the sealing member removing unit of the closure of a vessel of FIG. 17;
- [37] FIG. 21 is a sectional view showing a state that a sealing member has been cut by the sealing member removing unit of the closure of a vessel of FIG. 17;
- [38] FIG. 22 is a sectional view showing a modification example of the closure of a vessel

of FIG. 17;

- [39] FIG. 23 is a sectional view showing a state that a sealing member has been cut by a sealing member removing unit of the closure of a vessel of FIG. 22;
- [40] FIG. 24 is a sectional view of a closure of a vessel according to a third embodiment of the present invention; FIG. 25 is a sectional view of the closure of a vessel of FIG. 24 having a protection plate removed therefrom; FIGS. 26 to 29 are conceptual views showing operational procedures of first and second keys of the closure of a vessel of FIG. 24;
- [41] FIG. 30 is a sectional view of a closure of a vessel according to a fourth embodiment of the present invention; FIG. 31 is a sectional view of the closure of a vessel of FIG. 30 having a spacer 350 removed therefrom;
- [42] FIG. 32 is a sectional view of a closure of a vessel according to a fifth embodiment of the present invention; FIGS. 33 and 34 are sectional views taken along line IV-IV in FIG. 32;
- [43] FIG. 35 is a modification example of a spacer and a reverse rotation force transmitting portion of the closure of a vessel of FIG. 32, which shows an outer closure being rotated in a closing direction; FIG. 36 is a conceptual view showing a state that the outer closure of the closure of a vessel of FIG. 35 is being rotated in an opening direction; FIG. 37 is a conceptual view showing a state that the outer closure of the closure of a vessel of FIG. 35 is being rotated in a closing direction; and
- [44] FIG. 38 is a sectional view of a closure of a vessel according to a sixth embodiment of the present invention; FIG. 39 is a disassembled perspective view of the closure of a vessel of FIG. 38; FIG. 40 is a view showing coupled state of the closure of the vessel of FIG. 38; and FIG. 41 is a perspective view of an inner closure of the closure of a vessel of FIG. 38;

Mode for the Invention

- [45] The technical features of the present invention are summarized as follows. Firstly, a closure of a vessel is composed of an inner closure coupled to a vessel, and an outer closure engaged with the inner closure and transmitting a rotation force to the inner closure. Secondly, a spacer for maintaining a gap between the inner and outer closures is installed, so that the outer closure can perform only an idle in an opening direction once the closure of a vessel has been mounted to the vessel.
- [46] Hereinafter, a closure of a vessel according to the present invention will be explained in more detail with reference to the attached drawings.
- [47] A closure of a vessel according to a first embodiment of the present invention comprises: an inner closure 14 mounted to a vessel inlet 12 through which contents stored in a vessel 10 are discharged out; an outer closure 16 disposed on an outer cir-

cumferential surface of the inner closure 14 so as to perform an idle rotation with respect to the inner closure 14; a rotation force transmitting portion 18 formed between the inner closure 14 and the outer closure 16 for transmitting a rotation force of the outer closure 16 to the inner closure 14 only when the outer closure 16 is downwardly pressed by a force more than a predetermined force; and a protection plate 13 supported by a spacer 15 that maintains a gap between the inner closure 14 and the outer closure 16 by being disposed between the inner closure 14 and the outer closure 16, and detachably mounted to the outer closure 16 with constituting a part of an upper surface of the outer closure 16, for allowing the outer closure 16 to perform only an idle rotation with respect to the inner closure 14 in an opening direction, and for transmitting a rotation force of the outer closure 16 to the inner closure 14 when detached from the outer closure 16, the outer closure 16 downwardly moved by a force more than a predetermined force from the rotation force transmitting portion 18.

- [48] The vessel 10 may contain various contents such as harmful to children such as poisonous drugs, detergents, domestic drugs, refined contents, powders, etc.
- [49] A sealing member 20 for protecting the contents stored in the vessel 10 by sealing the vessel inlet 12 may be attached to the vessel inlet 12 through which the contents are discharged out. Preferably, the sealing member 20 is formed of paper or an aluminum thin plate, etc. that can be easily removed by a knife, etc.
- [50] The inner closure 14 is formed in a cylindrical shape having opened upper and lower ends. A female screw portion 26 screw-coupled to a male screw portion 24 formed on an outer circumferential surface of the vessel inlet 12 is formed on a lower inner circumferential surface of the inner closure 14. An close contact portion 28 for closely contacting an upper end of the vessel inlet 12 thereto may be protruding from an upper inner circumferential surface of the female screw portion 26.
- [51] A separation preventing protrusion 11 for preventing separation of the inner closure 14 from the outer closure 16 may be protruding from an outer circumferential surface of the lower end of the inner closure 14. An outer separation preventing protrusion 16b on an inner circumferential surface of the lower end rather than the separation preventing protrusion 14a, or both the outer separation preventing protrusion 16b and the separation preventing protrusion 14a may be formed.
- [52] The outer closure 16 is inserted to outside of the inner closure 14 so as to be moveable in upper and lower directions, and is formed in a cylindrical shape having opened upper and lower ends. A plurality of concaved-convexed portions 16c through which a user can easily rotate the outer closure 16 with using his hand are formed on an outer circumferential surface of the outer closure 16.
- [53] The rotation force transmitting portion 18 includes one or more first keys 40 formed on an outer side surface of the inner closure 14 in a circumferential direction, and one

or more second keys 42 formed on an inner side surface of the outer closure 16, for transmitting a rotation force in an opening direction of the outer closure 16 to the inner closure 14, by being gear-engaged with the first keys 40 when the outer closure 16 is pressed by a force more than a predetermined force.

- [54] The first keys 40 may be disposed on an outer side surface of the inner closure 14 in a circumferential direction with the same interval therebetween in plurality in number. The first key 40 may be formed with a hook for locking the second key 42 of the outer closure 16 in a closing direction of the inner closure 14, an inclination surface so that the second key 42 of the outer closure 16 contacting thereto by a pressing operation in an opening direction of the inner closure 14 can slide therethrough.
- [55] The second keys 42 may be disposed on an inner side surface of the outer closure 16 in a circumferential direction with the same interval therebetween in plurality in number. The second key 42 may be formed with a hook for locking the hook of the first key 40 in a closing direction of the outer closure 16, an inclination surface so that the inclination surface of the first key 40 contacting thereto in an opening direction of the outer closure 16 can slide therethrough.
- [56] The first key 40 and the second key 42 may have any configurations that they are gear-engaged with each other when the outer closure 16 is pressed, and may be formed on either an outer surface of the inner closure 14 or an inner surface of the outer closure 16.
- [57] The first key 40 and the second key 42 may have a predetermined gap therebetween. There may be formed an elastic member (not shown) supported by an upper surface of the inner closure 14 and maintaining an upwardly moved state of the outer closure 16 from the inner closure 14.
- [58] Differently from the spacer for allowing the outer closure 16 to perform only an idle rotation in an opening direction, the elastic member is formed of a thin film configured to generate an elastic force by being bent. The elastic member has an end portion supported by an upper surface of the inner closure 14, thereby providing its elastic force to the outer closure 16 and thus maintaining an upwardly moved state of the outer closure 16.
- [59] Once the outer closure 16 is downwardly pushed, the outer closure 16 is downwardly moved while the elastic member is elastically deformed. However, once the force applied to the outer closure 16 is released, the outer closure 16 is upwardly moved to the original position by an elastic force of the elastic member.
- [60] When the outer closure 16 is not pressed by a force more than a predetermined force, the outer closure 16 is not completely pressed because an elastic force from the elastic member is applied to the outer closure 16. Accordingly, the first key 40 of the inner closure 14 and the second key 42 of the outer closure 16 are not completely engaged

with each other. As a result, even if the outer closure 16 is rotated, the rotation force of the outer closure 16 is not transmitted to the inner closure 14 since the second key 42 slides through the inclination surface of the first key 40. Therefore, the closure of a vessel is prevented from being opened.

- [61] The protection plate 13 is formed in a disc shape disposed on an upper inner circumferential surface of the outer closure 16 with a predetermined gap. A plurality of bridges 17 are disposed between an outer circumferential surface of the protection plate 13 and an upper inner circumferential surface of the outer closure 16, and maintain a fixed state of the protection plate 13 to the outer closure 16, and connected parts of the bridges 17 are cut when the protection plate 13 is downwardly moved. Rather than the bridges 17, cutting grooves may be formed to facilitate separation of the protection plate 13 from the outer closure 16.
- [62] A concaved portion 16a may be formed at the outer closure 16 so as to expose the protection plate 13 in a radius direction for a user's facilitation to easily separate the protection plate 13 from the outer closure 16. As shown in FIG. 4, the protection plate 13 may be formed to be more protruding from the original exposed part in a radius direction.
- [63] In order to allow a user to notice a separated state of the protection plate 13 from the outer closure 16, the protection plate 13 may be configured to be cut into a plurality of pieces when being separated from the outer closure 16. And, the protection plate 13 may be configured to be discolored when being deformed.
- [64] The spacer 15 is configured to maintain a constant gap between the inner closure 14 and the outer closure 16 so that the first key 40 of the inner closure 14 is gear-engaged with the second key 42 of the outer closure 16 even when a force is applied to the outer closure 16.
- [65] The spacer 15 may have any configurations to maintain a constant gap between the inner closure 14 and the outer closure 16 by supporting a bottom surface of the protection plate 13. The spacer 15 may be protruding from a bottom surface of the protection plate 13, or an upper side surface of the inner closure 14.
- [66] And, the spacer 15 may be implemented as one or more rods protruding from a bottom surface of the protection plate 13, or an upper side surface of the inner closure 14. The spacer 15 may be implemented as a ring portion or a plate as shown in a third embodiment rather than a rod, or may be implemented as a skirt installed on a lower end of the outer closure 16 as shown in a fourth embodiment.
- [67] When the protection plate 13 supported by the spacer 15 is installed, the outer closure 16 performs only an idle rotation with respect to the inner closure 14. Accordingly, the closure of a vessel requires a reverse rotation force transmitting portion for transmitting a rotation force of the outer closure 16 to the inner closure 14 in a

closing direction so as to be mounted to the vessel 10.

- [68] The reverse rotation force transmitting portion may include a first inclination protrusion 34 formed on a side outer circumferential surface of the inner closure 14 so as to form an inclination surface 34a in an opening direction and to form a hook 34b in a closing direction, and a second inclination protrusion 36 formed on an inner circumferential surface of the outer closure 16 so as to form an inclination surface 36a in an opening direction and to form a hook 36b in a closing direction in correspondence to the first inclination protrusion 34. As inclination surface 36a of the second inclination protrusion 36 slides over the inclination surface 34a of the first inclination protrusion 34, the outer closure 16 performs an idle rotation with respect to the inner closure 14. And, as the hook 36b of the second inclination protrusion 36 is locked by the hook 34b of the first inclination protrusion 34, a rotation force of the outer closure 16 in a closing direction is transmitted to the inner closure 14.
- [69] The closure of a vessel can be mounted to the vessel 10 by the above configuration of the reverse rotation force transmitting portion including the first inclination protrusion 34 and the second inclination protrusion 36. The configuration allows the outer closure 16 to perform an idle rotation with respect to the inner closure 14 in an opening direction, but allows a rotation force of the outer closure 16 to be transmitted to the inner closure 14 in a closing direction.
- [70] The reverse rotation force transmitting portion may be implemented by controlling shapes and heights of the first key 40 and the second key 42.
- [71] That is, the reverse rotation force transmitting portion may be implemented by forming a hook of the first key 40 for locking the second key 42 of the outer closure 16 in a closing direction of the inner closure 14, and by forming an inclination surface of the first key 40 through which the second key 42 of the outer closure 16 contacting the first key 40 can slide in an opening direction of the inner closure 14. Here, the second key 42 may be formed with a hook for locking the hook of the second key 42 in a closing direction of the outer closure 16, and may be provided with an inclination surface in an opening direction of the outer closure 16 through which the inclination surface of the second key can slide.
- [72] The first key 40 may include a first inclined portion 51 that constitutes the rotation force transmitting portion 18 together with the second key 42, and a second inclined portion 52 higher than the first inclined portion 51.
- [73] The first inclined portion 51 is gear-engaged with the second key 42, and transmits a rotation force of the outer closure 16 to the inner closure 14 only when a force more than a predetermined force is applied to the outer closure 16. And, the first inclined portion 51 is formed with an inclination surface 51a in an opening direction, but is provided with a hook 51b in a closing direction.

- [74] The second inclined portion 52 is configured to transmit a rotation force of the outer closure 16 to the inner closure 14 only in a closing direction under a state that the outer closure 16 is disposed at an upper side by the spacer 15. And, the second inclined portion 52 is configured to allow the outer closure 16 to perform an idle rotation with respect to the inner closure 14 in an opening direction. The second inclined portion 52 is formed with an inclination surface 52a having a height higher than that of the inclination surface 51a of the first inclined portion 51 in an opening direction, but is formed with a hook 52b in a closing direction. Here, the inclination surfaces 51a and 52a may have planar or curved surfaces, etc.
- [75] The second key 42 may include a first key portion 53 and a second key portion 54 corresponding to the first inclined portion 51 and the second inclined portion 52, respectively. The second key portion 54 may have an inclined surface in an opening direction.
- [76] As shown in FIG. 8, the first key portion 53 and the second key portion 54 may have different heights from each other from a bottom surface of the outer closure 16, thereby preventing interferences with the inclination surfaces 51a and 52a of the first inclined portion 51 and the second inclined portion 52. That is, the first key portion 53 corresponding to the first inclined portion 51 may be formed to have a height higher than that of the second key portion 54 corresponding to the second inclined portion 52.
- [77] Under a state that the spacer 15 has been installed, the first inclined portion 51 is formed not to overlap the first key portion 53, whereas the second inclined portion 52 is formed to partially overlap the second key portion 54. Accordingly, when the outer closure 16 is rotated in a closing direction, the second key portion 52 is locked by the hook 52b of the second inclined portion 52, thereby allowing a rotation force of the outer closure 16 to be transmitted to the inner closure 14.
- [78] As shown in FIG. 7c, the first key portion 53 and the second key portion 54 may be installed to have a phase difference from each other based on the center of the closure.
- [79] Hereinafter, the operation of the closure of a vessel according to the first embodiment of the present invention will be explained in more detail.
- [80] Referring to FIGS. 4 and 10, in the case that the closure has been mounted to the vessel, a constant gap between the inner closure 14 and the outer closure 16 is maintained by the spacer 15. Accordingly, even when a force is applied to the outer closure 16, a rotation force of the outer closure 16 is not transmitted to the inner closure 14 in an opening direction, because the first key 40 and the second key 42 can not be gear-engaged with each other. Rather, the outer closure 16 performs only an idle rotation with respect to the inner closure 14. Here, the closure can be mounted to the vessel by transmitting a rotation force of the outer closure 16 to the inner closure 14 by the reverse rotation force transmitting portion.

- [81] In case of separating the closure from the vessel 10, a user separates the protection plate 13 from the outer closure 16.
- [82] Once the protection plate 13 is separated from the outer closure 16, the spacer 15 is removed to downwardly move the outer closure 16 as shown in FIGS. 9 and 11. Then, once a user does not downwardly apply a constant force but rotates the outer closure 16 in an opening direction, the second key 42 of the outer closure 16 is moved toward the inclination surface of the first key 40.
- [83] As shown in FIG. 9, the second key 42 of the outer closure 16 slides through the inclination surface of the first key 40. Accordingly, even after the outer closure 16 is downwardly moved under a state that the protection plate 13 has been removed, the outer closure 16 performs an idle rotation with respect to the inner closure 14.
- [84] Once the user downwardly applies a predetermined force to the outer closure 16, the first key 40 and the second key 42 are gear-engaged with each other as shown in FIG. 13. And, when the outer closure 16 is rotated in an opening direction, the rotation force of the outer closure 16 is transmitted to the inner closure 14. Accordingly, the inner closure 14 is rotated, and thus the closure may be separated from the vessel inlet 12.
- [85] Hereinafter, will be explained an operation of the first key 40 shown in FIGS. 7 and 8.
- [86] Before the protection plate 13 is removed from the outer closure 16, as shown in FIG. 14, the outer closure 16 is positioned at an upper portion by the spacer 15. When the outer closure 16 is rotated in an opening direction, the second key 42 slides through the inclination surface 52a of the second inclined portion 52. On the contrary, when the outer closure 16 is rotated in a closing direction, the second key portion 54 of the second key 42 is locked by the hook 52b of the second inclined portion 52 as shown in FIG. 15, thereby transmitting a rotation force of the outer closure 16 to the inner closure 14.
- [87] After the protection plate 13 has been removed from the outer closure 16, a part of the outer closure 16 is downwardly moved as shown in FIG. 14.
- [88] Here, when the user rotates the outer closure 16 in an opening direction without downwardly applying a force to the outer closure 16, the first key portion 53 and the second key portion 54 of the second key 42 slide through the inclination surfaces 51a and 52a of the first inclined portion 51 and the second inclined portion 52 of the first key 40. Accordingly, the outer closure 16 performs an idle rotation with respect to the inner closure 14 in an opening direction.
- [89] On the contrary, when the user rotates the outer closure 16 in an opening direction with downwardly applying a force to the outer closure 16, the first key portion 53 and the second key portion 54 of the second key 42 are gear-engaged with the first inclined portion 51 and the second inclined portion 52 of the first key 40 as shown in FIG. 15.

Accordingly, the rotation force of the outer closure 16 is transmitted to the inner closure 14, thereby separating the closure from the vessel 10.

- [90] The inner closure or the outer closure of the closure according to the present invention may have various functions. For instance, the inner closure may be provided with a sealing member removing unit for removing a sealing member and storing the removed sealing member therein.
- [91] A closure of a vessel according to a second embodiment is different from that according to a first embodiment in that a sealing member removing unit 22 is further comprised. The sealing member removing unit 22 formed at the inner closure 14 removes a sealing member 20 sealing the vessel inlet 12 when the inner closure 14 is separated from the vessel inlet 12, and then stores the removed sealing member 20 in the inner closure 14.
- [92] Since the closure of a vessel according to the second embodiment has the same configuration as the closure of a vessel according to the first embodiment except for the sealing member removing unit 22, the same reference numerals will be given to the second embodiment and their detailed explanations will be omitted.
- [93] The sealing member removing unit 22 includes a pressing plate 24 disposed in the inner closure 14 so as to be movable in upper and lower directions, and pressed by a user; a cutter 26 formed at an edge of a lower surface of the pressing plate 24 in a circumferential direction for penetrating the sealing member 20 when the pressing plate 24 is pressed and cutting the sealing member 20 when the inner closure 14 is rotated; a locking portion 28 downwardly protruding from the lower surface of the pressing plate 24 for accommodating the sealing member 20 cut by the cutter 26 inside of a body 16; and a connection portion 30 connected between an outer circumferential surface of the pressing plate 24 and an inner circumferential surface of the inner closure 14, for guiding the pressing plate 24 to move in upper and lower directions, and supporting the pressing plate 24 having moved to another position by its own elastic force.
- [94] The pressing plate 24 may be formed in a disc shape having a diameter smaller than an inner diameter of the inner closure 14.
- [95] As shown in Figures, the cutter 26 for cutting the sealing member 20 by rotating the inner closure 14 includes a plurality of supporting portions 26a formed at an edge of a lower surface of the pressing plate 24 with the same interval therebetween, a first cutting portion 26b sharply formed at a lower end of the supporting portion 26a and downwardly moved when the pressing plate 24 is pressed for penetrating the sealing member 20, and a second cutting portion 26c formed on at least one side surface of both side surfaces of the supporting portion 60 for cutting the sealing member 20 as a circular shape with being rotated under a contact state to an inner circumferential surface of the vessel inlet 12 when the inner closure 14 is rotated.

- [96] As shown in Figures, the locking portion 28 includes a supporting rod 28a extending from a lower surface of the pressing plate 24 by a predetermined length for penetrating the sealing member 20, and one or more locking protrusions 28c formed at a side surface of the supporting rod 28a for locking the sealing member 20 so that the sealing member 20 cut by the cutter 26 can be stored in the inner closure 14.
- [97] The supporting rod 28a is formed as a bar type extending toward a lower direction of the pressing plate 24, and a punch portion 28b for penetrating the sealing member 20 is formed in a sharp shape at the end of the supporting rod 28a.
- [98] The locking protrusion 28c is formed to be elastically transformed, and is upwardly bent at the time of penetrating the sealing member 20 thereby to pass through a hole formed by the punch portion 28b and to be inserted into the sealing member 20. Then, the locking protrusion 28c is extended into the original state after being positioned at an inner side of the sealing member 20 thereby to be locked at the inner surface of the sealing member 20.
- [99] The locking protrusion 28c is perpendicularly extending from both side surfaces of the supporting rod 28a by a predetermined length in one or more in number.
- [100] The connection portion 30 is formed between an outer circumferential surface of the pressing plate 24 and an inner circumferential surface of the inner closure 14 as a thin film having a dome shape. The connection portion 30 is elastically transformed when the pressing plate 24 is pressed by a force more than a predetermined force, thereby guiding the pressing plate 24 to be downwardly moved.
- [101] The connection portion 30 elastically maintains a current position of the pressing plate 24. That is, when the pressing plate 24 is upwardly protruding without being pressed, the connection portion 30 has a convex dome shape and maintains the current state of the pressing plate 24. However, when the pressing plate 24 is pressed by a force more than a predetermined force, the connection portion 30 is elastically transformed into a concave shape and maintains the pressed state of the pressing plate 24.
- [102] As shown in FIG. 17, the spacer 15 for maintaining a gap between the inner closure 14 and the outer closure 16 may be installed on an upper surface of the pressing plate 24 so as to be supported thereby, or may be installed at the connection portion 30 for connecting the pressing plate 24 to the inner closure 14.
- [103] The operation of the sealing member removing unit 22 will be explained. The operation of the closure of a vessel according to the second embodiment is the same as that according to the first embodiment except for the sealing member removing unit, and thus its detailed explanation will be omitted.
- [104] In the closure of a vessel according to the second embodiment, since the pressing plate 24 of the sealing member removing unit 22 is covered by the protection plate 13,

the pressing plate 24 can be pressed to remove the sealing member 20 after the protection plate 13 has been removed.

[105] Accordingly, in order to remove the sealing member 20 by the sealing member removing unit 22, a user removes the protection plate 13 from the outer closure 16.

[106] Then, once the user presses the pressing plate 24 by applying a force thereto, the pressing plate 24 is downwardly moved by an elastic operation of the connection portion 30. And, the locking portion 28 and the cutter 26 installed at a bottom surface of the pressing plate 24 having been downwardly moved penetrate the sealing member 20 as shown in FIG. 21 or 23.

[107] Here, the locking protrusion 28c of the locking portion 28 is upwardly bent at the time of penetrating the sealing member 20 thereby to pass through a hole formed by the punch portion 28b and to be inserted into the sealing member 20. Then, the locking protrusion 28c is extended into the original state after being positioned at an inner side of the sealing member 20 thereby to be locked at the inner surface of the sealing member 20.

[108] Under this state, the user rotates the outer closure 16 in an opening direction by downwardly applying a force to the outer closure 16. Accordingly, the first key 40 and the second key 42 are gear-engaged with each other, and the rotation force of the outer closure 16 is transmitted to the inner closure 14, thereby rotating the inner closure 14. As the inner closure 14 is rotated, the cutter 26 cuts the sealing member 20 in a circumferential direction.

[109] Once the user rotates the closure until the closure is separated from the vessel inlet 12, the sealing member 20 which maintains a locked state by the locking portion 28 is separated from the vessel inlet 12 together with the inner closure 14.

[110] The spacer may be variously configured to maintain a gap between the inner closure and the outer closure by being disposed therebetween. The spacer allows the outer closure to perform an idle rotation with respect to the inner closure in an opening direction, even if a rotation force in an opening direction of the outer closure having downwardly moved by a force more than a predetermined force is transmitted to the inner closure.

[111] Hereinafter, a closure of a vessel according to a third embodiment of the present invention will be explained in more detail with reference to the attached drawings.

[112] FIG. 24 is a sectional view of a closure of a vessel according to a third embodiment of the present invention, FIG. 25 is a sectional view of the closure of a vessel of FIG. 24 having a protection plate removed therefrom, and FIGS. 26 to 29 are conceptual views showing operational procedures of first and second keys of the closure of a vessel of FIG. 24.

[113] The closure of a vessel according to the third embodiment is the same as that of the

second embodiment except for a spacer and a reverse rotation force transmitting portion. Accordingly, only the spacer and the reverse rotation force transmitting portion will be explained. The configuration of the third embodiment may be applied to the first embodiment.

- [114] The spacer 250 may include a ring portion protruding from an upper surface of the inner closure 14 or a bottom surface of the protection plate 13. FIGS. 24 and 25 show an example that the ring portion is protruding from an upper surface of the inner closure 14.
- [115] The ring portion is protruding from an upper surface of the inner closure 14 or a bottom surface of the protection plate 13, thereby maintaining a gap between the second key 42 of the outer closure 16 and the first key 40 of the inner closure 14 so as to prevent an engaged state with each other.
- [116] The ring portion may be formed to have a height high enough to prevent the second key 42 of the outer closure 16 from contacting the first key 40 of the inner closure 14, or enough to allow a partial contact therebetween.
- [117] In the case that the second key 42 of the outer closure 16 is spacing from the first key 40 of the inner closure 14 without contact therebetween, the reverse rotation force transmitting portion may be further provided so as to facilitate a coupling process of the closure to the vessel.
- [118] In the case that the second key 42 of the outer closure 16 is disposed to contact the first key 40 of the inner closure 14, the first key 40 may be provided with an inclination surface 40b in an opening direction so that a rotation force of the outer closure 16 can not be transmitted to the inner closure 14 due to sliding of the second key 42.
- [119] As shown in FIG. 27, the inclination surface 40b is formed to have a depth deep enough to prevent a rotation force of the outer closure 16 from being transmitted to the inner closure 14 by sliding the end of the second key 42 therethrough when a user downwardly pushes the outer closure 16 toward the inner closure 14. The inclination surface 40b is formed to have a proper depth with consideration of tolerances and modifications of the inner closure 14 and the outer closure 16.
- [120] Since the second key 42 of the outer closure 16 and the first key 40 of the inner closure 14 maintain a predetermined gap therebetween by the spacer 250 so as not to be engaged with each other, a rotation force of the outer closure 16 is not transmitted to the inner closure 14 even when the user rotates the outer closure 16. Accordingly, it is impossible to open the closure of a vessel without removing the protection plate 13.
- [121] Hereinafter, procedures for opening the closure from the vessel by the user will be explained.
- [122] Firstly, like in the first or second embodiment, once the user has removed the

protection plate 13, the closure of a vessel is implemented as shown in FIG. 28. When the outer closure 16 is rotated by the user, the rotation force of the outer closure 16 is not transmitted to the inner closure 14 due to the inclination surface of the first key 40.

[123] Herein, when the user pushes the outer closure 16 toward the inner closure 14, the outer closure 16 is moved to the inner closure 14. Accordingly, the first key 40 and the second key 42 are engaged with each other as shown in FIG. 29, thereby transmitting a rotation force of the outer closure 16 being rotated by the user to the inner closure 14. Since the outer closure 16 and the inner closure 14 of the closure of a vessel are formed of transformable materials such as plastic, the first key 40 and the second key 42 are engaged with each other due to mutual transformations of the outer closure 16 and the inner closure 14 having received a force from the user.

[124] Once the spacer 250 has been removed, it can not be restored to the original state. Accordingly, the user can check whether the closure of a vessel has been opened or not according to whether the spacer 250 exists or not.

[125] The spacer 250 may be modified into various shapes rather than the ring shape.

[126] Hereinafter, a closure of a vessel according to a fourth embodiment of the present invention will be explained in more detail.

[127] FIG. 30 is a sectional view of a closure of a vessel according to a fourth embodiment of the present invention, and FIG. 31 is a sectional view of the closure of a vessel of FIG. 30 having a spacer 350 removed therefrom.

[128] The closure of a vessel according to the fourth embodiment is similar to that according to the third embodiment except for the spacer 350. Accordingly, only the spacer 350 will be explained in brief.

[129] The spacer 350 may be detachably installed near a lower end of the outer closure 16 or the inner closure 14.

[130] Here, the spacer 350 maintains a gap between the second key 42 of the outer closure 16 and the first key 40 of the inner closure 14 as shown in FIGS. 26 and 27.

[131] As shown in FIG. 30, the spacer 350 may be implemented as a skirt connected to a lower end of the outer closure 16 by one or more bridges 351, and supported by the inner closure 14 or the vessel for maintaining a constant gap between the second key 42 of the outer closure 16 and the first key 40 of the inner closure 14.

[132] Here, the spacer 350 may be variously modified to have groove portions provided with cut patterns(a knife line) so as to be separated from the outer closure 16 by cutting.

[133] As shown in FIG. 31, under a state that the spacer 350 in the form of a skirt has been removed, when the user pushes the outer closure 16 toward the inner closure 14, the outer closure 16 is moved to the inner closure 14. Accordingly, as shown in FIG. 29, the first key 40 and the second key 42 are engaged with each other, thereby

transmitting a rotation force of the outer closure 16 being rotated by the user to the inner closure 14. Since the outer closure 16 and the inner closure 14 of the closure of a vessel are formed of transformable materials such as plastic, the first key 40 and the second key 42 are engaged with each other due to mutual transformations of the outer closure 16 and the inner closure 14 having received a force from the user.

- [134] Once the spacer 350 has been removed, it can not be restored to the original state. Accordingly, the user can check whether the closure of a vessel has been opened or not according to whether the spacer 350 exists or not.
- [135] In the closure of a vessel of the present invention, the outer closure 16 is configured to perform an idle rotation with respect to the inner closure 14. Accordingly, a reverse rotation force transmitting portion for transmitting a rotation force of the outer closure being rotated to the inner closure in a closing direction may be preferably provided for facilitation of a coupling process of the closure to the vessel.
- [136] The reverse rotation force transmitting portion may have any configurations to transmit a rotation force of the outer closure being rotated to the inner closure in a closing direction.
- [137] Hereinafter, a closure of a vessel according to a fifth embodiment of the present invention will be explained in more detail.
- [138] FIG. 32 is a sectional view of a closure of a vessel according to a fifth embodiment of the present invention, and FIGS. 33 and 34 are sectional views taken along line IV-IV in FIG. 32.
- [139] A closure of a vessel according to a fifth embodiment is similar to that according to the third embodiment except for a reverse rotation force transmitting portion, and thus only the reverse rotation force transmitting portion will be explained. Differently from the closure of a vessel according to the third embodiment, the closure of a vessel according to a fifth embodiment is not provided with a pressing plate.
- [140] The spacer 250 may be protruding from an upper surface of the inner closure 14 or a bottom surface of the protection plate 13 (the upper surface of the inner closure 14 in the fifth embodiment). And, the spacer 250 may be provided with a ring portion having a cut-out portion 251 cut-out one or more times in a circumferential direction.
- [141] The spacer 250 may be composed of a plurality of circular plates each having a curvature. As shown in FIGS. 32 to 34, the spacer 250 may be composed of a plurality of flat plates 252 that constitutes a virtual circle (C1).
- [142] As shown in FIGS. 32 to 34, the reverse rotation force transmitting portion may include one or more reverse rotation protrusions 260 formed on an inner surface of the outer closure 16 or an outer surface of the inner closure 14 so as to be locked by the cut-out portion 251 of the ring portion, the spacer 250 in a closing direction of the inner closure 14. When the spacer 250 is formed at the inner closure 14, the reverse

rotation protrusion 260 is formed on an inner surface of the outer closure 16. However, when the spacer 250 is formed at the outer closure 16, the reverse rotation protrusion 260 is formed on an outer surface of the inner closure 14.

[143] The reverse rotation protrusion 260 may include a locking surface 261 locked by the cut-out portion 251 of the ring portion in a closing direction of the inner closure 14, and an inclination surface 262 formed to be spacing from the cut-out portion 251 of the ring portion in an opening direction from the locking surface 261.

[144] For instance, as shown in FIGS. 32 to 34, the spacer 250 is formed on an upper surface of the inner closure 14 as a ring portion to support the protection plate 13. And, the spacer 250 having a thin thickness and cut-out so as to be easily bent when a force is applied from an outer or inner circumferential surface of the spacer 250 is provided with a plurality of cut-out portions 251.

[145] Preferably, one side 251a of the cut-out portion 251 of the spacer 250, which is toward a closing direction based on the virtual circle C_1 is more protruding toward outside of the virtual circle C_1 , i.e., the reverse rotation protrusion 260. And, the other side 251b of the cut-out portion 251 of the spacer 250, which is toward an opening direction based on the virtual circle C_1 is more protruding toward inside of the virtual circle C_1 .

[146] The reverse rotation protrusion 260 of the reverse rotation force transmitting portion is implemented in one or more in number, and is formed on an inner surface of the outer closure 16.

[147] Here, the reverse rotation protrusion 260 includes a locking surface 261 locked by the one side 251a of the cut-out portion 251 toward a closing direction. Preferably, the reverse rotation protrusion 260 is provided with an inclination surface 262 formed to be spacing from the cut-out portion 251 of the ring portion in an opening direction from the locking surface 261, so that the outer closure 16 can smoothly perform an idle rotation with respect to the inner closure 14 in an opening direction without interference with the inner closure 14.

[148] Under this configuration, once the outer closure 16 is rotated in a closing direction, the one side 251a toward a closing direction is locked by the locking surface 261 as shown in FIG. 33. Accordingly, a rotation force of the outer closure 16 is transmitted to the inner closure 14.

[149] However, referring to FIG. 34, once the outer closure 16 is rotated in an opening direction, the locking surface 261 inwardly pushes the spacer 250 by the inclination surface 262 when it is toward the other side 251b of the cut-out portion 251 of the spacer 250. Accordingly, a rotation force of the outer closure 16 is prevented from being transmitted to the inner closure 14.

[150] FIG. 35 is a modification example of a spacer and a reverse rotation force

transmitting portion of the closure of a vessel of FIG. 32, which shows an outer closure being rotated in a closing direction; FIG. 36 is a conceptual view showing a state that the outer closure of the closure of a vessel of FIG. 35 is being rotated in an opening direction; and FIG. 37 is a conceptual view showing a state that the outer closure of the closure of a vessel of FIG. 35 is being rotated in a closing direction.

- [151] The spacer 250 and the reverse rotation force transmitting portion may have various modifications. As shown in FIGS. 35 to 37, the spacer 250 is implemented as a ring portion. And, the reverse rotation force transmitting portion may include one or more first protrusions 363 formed on an outer circumferential surface of the ring portion, and one or more second protrusions 364 formed at the outer closure 16 and locked by the first protrusions 363 only in a closing direction.
- [152] Preferably, surfaces of the first protrusion 363 and the second protrusion 364 facing each other in a closing direction constitute hooks 363a and 364a, whereas opposite surfaces thereto in an opening direction constitute inclination surfaces 363b and 364b.
- [153] The second protrusion 364 of the reverse rotation force transmitting portion is rotated as the outer closure 16 is rotated. As shown in FIG. 35, when the outer closure 16 is rotated in a closing direction, the hooks 363a and 364a of the first protrusion 363 and the second protrusion 364 are locked by each other. Accordingly, a rotation force of the outer closure 16 is transmitted to the inner closure 14, thereby coupling the closure to the vessel.
- [154] Referring to FIG. 36, when the outer closure 16 is rotated in an opening direction, inclination surfaces 363b and 364b of the first protrusion 363 and the second protrusion 364 come in contact with each other to be elastically deformed. Accordingly, a rotation force of the outer closure 16 is prevented from being transmitted to the inner closure 14 by sliding the inclination surfaces 363b and 364b.
- [155] Referring to FIG. 37, the protection plate 13 may be provided with a cut-out portion 13a through which a user can observe the second protrusion 364 of the outer closure 16 from outside.
- [156] FIG. 38 is a sectional view of a closure of a vessel according to a sixth embodiment of the present invention, FIG. 39 is a disassembled perspective view of the closure of a vessel of FIG. 38, FIG. 40 is a sectional view showing a coupled state of the closure of FIG. 38 to a vessel, and FIG. 41 is a perspective view of an inner closure of the closure of a vessel of FIG. 38.
- [157] A closure of a vessel according to a sixth embodiment is similar to that according to the third embodiment except for a reverse rotation force transmitting portion, and thus only the reverse rotation force transmitting portion will be explained. Differently from the closure of a vessel according to the third embodiment, the closure of a vessel according to the sixth embodiment is not provided with a pressing plate.

- [158] The reverse rotation force transmitting portion may include one or more first protrusions 361 formed to be separated from the inner closure 14 or cut into pieces when a force more than a predetermined force is applied to the inner closure 14 (sixth embodiment) or a bottom surface of the outer closure 16; and one or more second protrusions 362 formed on an inner surface of the outer closure 16 or an outer surface of the inner closure 14 so as to contact the first protrusions 361 in order to transmit a rotation force of the outer closure 16 in a closing direction to the inner closure 14.
- [159] The first protrusion 361 and the second protrusion 362 are formed respectively at the inner closure 14 and the outer closure 16. In order to couple the closure to the vessel tightly enough to prevent leak of contents inside the vessel, the first protrusion 361 and the second protrusion 362 transmit a rotation force of the outer closure 16 being rotated in a closing direction to the inner closure 14. Once the inner closure 14 is completely coupled to the vessel, it is not rotated any longer. Accordingly, the first protrusion 361 is separated from the inner closure 14 or broken, and thus a rotation force of the outer closure 16 is not transmitted to the inner closure 14. This causes the inner closure 14 not to be rotated even when the outer closure 16 is rotated.
- [160] The first protrusion 361 and the second protrusion 362 are installed so as to transmit a rotation force to each other, and may have any configurations to separate the first protrusion 361 from the inner closure 14 or to break the first protrusion 361. Also, the first protrusion 361 and the second protrusion 362 may have any configurations that one of them can be inserted into another.
- [161] For example, the first protrusion 361 is detachably protruding from an upper surface of the inner closure 14. And, the second protrusion 362 is provided with a groove portion 362a for inserting the first protrusion 361, and is formed at a bottom surface of the protection plate 362. Here, the first protrusion 361 and the second protrusion 362 serve as a spacer, thereby not necessarily requiring an additional spacer.
- [162] The first protrusion 361 and the second protrusion 362 are formed at a central part of an upper surface of the inner closure 14, but are not limited thereto.
- [163] The first protrusion 361 may be formed in one or more in number, and an upper edge thereof may be formed to have a curved surface so as to easily insert the second protrusion 362 into the groove portion 362a.
- [164] In order to easily transmit a rotation force of the outer closure 16 into the inner closure 14, a horizontal section of the first protrusion 361 may have various shapes such as a polygonal shape and a star shape.
- [165] The first protrusion 361 undergoes a process for forming cut patterns (a knife line) or a separating groove at the time of injection-molding plastic materials, so as to be easily separated from the inner closure 14 or so as to be easily broken.
- [166] The second protrusion 362 may be also formed to be separated from the outer closure

16 or to be broken when a force more than a predetermined force is applied to a bottom surface of the outer closure 16.

[167] In the closure of a vessel, when the outer closure 16 is rotated, the rotation force of the outer closure 16 is transmitted to the inner closure 14 by a reciprocal coupling between the first protrusion 361 and the second protrusion 362.

[168] However, once the closure has been completely coupled to the vessel, the inner closure 14 is not rotated any longer, thus to have a resistance against the rotation of the outer closure 16. Here, when the first protrusion 361 is supplied with a force more than a predetermined force, it is separated from the inner closure 14 as shown in FIG .40.

[169] After the first protrusion 361 is separated from the inner closure 14, a rotation force of the outer closure 16 being rotated is not transmitted to the inner closure 14. Accordingly, even if the outer closure 16 is rotated in any directions, the inner closure 14 is not rotated. This does not allow a user to separate the closure from the vessel without removing the protection plate 13.

[170] It will also be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

- [1] A closure of a vessel, comprising:
an inner closure mounted to a vessel inlet of a vessel;
an outer closure disposed on an outer circumferential surface of the inner closure so as to perform an idle rotation with respect to the inner closure;
a rotation force transmitting portion formed between the inner closure and the outer closure for transmitting a rotation force of the outer closure in an opening direction to the inner closure only when the outer closure is downwardly pressed by force more than a predetermined force; and
a protection plate supported by a spacer that maintains a gap between the inner closure and the outer closure by being disposed therebetween, and detachably installed to the outer closure with constituting a part of an upper surface of the outer closure, for allowing the outer closure to perform only an idle rotation with respect to the inner closure in an opening direction, and for transmitting a rotation force of the outer closure to the inner closure when the protection plate is detached from the outer closure and the outer closure is downwardly moved by a force more than a predetermined force from the rotation force transmitting portion.
- [2] The closure of a vessel of claim 1, wherein the spacer is protruding from an upper surface of the inner closure or a bottom surface of the protection plate.
- [3] The closure of a vessel of claim 1, wherein the spacer is implemented as one or more rods protruding from an upper surface of the inner closure or a bottom surface of the protection plate.
- [4] The closure of a vessel of claim 1, wherein a cut groove for facilitating separation of the protection plate from the outer closure is formed between the protection plate and the outer closure.
- [5] The closure of a vessel of claim 1, wherein the protection plate and the outer closure are connected to each other by a plurality of bridges so as to easily separate the protection plate from the outer closure.
- [6] The closure of a vessel of claim 1, wherein the protection plate is partially connected to the outer closure after being separated from the outer closure.
- [7] The closure of a vessel of claim 1, wherein the rotation force transmitting portion comprises:
one or more first keys formed on an outer side surface of the inner closure in a circumferential direction; and one or more second keys formed on an inner side surface of the outer closure, for transmitting a rotation force in an opening direction of the outer closure to the inner closure, by being gear-engaged with the

first keys when the outer closure is pressed by a force more than a predetermined force.

- [8] The closure of a vessel of claim 7, wherein the first key is formed with a hook for locking the second key of the outer closure in a closing direction of the inner closure, and an inclination surface so that the second key of the outer closure contacting thereto in an opening direction of the inner closure can slide therethrough.
- [9] The closure of a vessel of claim 7, wherein the spacer maintains a gap between an upper surface of the inner closure and a lower surface of the outer closure so as to prevent the first key from being gear-engaged with the second key under a state that the protection plate has been connected to the outer closure.
- [10] The closure of a vessel of claim 7, wherein the second key is formed with a hook for locking the hook of the second key in a closing direction of the outer closure, and an inclination surface so that the inclination surface of the second key contacting thereto in an opening direction of the outer closure can slide therethrough.
- [11] The closure of a vessel of claim 1, further comprising a reverse rotation force transmitting portion disposed between an inner surface of the outer closure and an outer surface of the inner closure, for transmitting a rotation force of the outer closure in a closing direction to the inner closure.
- [12] The closure of a vessel of claim 11, wherein the reverse rotation force transmitting portion comprises:
a first inclination protrusion formed on a side outer circumferential surface of the inner closure so as to form an inclination surface in an opening direction and a hook in a closing direction; and
a second inclination protrusion formed on an inner circumferential surface of the outer closure so as to form an inclination surface in an opening direction, and to form a hook in a closing direction in correspondence to the first inclination protrusion, for allowing the outer closure to perform an idle rotation with respect to the inner closure by sliding the inclination surface of the first inclination protrusion in the opening direction, and for transmitting a rotation force in a closing direction to the inner closure by being locked by the hook of the first inclination protrusion.
- [13] The closure of a vessel of claim 12, wherein the rotation force transmitting portion comprises:
one or more first keys formed on an outer side surface of the inner closure in a circumferential direction, and having an inclination surface in an opening direction; and one or more second keys formed on an inner side surface of the

outer closure in a circumferential direction, for transmitting a rotation force in an opening direction of the outer closure to the inner closure, by being gear-engaged with the first keys when the outer closure is pressed by a force more than a predetermined force.

[14] The closure of a vessel of claim 13, wherein the first key comprises: a first inclined portion; and a second inclined portion higher than the first inclined portion.

[15] The closure of a vessel of claim 11, wherein the reverse rotation force transmitting portion comprises:
one or more first protrusions formed on an outer circumferential surface of the inner closure, or an inner surface of the outer closure so as to be separated therefrom by a force more than a predetermined force; and
one or more second protrusions formed on an inner surface of the outer closure or an outer surface of the inner closure so as to contact the first protrusions in order to transmit a rotation force of the outer closure in a closing direction to the inner closure.

[16] The closure of a vessel of claim 11, wherein the reverse rotation force transmitting portion comprises:
one or more first protrusions formed on an upper surface of the inner closure, or a bottom surface of the outer closure so as to be separated therefrom by a force more than a predetermined force; and
one or more second protrusions formed on an inner surface of the outer closure or an outer surface of the inner closure so as to contact the first protrusions in order to transmit a rotation force of the outer closure in a closing direction to the inner closure.

[17] The closure of a vessel of claim 16, wherein the first protrusion and the second protrusion are formed at a central part of an upper surface of the inner closure.

[18] The closure of a vessel of claim 16, wherein the second protrusion is provided with a groove portion for inserting the first protrusion.

[19] The closure of a vessel of claim 17 or 18, wherein the spacer is implemented as a ring portion protruding from an upper surface of the inner closure or a bottom surface of the protection plate.

[20] The closure of a vessel of claim 11, wherein the spacer is protruding from an upper surface of the inner closure or a bottom surface of the protection plate, and has a ring portion formed with a cut-out portion cut-out one or more times in a circumferential direction.

[21] The closure of a vessel of claim 20, wherein the reverse rotation force transmitting portion comprises

one or more reverse rotation protrusions formed on an inner surface of the outer closure or an outer surface of the inner closure so as to be locked by the cut-out portion of the ring portion in a closing direction of the inner closure.

[22] The closure of a vessel of claim 21, wherein the reverse rotation protrusion comprises: a locking surface locked by the cut-out portion of the ring portion in a closing direction of the inner closure; and an inclination surface formed to be spacing from the cut-out portion of the ring portion in an opening direction from the locking surface.

[23] The closure of a vessel of claim 20 or 21, wherein the ring portion is formed to be more protruding toward the reverse rotation protrusion so as to be locked by the locking surface of the reverse rotation protrusion.

[24] The closure of a vessel of claim 20 or 21, wherein the ring portion is formed to be more protruding toward the reverse rotation protrusion so as to be locked by the locking surface of the reverse rotation protrusion.

[25] The closure of a vessel of claim 11, wherein the spacer is provided with a ring portion protruding from an upper surface of the inner closure or a bottom surface of the protection plate, and

wherein the reverse rotation protrusion comprises: one or more first protrusions formed on an outer circumferential surface of the ring portion of the spacer; and one or more second protrusions formed on the outer closure, and locked by the first protrusions in a closing direction.

[26] The closure of a vessel of claim 25, wherein surfaces of the first protrusion and the second protrusion facing each other in a closing direction constitute protrusions, whereas opposite surfaces thereto in an opening direction constitute inclination surfaces.

[27] The closure of a vessel of claim 1, further comprising a sealing member removing unit disposed at the inner closure, for removing a sealing member when the inner closure is separated from the vessel inlet, and storing the removed sealing member therein.

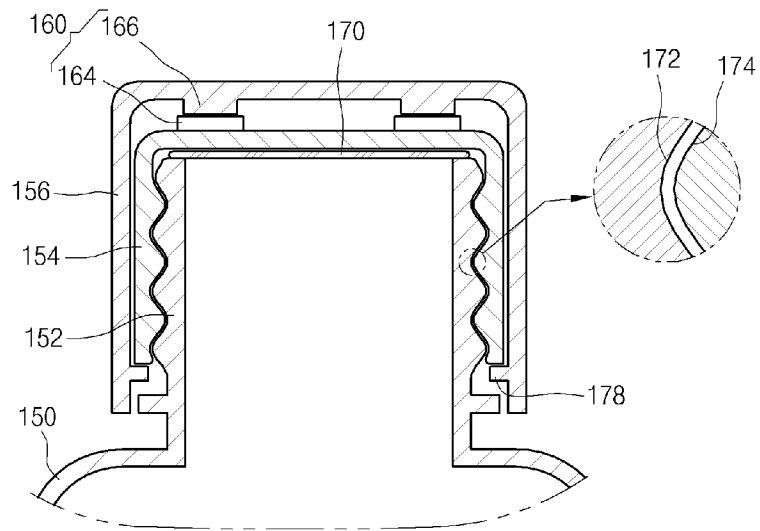
[28] The closure of a vessel of claim 27, further comprising a sealing member removing unit comprises:
a pressing plate disposed in the inner closure so as to be movable in upper and lower directions;
one or more cutters formed at an edge of a lower surface of the pressing plate in a circumferential direction, for penetrating the sealing member when the pressing plate is pressed and cutting the sealing member when the inner closure is rotated;
a locking portion downwardly protruding from the lower surface of the pressing plate, for accommodating the sealing member cut by the cutter in a body; and

- a connection portion connected between an outer circumferential surface of the pressing plate and an inner circumferential surface of the inner closure, and elastically transformed to move the pressing plate in upper and lower directions.
- [29] The closure of a vessel of claim 28, wherein the pressing plate is formed to have a center eccentric from the center of the outer closure and including the center of the outer closure.
- [30] The closure of a vessel of claim 1, wherein the inner closure has opened upper and lower ends thereof, wherein a female screw portion screw-coupled to a male screw portion formed on an outer circumferential surface of the vessel inlet is formed at a lower inner circumferential surface of the inner closure, and wherein a separation preventing protrusion for preventing the inner closure from being separated from the outer closure is protruding from an inner circumferential surface of a lower end of the inner closure.
- [31] The closure of a vessel of claim 1, wherein the outer closure is inserted into the inner closure so as to be movable in upper and lower directions, has opened upper and lower ends thereof, is provided with a plurality of convex-concaved portions on an outer circumferential surface thereof for facilitation of rotation by a user's hand, and is provided with a separation preventing protrusion locked by the inner closure on an inner circumferential surface of a lower end thereof.
- [32] The closure of a vessel of claim 1, wherein an elastic member supported by an upper surface of the inner closure and maintaining an upwardly moved state of the outer closure from the inner closure is formed on an upper end of the outer closure.
- [33] The closure of a vessel of claim 32, wherein the elastic member is formed of a thin film configured to generate an elastic force by being bent.
- [34] The closure of a vessel of claim 2, wherein the spacer has a ring shape protruding from an upper surface of the inner closure or a bottom surface of the protection plate.
- [35] A closure of a vessel, comprising:
an inner closure mounted to a vessel inlet of a vessel;
an outer closure disposed on an outer circumferential surface of the inner closure so as to perform an idle rotation with respect to the inner closure;
a rotation force transmitting portion formed between the inner closure and the outer closure for transmitting a rotation force of the outer closure in an opening direction to the inner closure only when the outer closure is downwardly pressed by a force more than a predetermined force; and
a spacer for maintaining a gap between the inner closure and the outer closure by being disposed therebetween, such that the outer closure performs an idle

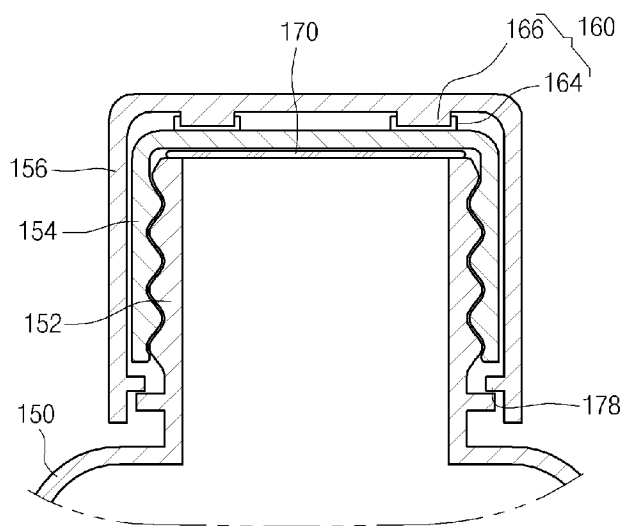
rotation with respect to the inner closure in an opening direction even when the outer closure is downwardly moved by a force more than a predetermined force.

[36] The closure of a vessel of claim 35, wherein the spacer is detachably installed near a lower end of the outer closure or the inner closure, and downwardly moves the outer closure by a force more than a predetermined force when detached therefrom, thereby transmitting a rotation force of the outer closure in an opening direction to the inner closure.

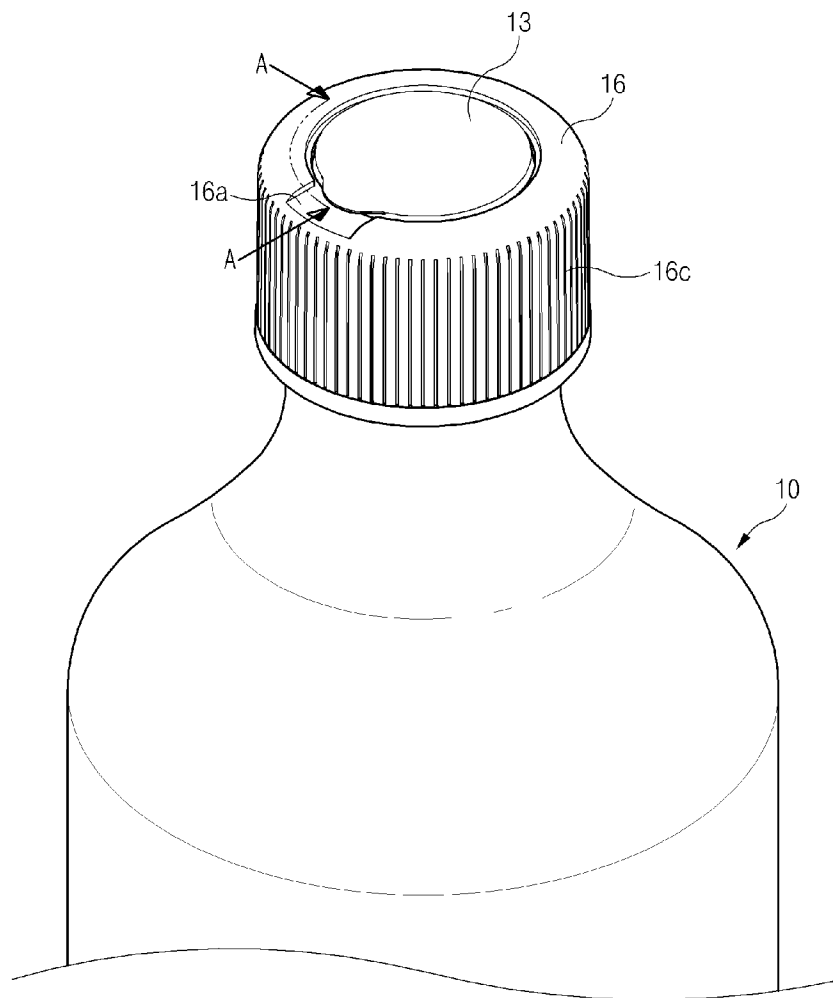
[Fig. 1]



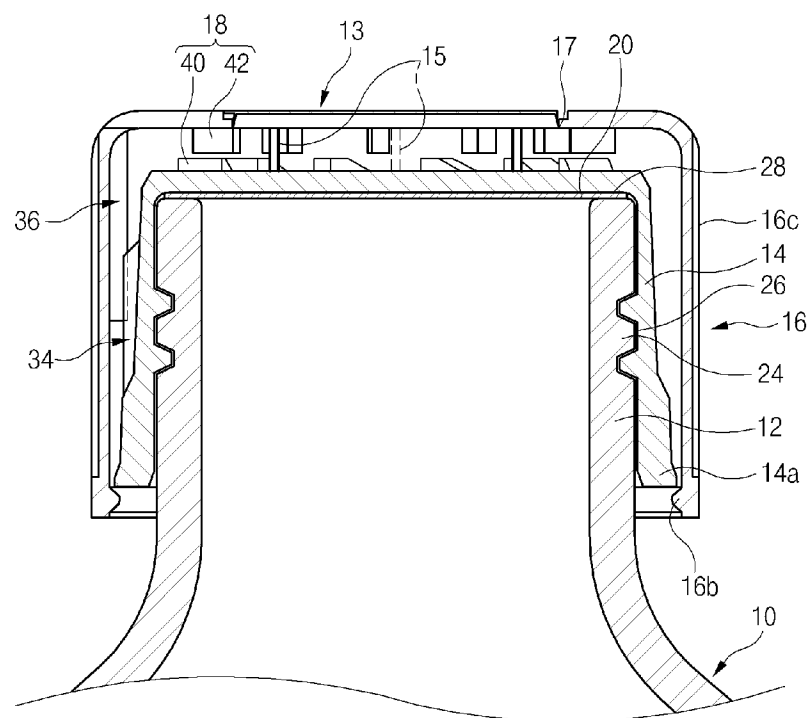
[Fig. 2]



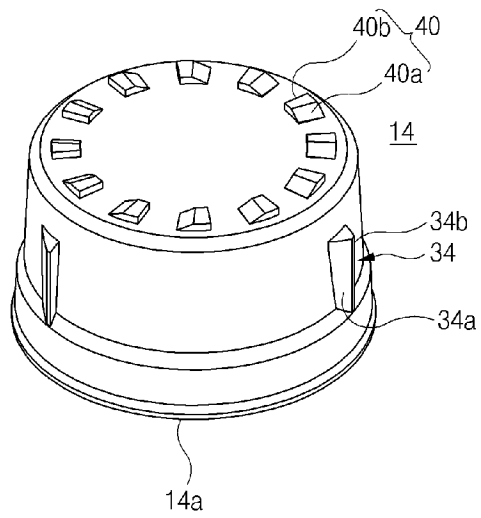
[Fig. 3]



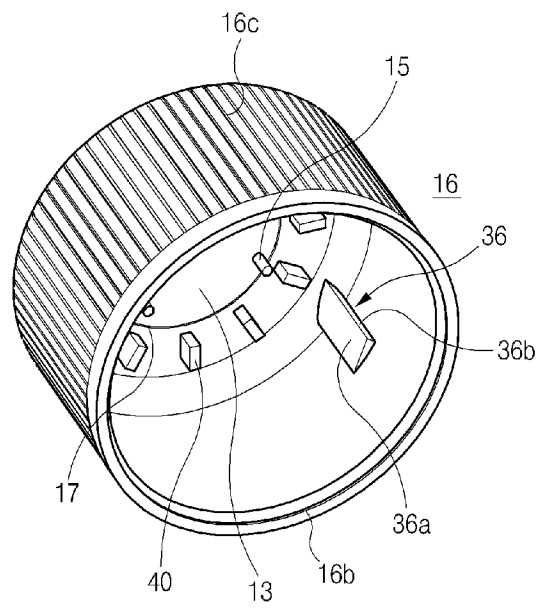
[Fig. 4]



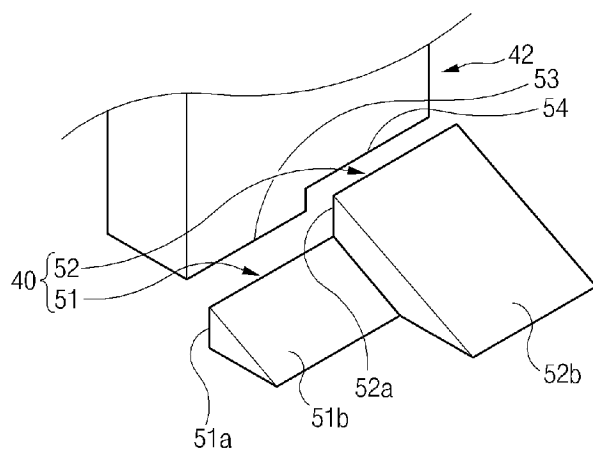
[Fig. 5]



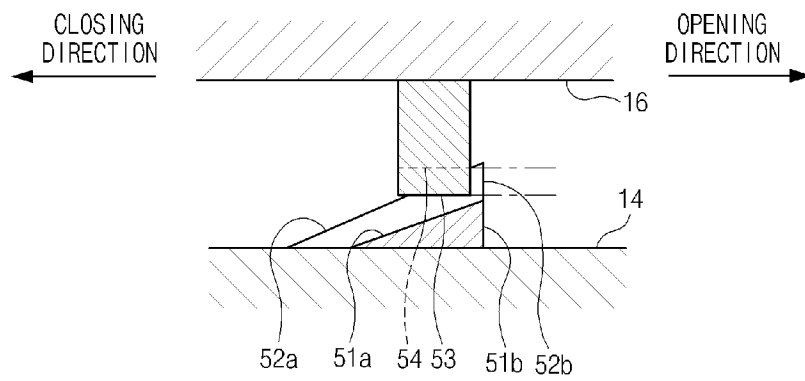
[Fig. 6]



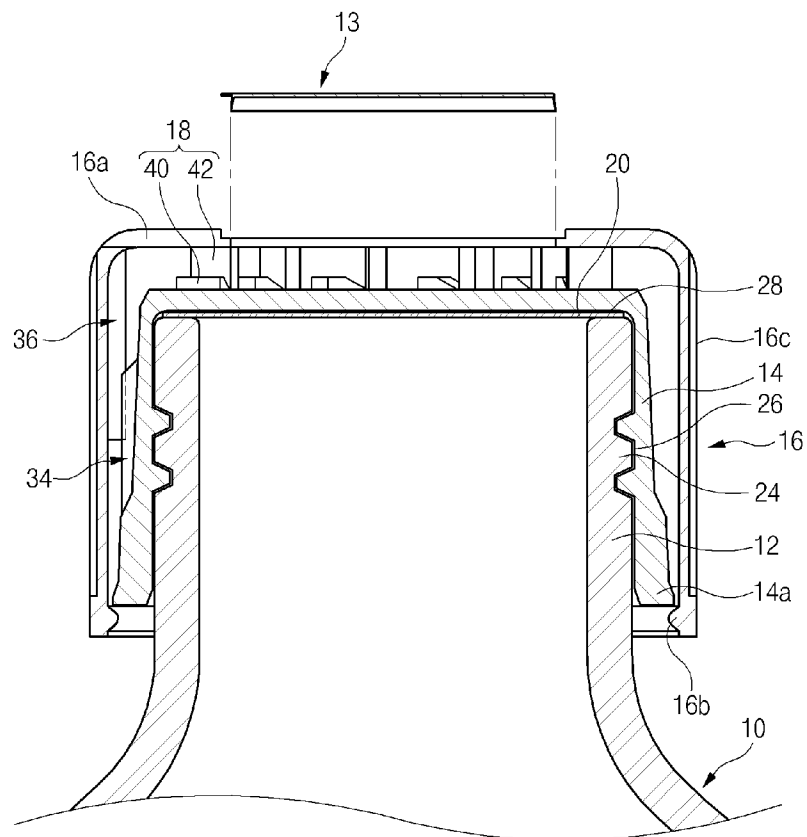
[Fig. 7]



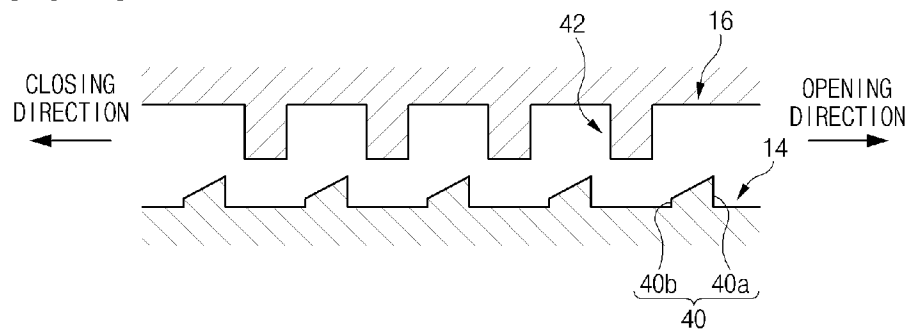
[Fig. 8]



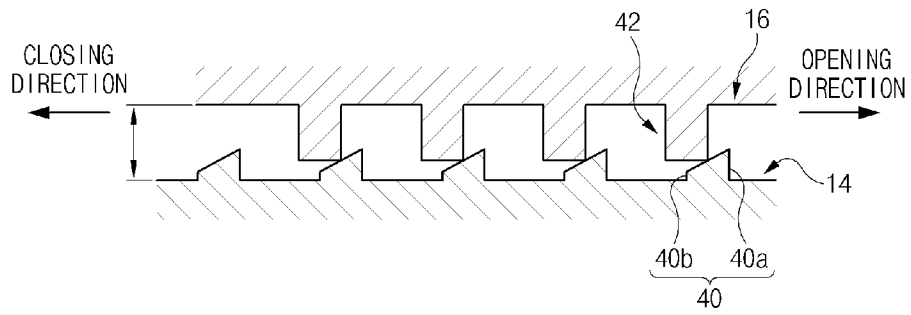
[Fig. 9]



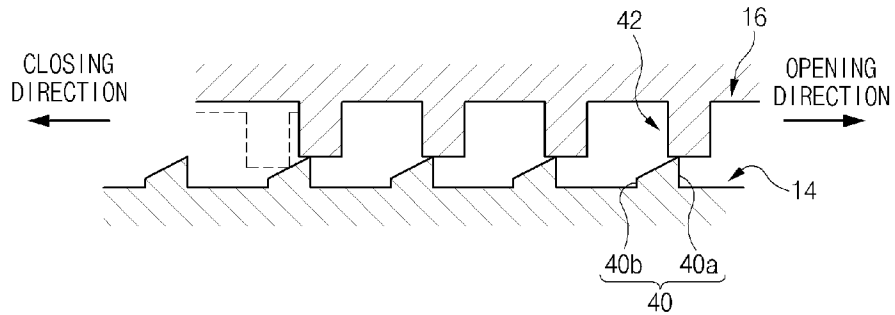
[Fig. 10]



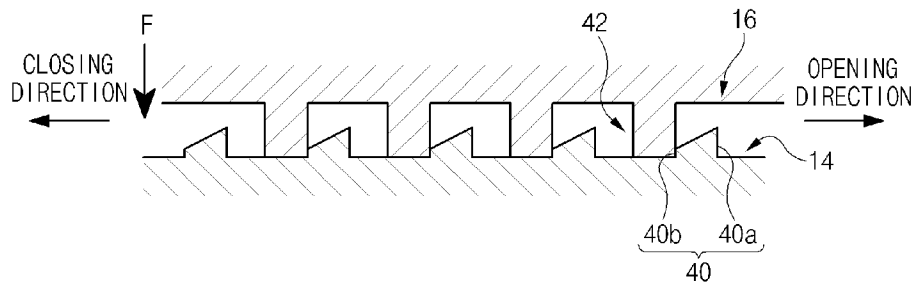
[Fig. 11]



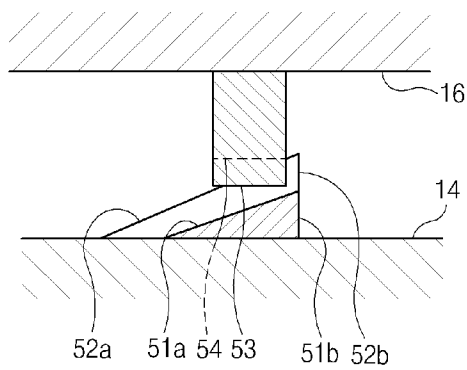
[Fig. 12]



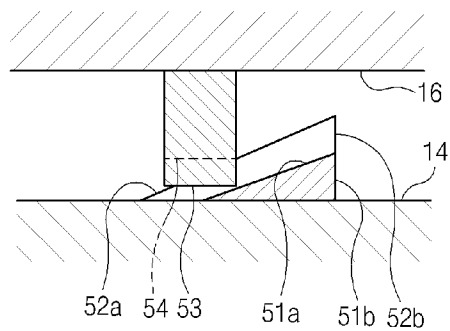
[Fig. 13]



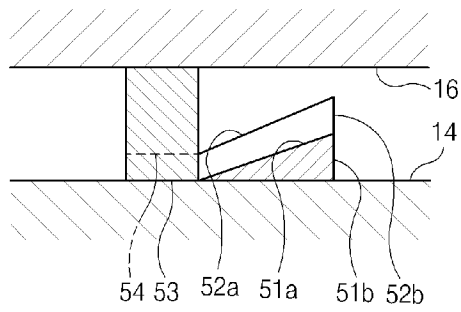
[Fig. 14]



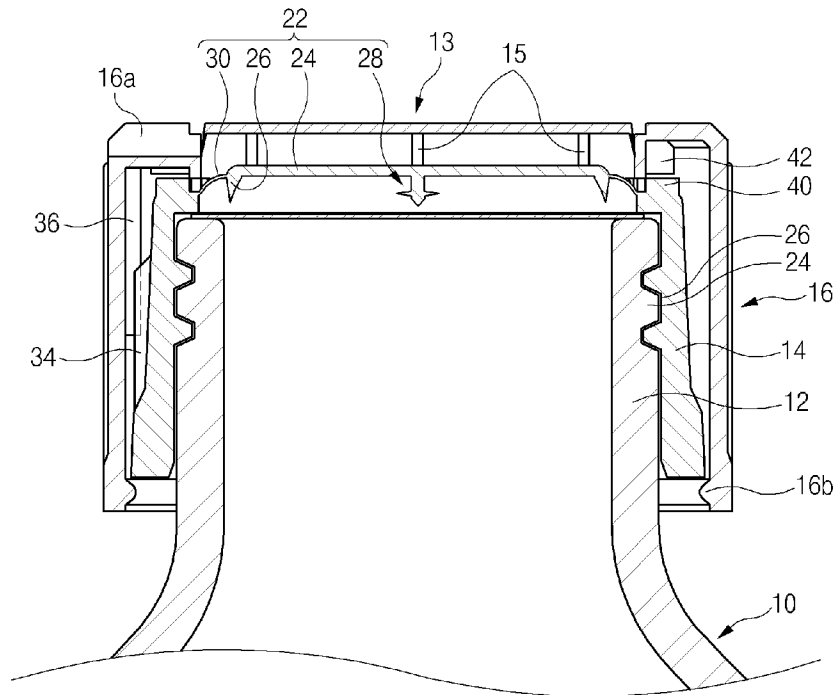
[Fig. 15]



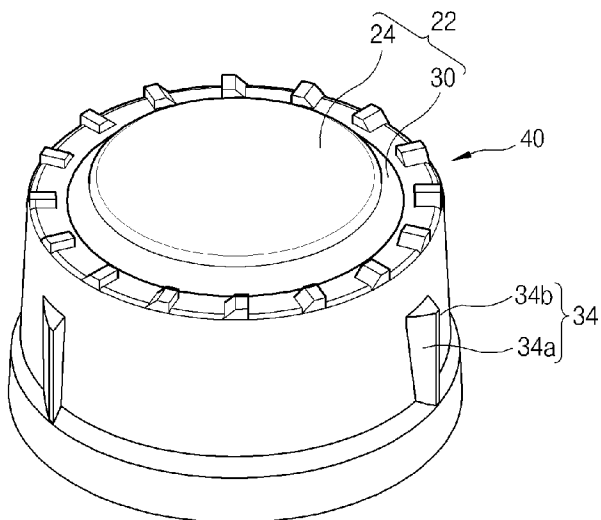
[Fig. 16]



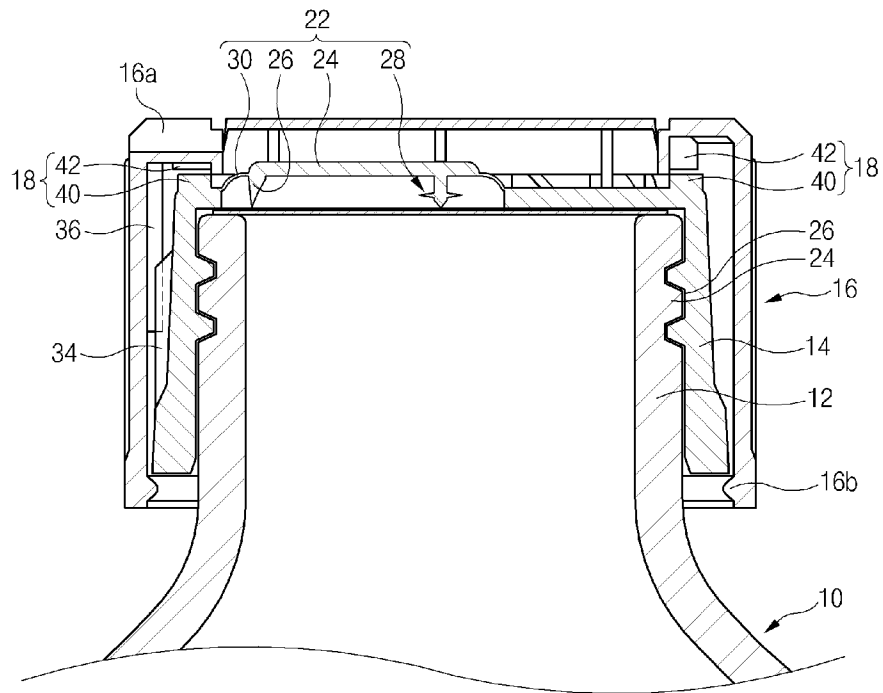
[Fig. 17]



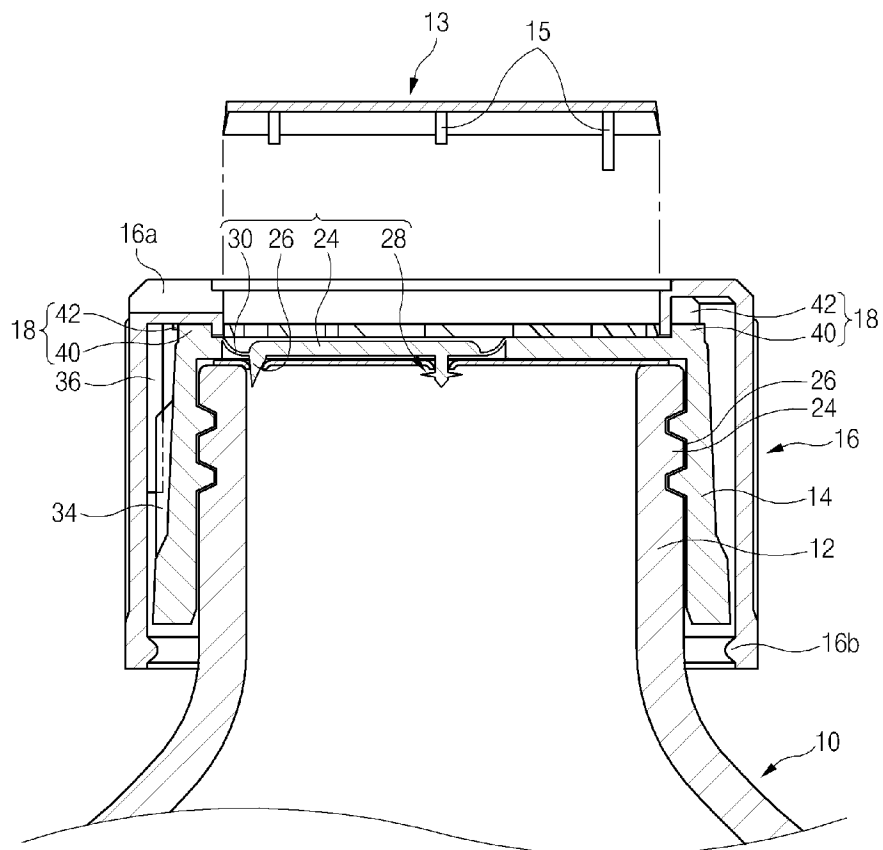
[Fig. 18]



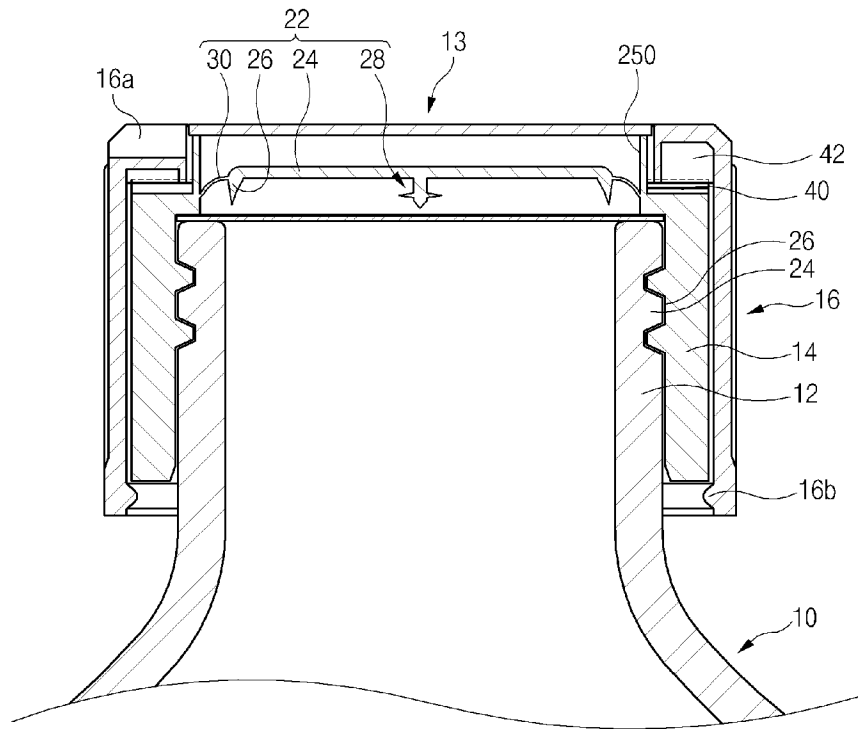
[Fig. 22]



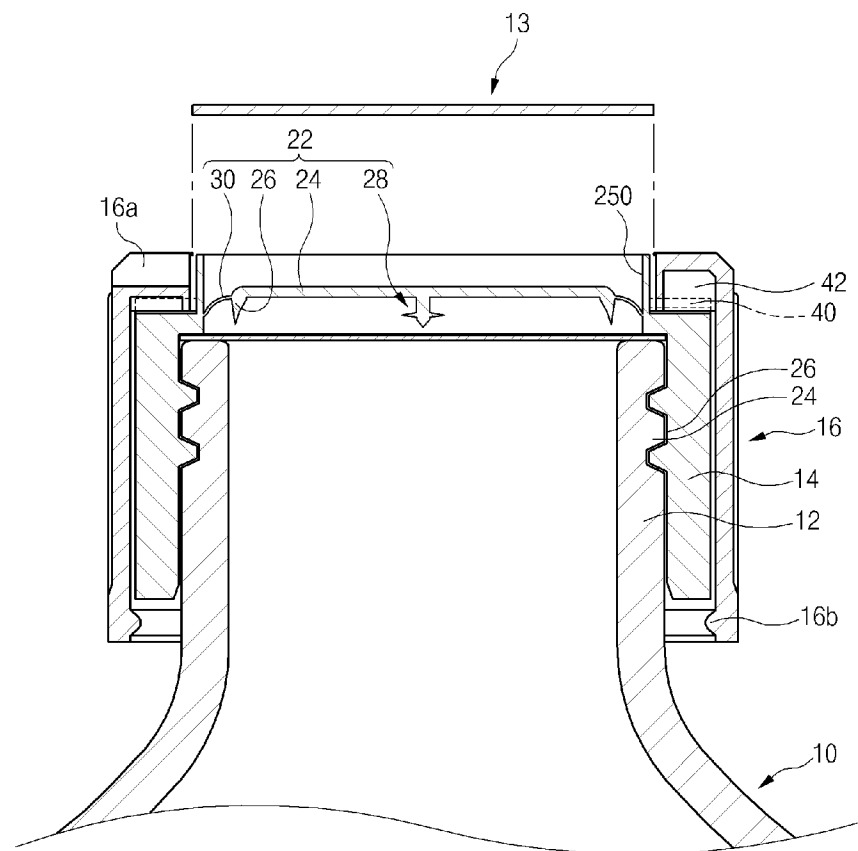
[Fig. 23]



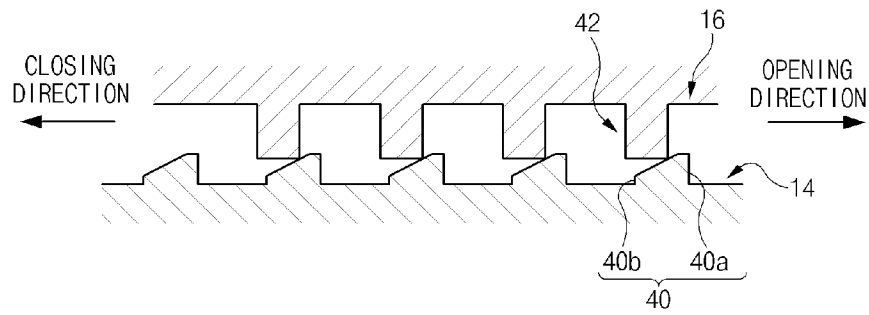
[Fig. 24]



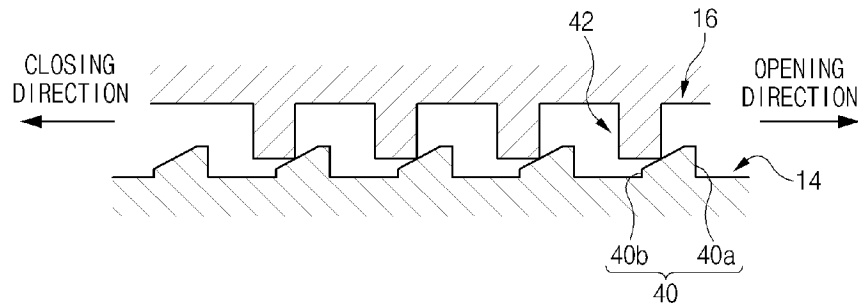
[Fig. 25]



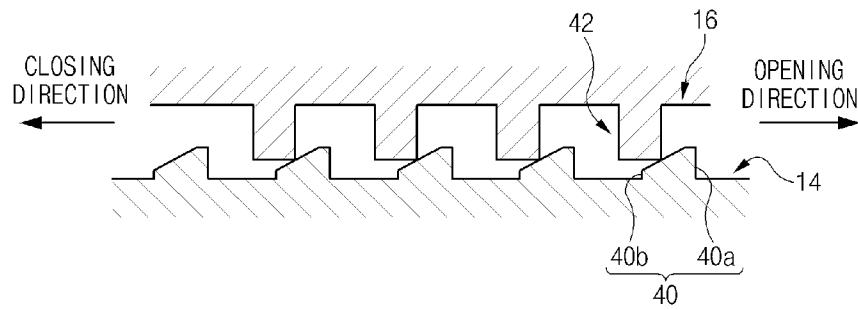
[Fig. 26]



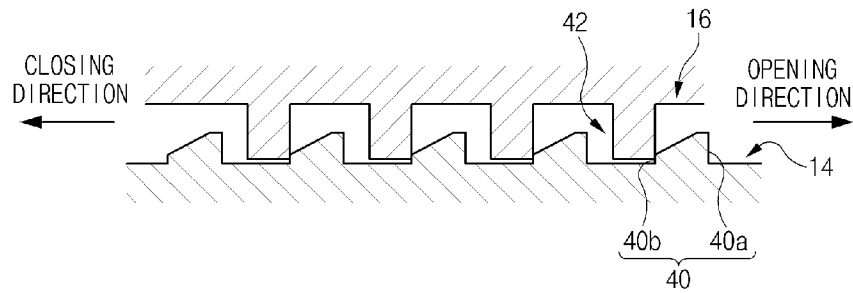
[Fig. 27]



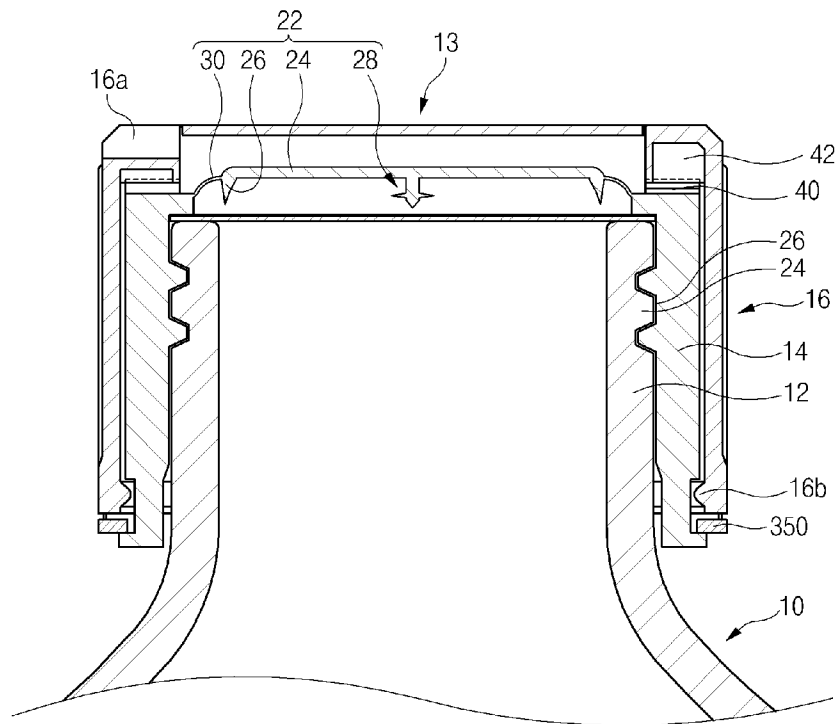
[Fig. 28]



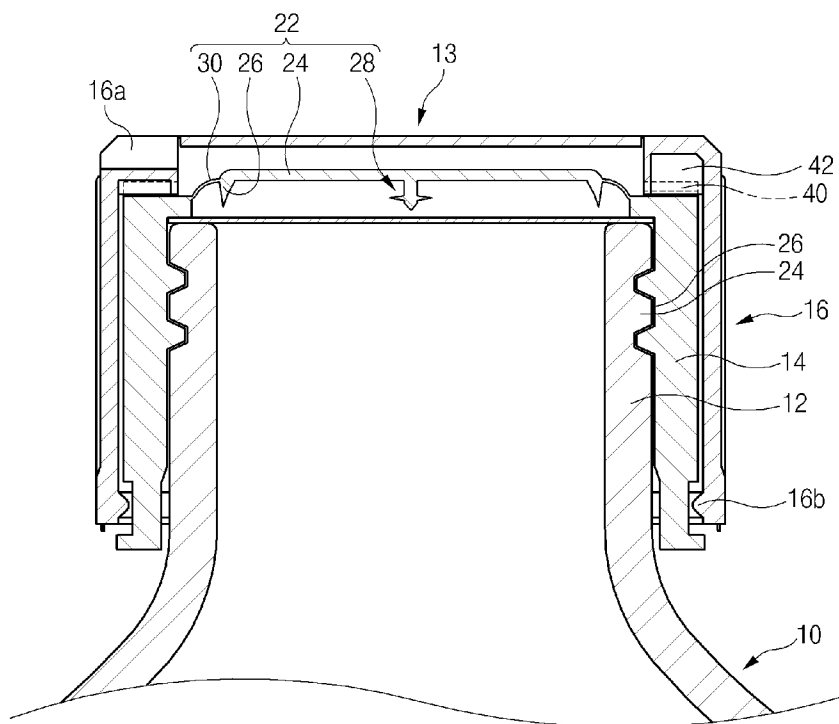
[Fig. 29]



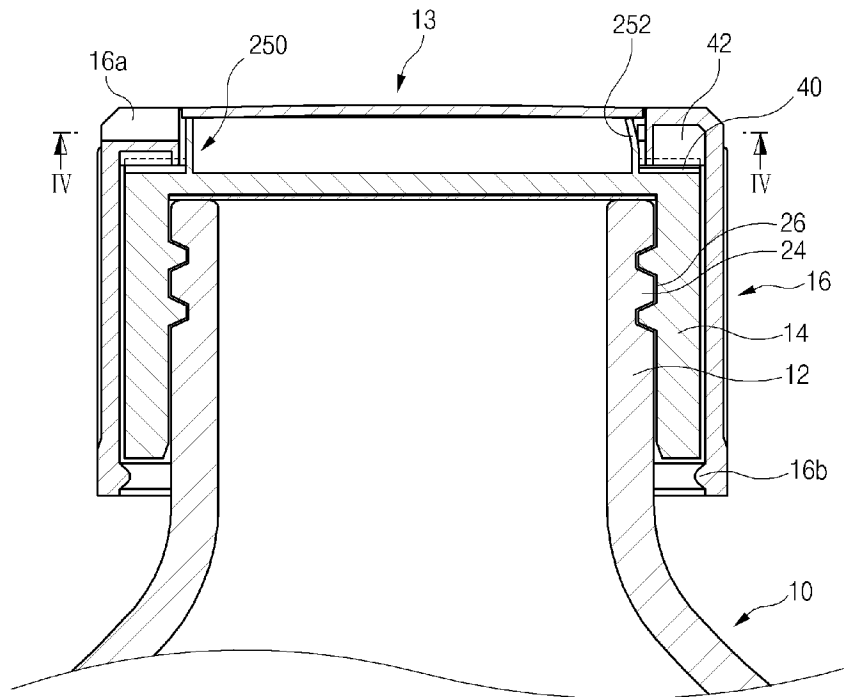
[Fig. 30]



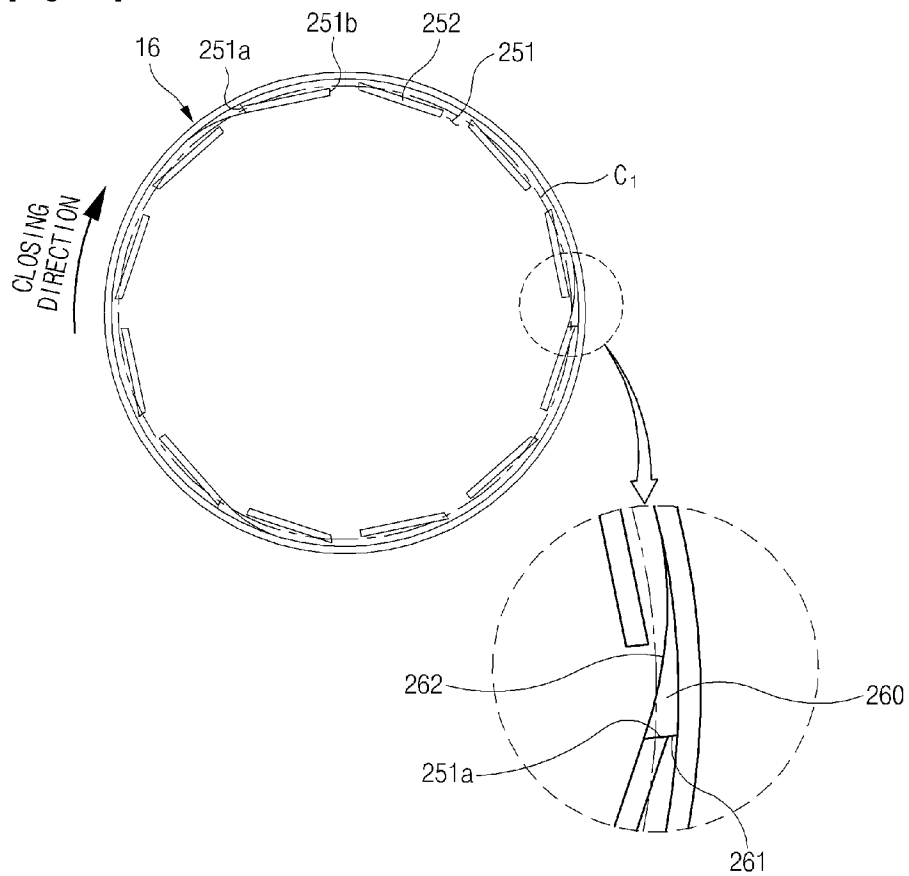
[Fig. 31]



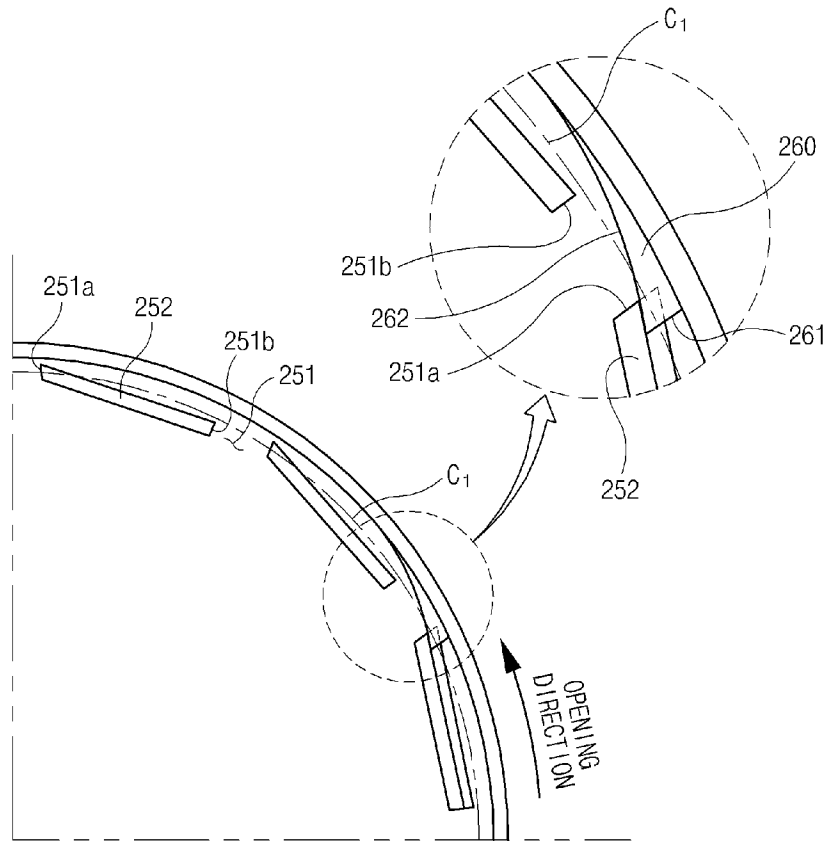
[Fig. 32]



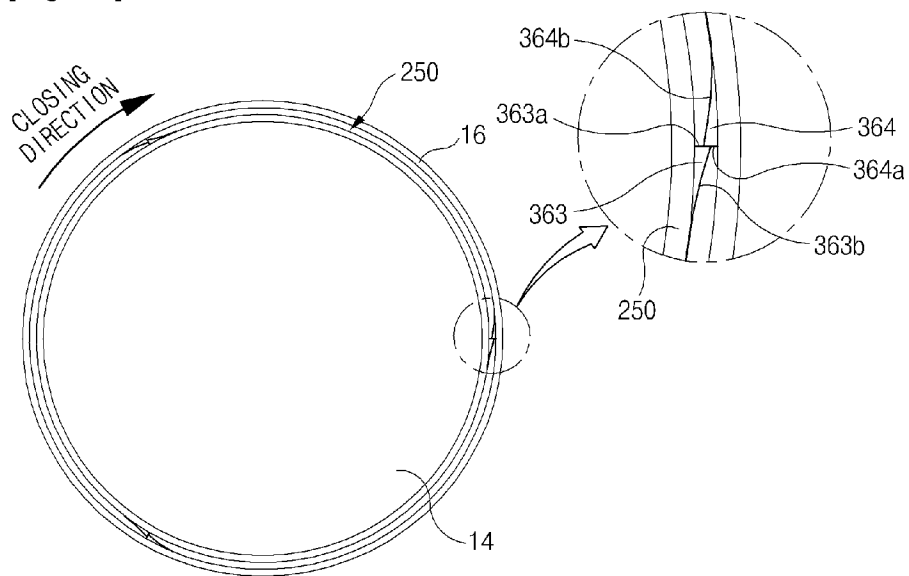
[Fig. 33]



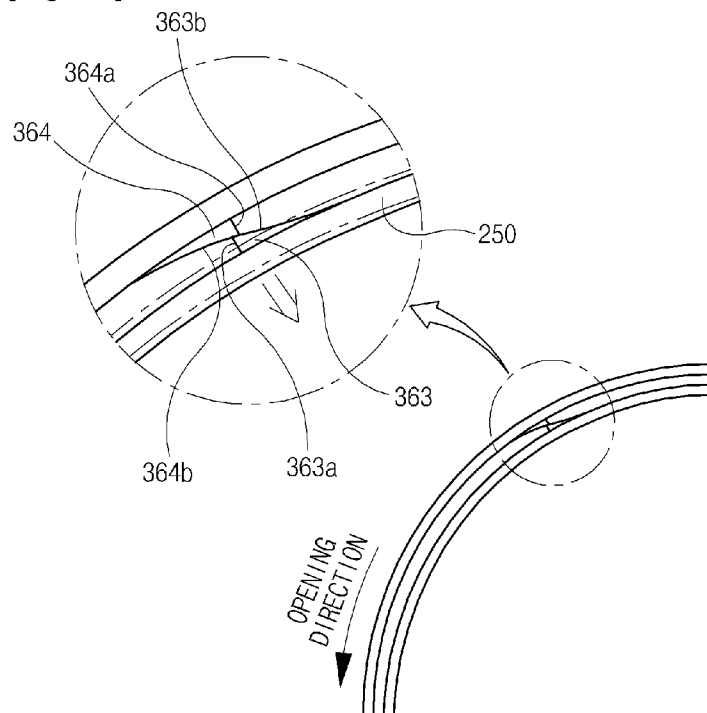
[Fig. 34]



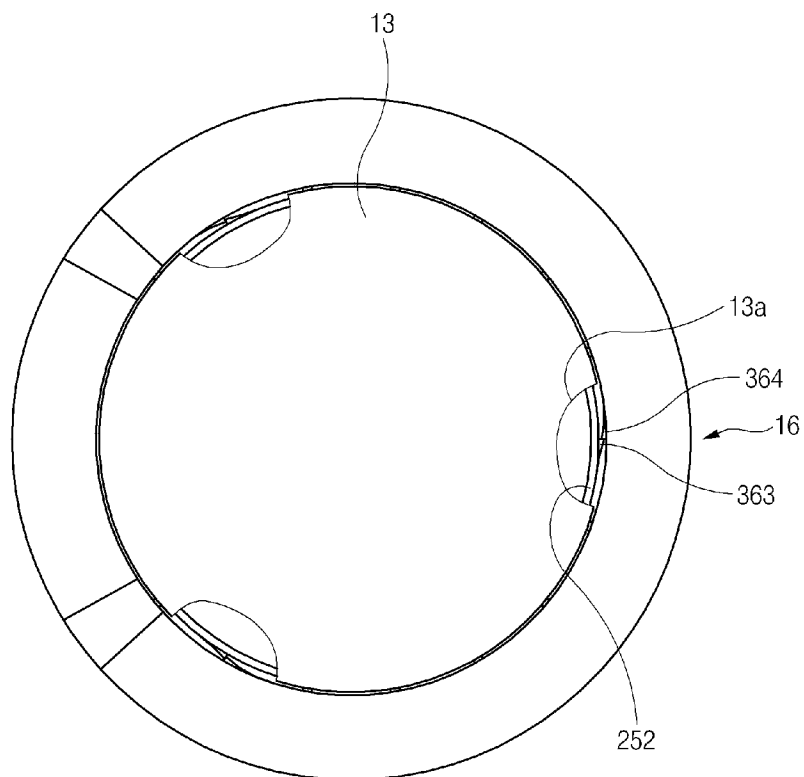
[Fig. 35]



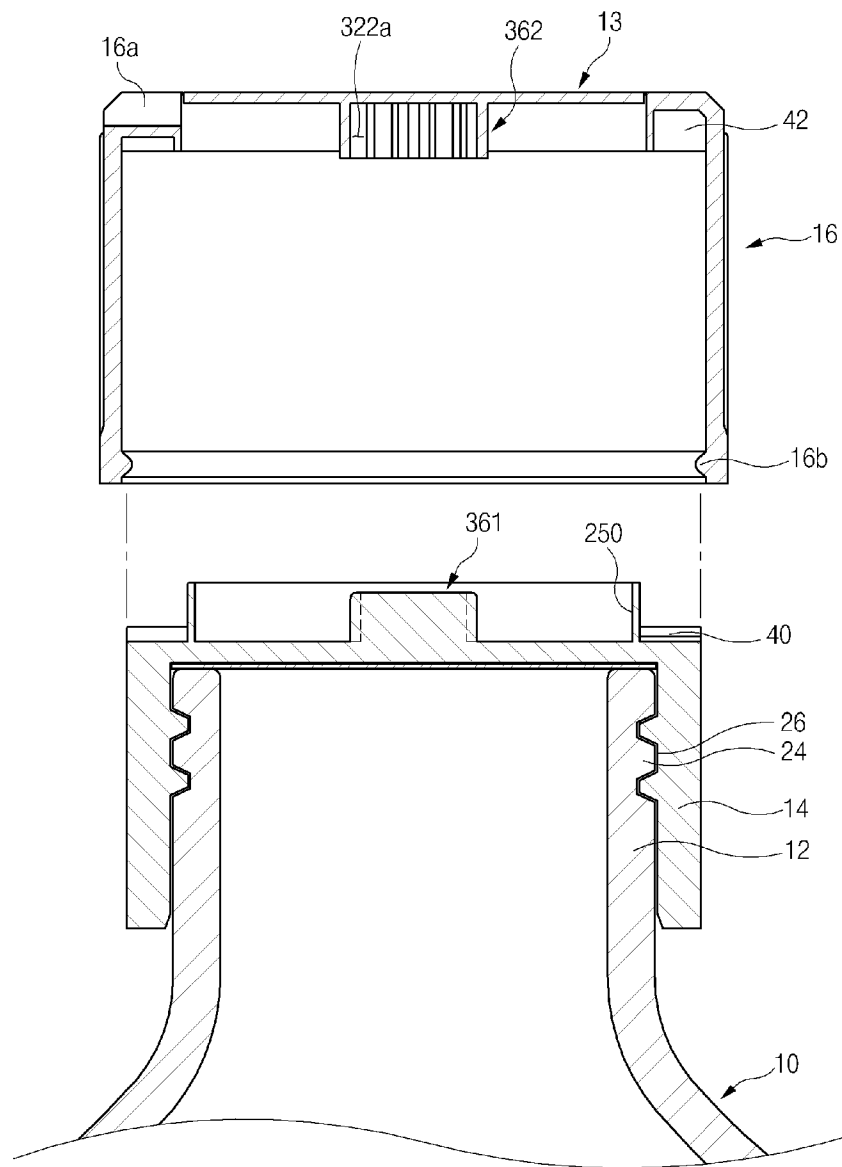
[Fig. 36]



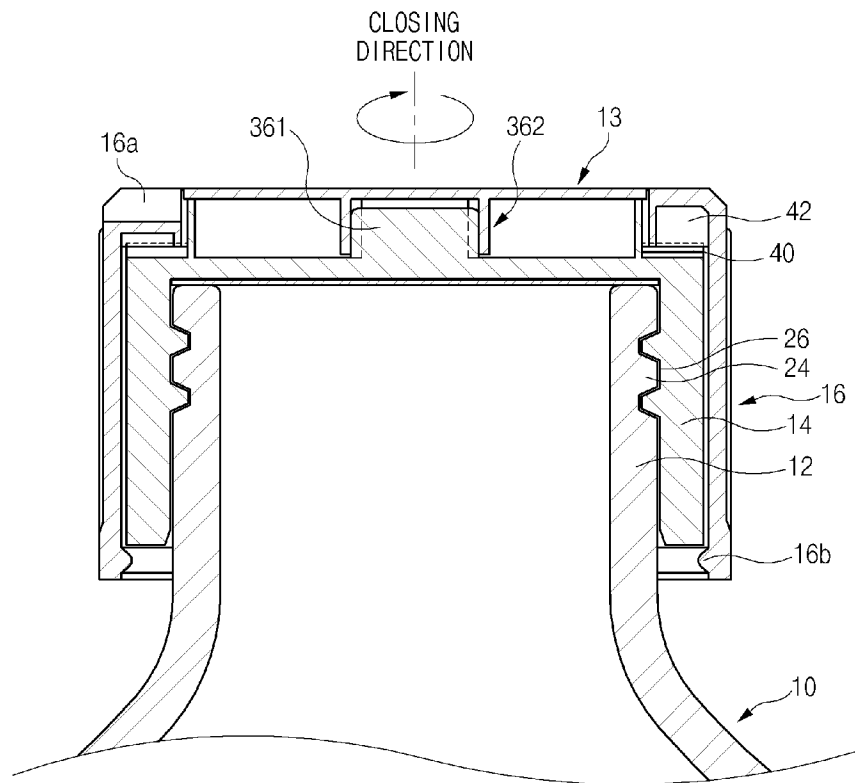
[Fig. 37]



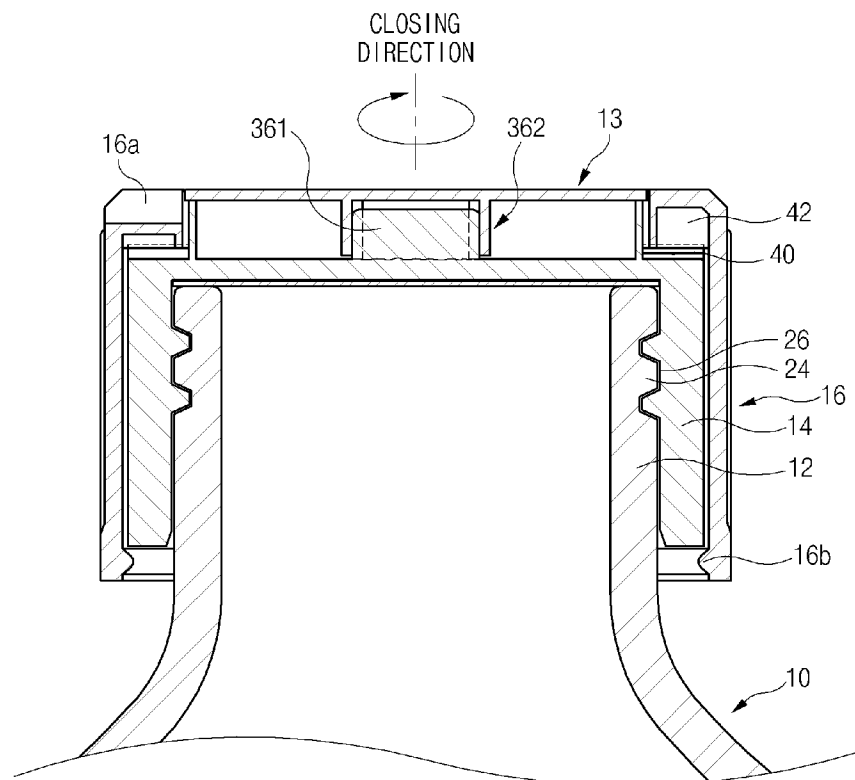
[Fig. 38]



[Fig. 39]



[Fig. 40]



[Fig. 41]

