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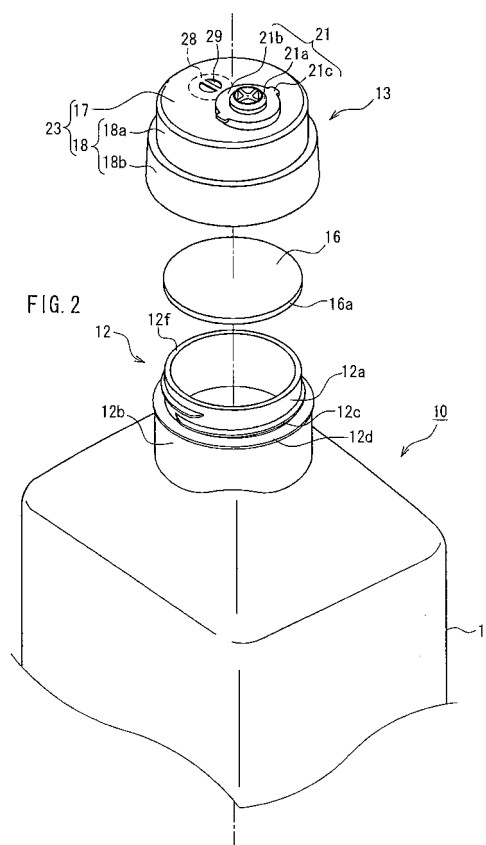
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(54) **CAP AND NUTRITIONAL SUPPLEMENT CONTAINER USING SAME**

(57) A cap (13) to be mounted to a mouth part of a main container unit of a nutritional supplement container (10) is provided for flowing out a liquid substance filled in the main container unit. The main container unit includes a thin film (16) that is attached to the mouth part so as to seal the interior of the main container unit. The cap can take a first mounted state and a second mounted state with respect to the mouth part. In the first mounted state, the mounted state of the cap with respect to the mouth part is held in a state where an end surface of a hollow nozzle (22) of the cap is located not in contact with the thin film or in contact with the thin film but not pressing the thin film. In the second mounted state, the mounted state of the cap with respect to the mouth part is held in a state where the thin film is broken by the hollow nozzle and the hollow nozzle is located inside the mouth part.



Description

Technical Field

[0001] The present invention relates to a cap to be mounted to a mouth part from which a liquid substance filled in a main container unit of a nutritional supplement container flows out, and a nutritional supplement container having a main container unit to which the cap is mounted.

Background Art

[0002] As parenteral methods of administering nutrition and medicines to a patient, a transintestine nutritional treatment and an intravenous nutritional treatment have been known. In the transintestine nutritional treatment, liquid substances such as nutrition, liquid food and medicines (in general called "transintestine nutrition") are administered through a tube (in general called "nasal tube") passed from a nasal cavity of a patient to either his/her stomach or duodenum or through a tube (in general called "PEG tube") that has been inserted into a gastric fistula formed in the abdomen of a patient (a treatment for forming a gastric fistula is called "Percutaneous Endoscopic Gastrostomy"). In the intravenous nutritional treatment, a liquid substance (in general called "transfusion") containing a nutritional ingredient such as glucose and a medicinal ingredient is administered through a transfusion line (liquid delivery path) inserted into a vein of a patient.

[0003] FIG. 22 is a schematic diagram showing an example of a transintestine nutrition set used for a conventional transintestine nutritional treatment. A main container unit 101 of a nutritional supplement container 100 is filled with a nutritional supplement. A thin film (not shown) is attached to a mouth part 102 from which the nutritional supplement in the main container unit 101 flows out, thereby sealing the interior of the main container unit 101. When administering the nutritional supplement into a body, a plastic connection needle 104 is used to prick a cap 105 mounted to the mouth part so as to puncture the thin film. In this manner, the nutritional supplement can be delivered into the body through a tube connected to the connection needle 104.

[0004] FIG. 23 is a schematic diagram showing an example of a transfusion set used for a conventional intravenous nutritional treatment. A main bag unit 111 of a bag 110 is filled with a liquid substance containing a nutritional ingredient and/or a medicinal ingredient. When administering the liquid substance into a body, a connection needle 114 is used to prick a port 113 for the connection needle. In this manner, the liquid substance can be delivered into the body through a tube connected to the connection needle 114 (see Patent document 1).

Prior Art Document

Patent Document

5 **[0005]** Patent document D1: JP 2000-176023

Disclosure of Invention

Problem to be Solved by the Invention

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[0006] As described above, in a conventional transintestine nutritional treatment, similarly to an intravenous nutritional treatment, a technique of delivering a nutritional supplement into a body by pricking a connection object with a sharp-tipped connection needle may be employed. In such a case, it is possible to puncture the cap 105 with the connection needle 114. In this case, the connection needle 114 may penetrate both the cap 105 and the thin film to the interior of the mouth part 102. However, if such an improper connection is carried out, a nutritional supplement or the like to be supplied to a stomach or intestines would be supplied by mistake to a vein, causing potential harm to the patient.

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[0007] The present invention provides a cap that solves the above-mentioned problem of an improper connection and that can provide a nutritional supplement container that can supply liquid substances such as a nutritional supplement sanitarily in a simple manner, and a nutritional supplement container using the cap.

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Means for Solving Problem

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[0008] A cap of the present invention is a cap to be mounted to a mouth part of a main container unit of a nutritional supplement container in order to deliver a liquid substance filled in the main container unit. The main container unit includes a thin film that is attached to the mouth part so as to seal the interior of the main container unit. The cap includes: a base part including a top panel part to block an opening of the mouth part and a side wall part to surround an outer peripheral surface of the mouth part at the time of mounting the cap to the mouth part; a connection part that includes a tubular part protruding from an outer main surface of the top plate part and to which a connector can be connected; and a hollow nozzle that protrudes from an inner main surface of the top plate part and that has a through hole in communication with a through hole of the tubular part. The cap is allowed to take a first mounted state and a second mounted state with respect to the mouth part. In the first mounted state, the mounted state of the cap with respect to the mouth part is held in a state where an end surface of the hollow nozzle is located not in contact with the thin film or in contact with the thin film but not pressing the thin film, and in the second mounted state, the mounted state of the cap with respect to the mouth part is held in a state where the thin film is broken by the hollow nozzle and the hollow nozzle is located inside the mouth part.

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[0009] A nutritional supplement container of the present invention includes: a main container unit including a mouth part; a liquid substance filled in the main container unit; a thin film attached to the mouth part so as to seal the interior of the main container unit; and the cap according to the present invention, which is mounted to the mouth part. The cap is mounted to the mouth part in the first mounted state.

Effects of the Invention

[0010] The present invention provides a cap that solves the above-mentioned problem of an improper connection (i.e., a liquid delivery path for an intravenous nutritional treatment is connected by mistake to a nutritional supplement container) and that can provide a nutritional supplement container that can supply liquid substances such as a nutritional supplement sanitarily in a simple manner. The present invention provides also a nutritional supplement container using the cap.

Brief Description of Drawings

[0011]

[FIG. 1] FIG. 1 is a partial perspective view showing a schematic configuration of a nutritional supplement container according to Embodiment 1 of the present invention.

[FIG. 2] FIG. 2 is an exploded perspective view showing the nutritional supplement container as shown in FIG. 1.

[FIG. 3] FIG. 3 is an enlarged perspective view showing a schematic configuration of an example of a cap of the present invention, which constitutes the nutritional supplement container as shown in FIG. 1.

[FIG. 4] FIG. 4 is an enlarged view showing a connection part constituting the cap as shown in FIG. 3.

[FIG. 5] FIG. 5 is a perspective view showing a state just before a connection of a liquid delivery path to the nutritional supplement container as shown in FIG. 1.

[FIG. 6] FIG. 6 is a perspective view showing a state where the liquid delivery path is connected to the nutritional supplement container as shown in FIG. 1.

[FIG. 7A] FIG. 7A is a plan view for explaining a first mounted state of the cap as shown in FIG. 3 with respect to a mouth part as shown in FIG. 2.

[FIG. 7B] FIG. 7B is a partial cross-sectional conception diagram of FIG. 7A.

[FIG. 8] FIG. 8 is a partial enlarged view of FIG. 7B.

[FIG. 9A] FIG. 9A is a plan view for explaining a second mounted state of the cap as shown in FIG. 3 with respect to the mouth part as shown in FIG. 2.

[FIG. 9B] FIG. 9B is a partial cross-sectional conception diagram of FIG. 9A.

[FIG. 10] FIG. 10 is a cross-sectional conception diagram of FIG. 9A.

[FIG. 11] FIG. 11 is a perspective view showing a schematic configuration of an example of a cap according to Embodiment 2 of the present invention.

[FIG. 12] FIG. 12 is a perspective view showing a schematic configuration of an example of a cap according to Embodiment 3 of the present invention.

[FIG. 13] FIG. 13 is a partial perspective view showing a schematic configuration of an example of a nutritional supplement container according to Embodiment 4 of the present invention.

[FIG. 14] FIG. 14 is an exploded perspective view showing the nutritional supplement container as shown in FIG. 13.

[FIG. 15] FIG. 15 is a schematic plan view showing, from the opening end surface side, the mouth part of the nutritional supplement container as shown in FIG. 14.

[FIG. 16] FIG. 16 is an enlarged perspective view showing a schematic configuration of an example of a cap of the present invention, which constitutes the nutritional supplement container as shown in FIG. 13.

[FIG. 17A] FIG. 17A is a plan view for explaining a first mounted state of the cap as shown in FIG. 16 with respect to the mouth part as shown in FIG. 14.

[FIG. 17B] FIG. 17B is a partial cross-sectional conception diagram of FIG. 17A.

[FIG. 18] FIG. 18 is a partial enlarged view of FIG. 17A.

[FIG. 19A] FIG. 19A is a plan view for explaining a mounted state of the cap as shown in FIG. 16 with respect to the mouth part as shown in FIG. 14, in a transitional stage from the first mounted state to the second mounted state.

[FIG. 19B] FIG. 19B is a partial cross-sectional conception diagram of FIG. 19A.

[FIG. 20A] FIG. 20A is a plan view for explaining a second mounted state of the cap as shown in FIG. 16 with respect to the mouth part as shown in FIG. 14.

[FIG. 20B] FIG. 20B is a partial cross-sectional conception diagram of FIG. 20A.

[FIG. 21] FIG. 21 is a cross-sectional conception diagram of FIG. 20A.

[FIG. 22] FIG. 22 is a schematic diagram showing an example of a transintestine nutrition set used for a conventional transintestine nutritional treatment.

[FIG. 23] FIG. 23 is a schematic diagram showing an example of a transfusion set used for a conventional intravenous nutritional treatment.

Description of the Invention

[0012] In a preferred example of the cap in the present invention, a mouth part of a main container unit includes a distal cylindrical part having an outer peripheral surface on which a male thread is formed, and a proximal cylindrical part having an outer diameter larger than that of the distal cylindrical part and having an outer peripheral

surface on which a first protrusion is formed. The cap has a small-diameter cylindrical part facing the distal cylindrical part in the second mounted state and having an inner peripheral surface on which a female thread to be engaged with the male thread is formed, and a large-diameter cylindrical part facing the proximal cylindrical part in the second mounted state and having an inner peripheral surface on which a second protrusion is formed. In this case, a first mounted state is obtained by pushing the mouth part into the cap so that the second protrusion surmounts the first protrusion, and the second mounted state is obtained by puncturing the thin film with the hollow nozzle while rotating the cap in the first mounted state so as to engage the female thread with the male thread and by rotating the cap to its rotational limit.

[0013] It is preferable that a slit is formed on the large-diameter cylindrical part from the opening end side of the cap toward the top plate part side. In this case, the operation of pushing the mouth part into the cap for making the second protrusion surmount the first protrusion is carried out easily.

[0014] In a preferred example of the cap in the present invention, the mouth part of the main container unit has the male thread formed on the outer peripheral surface. With regard to the cap, a notched part is formed on the side wall part. A female thread that can be engaged with the male thread in the second mounted state is formed on the inner peripheral surface of the side wall part at a position closer to the top plate part than the notched part, and a third protrusion is formed on the inner peripheral surface of the side wall part at a position farther from the top plate part than the position at which the female thread is formed. And, the first mounted state is obtained by pushing the mouth part into the cap so that the third protrusion surmounts the male thread, and the second mounted state is obtained by puncturing the thin film with the hollow nozzle while rotating the cap in the first mounted state so as to engage the female thread with the male thread and by further rotating the cap to its rotational limit. In the thus configured cap, it is easy to confirm that the third protrusion has surmounted the male thread, and thus it is easy to confirm that the first mounted state has been obtained.

[0015] In a preferred example of the cap in the present invention, the connection part includes a seat part that is formed on the circumference of the tubular part and a claw part that protrudes outward from the outer peripheral surface of the seat part and that may be engaged with a connector. In the thus configured cap, accidental detachment of the connector from the tubular part can be prevented with certainty.

[0016] In a preferred example of the cap in the present invention, the cap includes further a sealer arranged on the inner main surface of the top plate part of the cap. In the thus configured cap, air-tightness between the cap and the mouth part in the second mounted state can be improved.

[0017] In a preferred example of the cap in the present

invention, the top plate part of the cap has a vent hole formed to penetrate in the thickness direction, and a vent filter is attached to the top plate part so as to cover the vent hole. In the second mounted state, air outside the main container unit flows into the main container unit through the vent filter. In the thus configured cap, in a case where the main container unit is made of a hard material, during a supply of a nutritional supplement into a body, the liquid substance can flow out continuously from the main container unit without forming a hole, for example for ventilation, on the main container unit by pricking the main container unit with a needle or the like.

[0018] In a preferred example of the cap in the present invention, a rib for partitioning the through hole of the tubular part is provided, and the through hole of the tubular part is partitioned into at least three by the rib when viewing the cylindrical part from the distal side. In the thus configured cap, since intrusion of the connection needle into the tubular part can be inhibited by the rib, the risk of an improper connection can be prevented with further certainty.

(Embodiment 1)

[0019] Hereinafter, an example of a cap of the present invention and also an example of a nutritional supplement container of the present invention using the cap are explained with reference to FIGs. 1 to 10.

[0020] FIG. 1 is a partial perspective view showing a schematic configuration of an example of a nutritional supplement container according to the present embodiment. As shown in FIG. 1, a nutritional supplement container 10 includes a bottle unit 11 as the main container unit, a liquid substance (not shown) containing a nutritional supplement and filled in the bottle unit 11, and a cap 13 mounted to the mouth part 12 (see FIG. 2) of the bottle unit 11. At the bottom of the bottle unit 11, a hanger (not shown) for hanging the bottle unit 11 on a stand or the like is provided.

[0021] The bottle unit 11 is formed of a hard material for example. Therefore, the external configuration is maintained unless external force is applied. The bottle unit 11 is obtained by blow molding a resin material, for example. Examples of the resin material include polyethylene terephthalate (PET), polypropylene (PP), polyvinyl chloride (PVC), nylon and the like.

[0022] FIG. 2 is an exploded perspective view showing the nutritional supplement container as shown in FIG. 1. The mouth part 12 includes a distal cylindrical part 12a and a proximal cylindrical part 12b in this order when viewed from the distal side. On the outer peripheral surface of the distal cylindrical part 12a, a male thread 12c to be engaged with a female thread 19 (see FIG. 3) of the cap 13 is formed. The proximal cylindrical part 12b has an outer diameter larger than that of the distal cylindrical part 12a. On the outer peripheral surface of the proximal cylindrical part 12b, an annular first protrusion 12d is formed.

[0023] To the mouth part 12, a thin film 16 is attached for blocking the opening of the mouth part 12, thereby sealing the interior of the bottle unit 11 with the thin film 16. As a result, even when the bottle unit 11 to which the thin film 16 is attached is turned so that the mouth part 12 is directed downward, the liquid substance in the bottle unit 11 will not leak from the bottle unit 11.

[0024] Examples of the material of the thin film 16 include an aluminum foil, a laminated film formed of paper and an aluminum foil, a resin film containing the same resin as that of the bottle unit 11, and the like. The resin film may be a monolayer or a laminate formed of a plurality of layers. In particular, a resin film containing the same resin as that of the bottle unit 11 is used preferably for the surface in contact with the bottle unit 11, from the viewpoint of ensuring high adhesion of the thin film 16 to the bottle unit 11 by thermal welding.

[0025] The thin film 16 may be adhered to an opening end surface 12f of the mouth part 12, and the rim part 16a may be adhered to the outer peripheral surface in the vicinity of the opening end surface 12f of the mouth part 12. Alternatively, the thin film 16 may be adhered only to the opening end surface 12f of the mouth part 12. The method of adhering the thin film 16 to the mouth part 12 is selected suitably in accordance with the material of the thin film 16, the material of the mouth part 12 and the like.

[0026] As shown in FIG. 2, the cap 13 includes a base part 23, a connection part 21 and a hollow nozzle 22 (see FIG. 3). The base part 23 denotes a part to be attached to the mouth part 12 of the bottle unit 11. A through hole 22b of the hollow nozzle 22 is in communication with a below-mentioned through hole 212 (see FIG. 4) of a tubular part 21a of a base part 23. The base part 23 includes a top plate part 17 and a side wall part 18. When the cap 13 is mounted to the mouth part 12, the top plate 17 faces the opening of the mouth part 12 so as to block the opening while the side wall part 18 surrounds the outer peripheral surface of the mouth part 12.

[0027] As shown in FIG. 3, the side wall part 18 includes a small-diameter cylindrical part 18a and a large-diameter cylindrical part 18b. On the inner peripheral surface of the small-diameter cylindrical part 18a, a female thread 19 to be engaged with the male thread 12c is formed. On the inner peripheral surface of the large-diameter cylindrical part 18b, a plurality of second protrusions 24 are formed. The second protrusions 24 are formed, for example, at a uniform spacing in the circumferential direction on the inner peripheral surface in the vicinity of the opening end sulfate of the base part.

[0028] As shown in FIG. 2, the connection part 21 includes a tubular part 21a that protrudes from the outer main surface of the top plate part 17, a seat part 21b formed on the circumference of the tubular part 21a, and a claw part 21c that protrudes outward from the outer peripheral surface of the seat part 21b. The seat part 21b protrudes from the outer main surface of the top plate part 17, while the upper surface is positioned lower than

the distal end surface of the tubular part 21a (i.e., the upper surface is positioned closer to the outer main surface of the top plate part 17). The other surface of the claw part 21c, which is opposite to the top plate part 17, is in the same plane as the upper surface of the seat part 21b.

[0029] As shown in FIG. 4, the distal outer peripheral surface of the tubular part 21a includes a tapered surface 211 that increases its diameter from the distal end of the tubular part 21a toward the base part side. In the lumen of the tubular part 21a, a rib 213 for partitioning the through hole 212 is provided, and the through hole 212 is partitioned into four by the rib 213. Namely, at the position where the rib 213 is formed, the through hole 212 is divided into four small holes 214.

[0030] FIG. 5 shows a state where a liquid delivery path 27 that includes a connector 25 and a flexible tube 26 connected to the connector 25 is about to be connected to the connection part 21. FIG. 6 shows a state where the liquid delivery path 27 is connected to the connection part 21. As shown in FIGs. 5 and 6, the connection part 21 is configured to be connected to the liquid delivery path 27 including the connector 25. This configuration is helpful for solving the problem of an improper connection as specified below. That is, if a liquid delivery path for an intravenous nutritional treatment was configured to deliver a liquid substance into a body by simply pricking a sharp-tipped connection needle into a connection object, the delivery path could be connected by mistake to a nutritional supplement container 10 to be used for a transintestine nutritional treatment. Furthermore, when the connection part 21 has the rib 213 to partition the through hole of the tubular part 21a as shown in FIG. 4, the above-mentioned problem of an improper connection can be avoided with further certainty.

[0031] Regarding the flexible tube 26 of the liquid delivery path 27, only limited areas of these components closer to the connector 25 are shown in FIGs. 5 and 6, for the convenience in illustration. After press-fitting the connector 25 in the tubular part 21a, the connector 25 is rotated so that the claw part 21c is placed below the opening part 25a formed in the connector 25. In this state, since the claw part 21c engages with a convex (not shown) of the connector 25 placed below the claw part 21c (in a region closer to the outer main surface of the top plate part 17), the connector 25 is fixed to the connection part 21, and thus accidental detachment of the connector 25 is prevented with certainty. The connection between the connection part 21 and the connector 25 can be achieved by any of known various connection mechanisms such as screwing, fitting, engagement and the like, and it is not limited to the example as shown in FIGs. 5 and 6.

[0032] In the top plate part 17, two vent holes 29 penetrating in the thickness direction are formed, and a vent filter 28 (see FIG. 3) is attached to the inner main surface of the top plate part 17 so as to cover the vent holes 29. The vent filter 28 is surrounded with an annular wall 28a

provided on the inner main surface of the top plate part 17. The vent filter 28 is a hydrophobic vent filter, which transmits a gas but not a liquid. As the liquid substance filled in the bottle unit 11 flows out from the mouth part 12, the pressure inside the bottle unit 11 is lowered. In a case where the bottle unit 11 is formed of a soft material, the bottle unit 11 will be deformed due to the outflow of the liquid substance, and thereby the liquid substance will flow out continuously. However, a bottle unit 11 formed of a hard material rarely will be deformed. In the present embodiment, with the outflow of the liquid substance, air will be drawn into the bottle unit 11 through the vent filter 28. As a result, during a supply of a nutritional supplement into the body, the liquid substance can flow out continuously from the bottle unit 11 without formation of a hole, for example for ventilation, in the bottle unit 11 by pricking the bottle unit 11 with a needle or the like.

[0033] The vent filter 28 is not limited particularly in the materials or the like as long as it is a known hydrophobic filter used for a connection needle such as a bottle needle.

[0034] Next, the connected state of a cap 13 with respect to the mouth part 12 will be described with reference to FIGs. 7A to 10. In FIGs. 7B and 9B, for the convenience in illustration, the thin film 16 attached to the mouth part 12 of the bottle unit 11 so as to seal the interior of the bottle unit 11 is not shown. In FIGs. 7B, 9B and 10B, the connection part 21, the hollow nozzle 22 and the annular wall 28a surrounding the vent filter 28 are shown (but not as cross-sectional views) even if they cannot be observed visually, for the purpose of indicating their locations.

[0035] The cap 13 may take a first mounted state and a second mounted state with respect to the mouth part 12. FIGs. 7A and 7B show the cap 13 and the mouth part 12 in the first mounted state. In the first mounted state, the mounted state of the cap 13 with respect to the mouth part 12 is held so that the end surface 22a of the hollow nozzle 22 is not in contact with the thin film.

[0036] The first mounted state is held in the following manner. The maximal inner diameter R1 of the large-diameter cylindrical part 18b of the cap 13 at which the second protrusions 24 are formed is greater than the maximal outer diameter of the distal cylindrical part 12d of the mouth part 12, and slightly greater than the maximal outer diameter of the proximal cylindrical part 12b at a position closer to the proximal end side (opposite to the distal side) than the position at which the annular first protrusion 12d is formed. However, the maximal inner diameter R1 is slightly smaller than the maximal outer diameter of the proximal cylindrical part 12b at a position where the annular first protrusion 12d is formed. Therefore, when the mouth part 12 is pushed into the cap 13 without rotating the cap 13, the second protrusions 24 surmount the first protrusion 12d. Thereby, the cap 13 mounted to the mouth part 12 can be prevented from detaching accidentally from the mouth part 12.

[0037] The female thread 19 formed on the inner peripheral surface of the small-diameter cylindrical part 18a has a shape to be engaged with the male thread 12c formed on the outer peripheral surface of the distal cylindrical part 12a. Therefore, even if the cap 13 is applied with a force to press the inner main surface of the top plate part 17 of the cap 13 toward the opening end surface of the mouth part 12, as shown in FIG. 8, a surface 191 of the female thread 19 to face the male thread 12c at the screw-starting side collides with a surface 121 of the male thread 12c at the screw-starting side, in a case where the cap 13 is not rotated with respect to the mouth part 12. As a result, the cap 13 is prevented from being further pushed toward the mouth part 12. Therefore, the thin film will not be punctured by the hollow nozzle 22 unless the cap 13 is rotated with respect to the mouth part 12.

[0038] In the present embodiment, the first mounted state is held in this manner. In the first mounted state, the cap 13 may move up and down with respect to the mouth part 12 as long as accidental detachment of the cap 13 from the mouth part 12 can be prevented and the thin film is not punctured by the hollow nozzle 22.

[0039] The second mounted state is achieved in the following manner. The cap 13 in the first mounted state is rotated in the direction indicated with the arrows in FIGs. 7A and 7B so as to engage the female thread 19 with the male thread 12c. Accordingly, in the first mounted state, the hollow nozzle 22, which has been located not to be in contact with the thin film, namely, placed outside the mouth part 12, approaches the thin film. Then, the hollow nozzle 22 positioned outside the mouth part 12 enters the mouth part 12, breaking the thin film 16 (see FIG. 2). Next, the cap 13 is rotated to its rotational limit so that the second mounted state as shown in FIGs. 9A to 10 is obtained. In the second mounted state, the small-diameter cylindrical part 18a of the cap faces the distal cylindrical part 12a, while the large-diameter cylindrical part 18b faces the proximal cylindrical part 12b. Since the thin film 16 is broken as shown in FIG. 10, when the bottle unit 11 is turned so that its mouth part 12 is directed downward, the hollow nozzle 22 and the vent filter 28 will be in contact with the liquid substance.

[0040] The rotational limit of the cap 13 can be controlled for example by use of the inner main surface of the top plate part 17 of the cap 13. That is, when the opening end surface 12f of the mouth part 12 (see FIG. 2) contacts with the inner main surface of the top plate part 17 of the cap 13, the cap 13 cannot be rotated any more. As a result, a further rotation of the cap 13 is prevented.

[0041] In the present embodiment, the length of the male thread 12c varies depending on the types of the threads or the like, though it is not limited particularly as long as the thin film 16 can be broken by the hollow nozzle 22 so that both the hollow nozzle 22 and the vent filter 28 can contact with the liquid substance while a part of the thin film 16 will not fall off, and as long as the air-

tightness between the cap 13 and the mouth part 12 can be ensured by the engaging of the male thread 12c and the female thread 19. In the example explained with reference to the attached drawings for the present embodiment, the male thread is a single-screw thread. The type of the thread is not limited to this example, but a multiple-screw thread may be used, and there is no particular limitation on the number of screws.

[0042] In this manner, the second mounted state is held in the present embodiment.

[0043] The present embodiment is helpful to solve the problem of an improper connection in which a liquid delivery path to be used for an intravenous nutritional treatment is connected by mistake to a container to be used for a transintestine nutritional treatment. In addition, since the cap 13 can take both the first mounted state and the second mounted state with respect to the mouth part 12, the liquid substance in the bottle unit 11 can flow out without peeling by hand a part or the whole of the thin film 16, or without making holes in the thin film 16 with a finger for example. Therefore, a liquid substance such as a nutritional supplement can be supplied hygienically in a simple operation. At shipping, if the cap 13 is mounted to the mouth part 12 in the first mounted state, the operator can supply the liquid substance to a patient only by connecting the liquid delivery path 27 to the connection part 21 and subsequently by rotating the cap 13 to its rotational limit.

[0044] Examples of the material for the cap 13 include polyethylene (PE), polypropylene (PP), polyacetal (POM), polyethylene terephthalate (PET), polycarbonate (PC) and the like.

(Embodiment 2)

[0045] Next, another example of a cap of the present invention, and another example of a nutritional supplement container of the present invention using the cap, will be described below with reference to FIG. 11.

[0046] As shown in FIG. 11, it is preferable that the cap 13 includes further an annular sealer 171 arranged on the inner main surface 17a of the top plate part 17. In a case where the cap 13 is mounted to the mouth part 12 in a second mounted state, the sealer 171 is sandwiched between the inner main surface 17a of the top plate part 17 and the opening end surface 12f (see FIG. 2) of the mouth part 12, thereby improving the air-tightness between the cap 13 and the mouth part 12. This serves to prevent effectively the liquid substance from leaking out from the gap between the cap 13 and the mouth part 12 during a supply of the liquid substance to a patient. For the purpose of convenience in illustration, the sealer 171 is hatched in the drawing. The cap in the present embodiment is configured identically to the cap in Embodiment 1 except that the sealer 171 is provided, and the main container unit to which the cap of the present embodiment is mounted is configured identically to the container in Embodiment 1. Due to this reason, the com-

mon components are not explained in detail in this embodiment.

[0047] Examples of the material for the sealer 171 include isoprene rubber, butylene rubber, thermoplastic elastomer and the like.

(Embodiment 3)

[0048] Next, another example of the cap of the present invention, and another example of the nutritional supplement container of the present invention using the cap, will be described with reference to FIG. 12.

[0049] As shown in FIG. 12, slits 181 may be formed in the large-diameter cylindrical part 18b of the cap 13, from an opening side end 13a of the cap 13 toward the top plate part 17. In this case, the operation of pushing the mouth part 12 into the cap 13 so that the second protrusions 24 surmount the first protrusion 12d (see FIG. 2) can be carried out easily. The cap 13 of the present embodiment is configured identically to the cap in Embodiment 1 except that the slits 181 are formed in the large-diameter cylindrical part 18b, and the container to which the cap of the present embodiment is mounted is configured identically to the container in Embodiment 1. Due to this reason, the common components are not explained in detail in this embodiment.

(Embodiment 4)

[0050] Next, another example of the cap of the present invention, and another example of the nutritional supplement container of the present invention using the cap, will be described with reference to FIGS. 13-21.

[0051] FIG. 13 is a partial perspective view showing a schematic configuration of an example of a nutritional supplement container in the present embodiment. As shown in FIG. 1, a nutritional supplement container 40 includes a bottle unit 41 as the main container unit, a liquid substance (not shown) containing a nutritional supplement and filled in the bottle unit 41, and a cap 43 mounted to the mouth part 42 (see FIG. 14) of the bottle unit 41. At the bottom of the bottle unit 41, a hanger (not shown) for hanging the bottle unit 41 on a stand or the like is provided.

[0052] The bottle unit 41 is formed of a hard material just like the bottle unit 41 in Embodiment 1.

[0053] FIG. 14 is an exploded perspective view showing a nutritional supplement container as shown in FIG. 13. On the outer peripheral surface of the mouth part 42 of the bottle unit 41, a male thread 42c to be engaged with the female thread 49 of the cap 43 (see FIG. 16) is formed. The male thread 42c is a four-screw thread and it includes a segment 421c, a segment 422c, a segment 423c and a segment 424c.

[0054] FIG. 15 is a plan view showing the mouth part 42 from the opening end surface 42f side. As shown in FIG. 15, the segment 421c, the segment 422c, the segment 423c and the segment 424c are formed so that the

male thread 42 will be present at any positions along the circumferential direction of the mouth part 42. The above-mentioned segments may have areas overlapped with the adjacent segments when the mouth part 42 is viewed from its open end side.

[0055] As shown in FIG. 14, on the outer peripheral surface at the proximal side of the mouth part 42, an annular protrusion 44 is formed.

[0056] At the opening end of the mouth part 42, a thin film 46 is attached for blocking the opening of the mouth part 42, so that the interior of the bottle unit 41 is sealed with the thin film 46. The material for the thin film 46 may be the same as that of the thin film 16 in Embodiment 1. Adhesion of the thin film 46 to the mouth part 42 can be carried out similarly to the case in Embodiment 1. Its rim part 46a may be adhered to the outer peripheral surface in the vicinity of an opening end surface 42f of the mouth part 42 and to the opening end surface 42f. Alternatively, the thin film 46 may be adhered only to the opening end surface 42f of the mouth part 42. The process for adhering thin film 46 to the mouth part 42 may be the same as that in Embodiment 1.

[0057] As shown in FIG. 14, the cap 43 includes a base part 45, a connection part 51 and a hollow nozzle 52 (see FIG. 16). The base part 45 is a part to be attached to the mouth part 42 of the bottle unit 41. The base part 45 includes a top plate part 47 and a side wall part 48. When the cap 43 is mounted to the mouth part 42, the top plate part 47 faces the opening of the mouth part 42 so as to block the opening, and the side wall part 48 surrounds the outer peripheral surface of the mouth part 42.

[0058] As shown in FIG. 16, in the side wall part 48, a pair of notched parts 48a are formed. On the inner peripheral surface of the side wall part 48, a female thread 49 that can be engaged with the male thread 42c is formed at the position closer to the top plate part 47 than the position where the notched parts 48a are formed. The female thread 49 also is a four-screw thread. On the other hand, on the inner peripheral surface of the side wall part 48, a plurality of third protrusions 54 are formed at the position farther from the top plate part 47 than the position where the female thread 49 is formed. The plural third protrusions 54 are formed, for example, on the inner peripheral surface in the vicinity of the opening end surface 43a of the base part 45, at regular intervals in the circumferential direction. The number of the third protrusions 54 is equal to the number of screws on the male thread 42c. In the example as shown in FIG. 16, the number is four.

[0059] As shown in FIG. 14, the connection part 51 includes a tubular part 51a, a seat part 51b formed on the circumference of the tubular part 51a, and a claw part 51c that protrudes outward from the outer peripheral surface of the seat part 51b, and a rib 513 that partitions a through hole in the tubular part 51a, similarly to the case in Embodiment 1. Though the seat part 51b protrudes from the outer main surface of the top plate part 47, the upper face is located lower than the distal end surface

of the tubular part 51a (i.e., located closer to the outer main surface of the top plate part 47). The opposite surface of the claw part 51c facing the top plate part 47 is in the same plane as the upper surface of the seat part 51b.

[0060] In the present embodiment, since the connection part 51 is identical to that in Embodiment 1, the connection between the connection part 51 and the liquid delivery path is provided similarly to Embodiment 1. Namely, the connection part 51 is configured to be connectable to a liquid delivery path including a connector. This configuration is helpful for solving the problem of an improper connection. That is, if a liquid delivery path for an intravenous nutritional treatment was configured to deliver a nutritional supplement into a body by simply pricking a sharp-tipped connection needle into a connection object, the delivery path could be connected by mistake into a nutritional supplement container to be used for a transintestinal nutritional treatment. Furthermore, as the connection part 51 is provided with a rib 513 to partition the through hole of the tubular part 51a, the above-mentioned problem of an improper connection can be prevented with further certainty.

[0061] In the top plate part 47, a pair of vent holes 59 penetrating in the thickness direction are formed, and a vent filter 58 (see FIG. 16) is attached to the inner main surface of the top plate part 47 so as to cover the vent holes 59. The material of the vent filter 58 may be the same as that of the vent filter 28 in Embodiment 1.

[0062] Next, the connected state of the cap 43 with respect to the mouth part 42 will be described with reference to FIGs. 17A to 21. For the convenience in illustration, the thin film 46 that is attached to the mouth part 42 of the main container unit 41 so as to seal the main container unit 41 is not shown in FIGs. 17B, 19B and 20B. In FIGs. 17B, 19B, 20B, and 21B, the connection part 51, the hollow nozzle 52 and the annular wall 58a surrounding the vent filter 58 are shown (but not as cross-sectional views) even if they cannot be observed visually, for the purpose of indicating their locations.

[0063] The cap 43 may take a first mounted state and a second mounted state with respect to the mouth part 42. FIGs. 17A and 17B show the cap 43 and the mouth part 42 in the first mounted state. In the first mounted state, the mounted state of the cap 43 with respect to the mouth part 42 is held so that the end surface of the hollow nozzle 52 is not in contact with the thin film 46 (FIG. 14).

[0064] The first mounted state is held in the following manner. The maximal inner diameter of the cap 43 at the position where the third protrusions 54 are formed is slightly smaller than the maximal outer diameter of the mouth part 42 at the position where the male thread 42c is formed. However, the diameter of the cylinder that includes the inner surface of a portion 48c of the side wall part 48 arranged between adjacent notched parts 48a in the circumferential direction and that includes a central axis 222 of the cap 43 as its central axis (see FIG. 16) is slightly larger than the maximal outer diameter of the

mouth part 42 at the position where the male thread 42c is formed. Therefore, by pushing the mouth part 42 into the cap 43 without rotating the cap 43, as shown in FIG. 17B, the third protrusions 54 surmount the male thread 42c. Thereby, accidental detachment of the cap 43 from the mouth part 42 can be prevented.

[0065] The female thread 49 formed on the inner peripheral surface of the side wall part 48 to be closer to the top plate part 47 than the notched parts 48a has a shape to be engaged with the male thread 42c formed on the outer peripheral surface of the mouth part 42. Therefore, even if the cap 43 is applied with a force to press the inner main surface of the top plate part 47 of the cap 43 toward the opening end surface 42f of the mouth part 42, as shown in FIG. 18, a surface 491 of the female thread 49 to face the male thread 42c at the screw-starting side collides with a surface 421 of the male thread 42c at the screw-starting side, in a case where the cap 43 is not rotated with respect to the mouth part 42. As a result, the cap 43 is prevented from being further pushed toward the mouth part 42. Therefore, the thin film will not be punctured to be broken by the hollow nozzle 52.

[0066] In the present embodiment, the first mounted state is held in this manner.

[0067] The second mounted state is held in the following manner. The cap 43 in the first mounted state is rotated in the direction indicated with the arrows in FIGs. 17A and 17B so as to engage the female thread 49 with the male thread 42c. As a result of this engaging, the hollow nozzle 52, which has been located not to be in contact with the thin film, namely, placed outside the mouth part 42, approaches the thin film. Then, the hollow nozzle 42 enters the mouth part 42, breaking the thin film 16. FIGs. 19A and 19B are plan views for explaining the mounted state of the cap 43 with respect to the mouth part 42 in a transitional stage from the first mounted state to the second mounted state. Next, the cap 43 is rotated to its rotational limit so that the second mounted state is obtained (see FIGs. 20A, 20B and 21). Since the thin film 46 is broken, when the bottle unit 41 is turned so that its mouth part 42 is directed downward, the hollow nozzle 52 and the vent filter 58 will contact with the liquid substance.

[0068] The rotational limit of the cap 43 can be controlled for example by use of the inner main surface of the top plate part 47 of the cap 43. Alternatively, the annular protrusion 44 may be formed at a predetermined position so that the rotational limit of the cap 43 is controlled by the annular protrusion 44.

[0069] In the present embodiment, the lengths of the male thread 42c and the female thread 49 are not limited particularly as long as the thin film 46 can be broken by the hollow nozzle 52 so that both the hollow nozzle 52 and the vent filter 58 contact with the liquid substance while a part of the thin film 46 will not fall off, and as long as the air-tightness between the cap 43 and the mouth part 42 can be ensured by the engaging of the male thread 42c and the female thread 49.

[0070] In this manner, the second mounted state is achieved in the present embodiment.

[0071] Similarly to Embodiment 1, the present embodiment is helpful to solve the problem of an improper connection that a liquid delivery path to be used for an intravenous nutritional treatment is connected improperly. In addition, a liquid substance such as a nutritional supplement can be supplied hygienically in a simple operation. At shipping, if the cap 43 has been mounted to the mouth part 42 in the first mounted state, the operator can supply the liquid substance to a patient only by connecting the liquid delivery path to the connection part 51 and subsequently by rotating the cap 43 to its rotational limit.

[0072] In the present embodiment, due to the reason as explained in Embodiment 1, it is preferable that the cap 43 further includes an annular sealer (not shown) arranged on the inner main surface of the top plate part 47.

[0073] In the example explained in the present embodiment with reference to the attached drawings, the male thread is a four-screw thread. However, the thread is not limited to this example, and it may be a multiple-screw thread other than the four-screw thread. Similarly, regarding the female thread, it may be a single-screw thread in accordance with the male thread, or may be a multiple-screw thread other than the four-screw thread.

[0074] In the liquid delivery path 27 as shown in FIG. 5, the connector 25 and the flexible tube 26 are shown only partially for the convenience in illustration. In fact, the liquid delivery path to be connected to the cap in any of Embodiments 1-4 may include any further components to be provided to a liquid delivery path to be used for a conventionally-known transintestine nutritional treatment, such as a flow controller for controlling the flow rate of the liquid substance flowing in the flexible tube 26 by pressing the flexible tube 26, an infusion cylinder 25, a connector that can be connected to a nasal tube or the like fixed to a patient, and a cover for the connector.

Industrial Applicability

[0075] The present invention can provide a cap for a nutritional supplement container suitably used for a transintestine nutritional treatment, and a nutritional supplement container using the cap.

Claims

1. A cap to be mounted to a mouth part of a main container unit of a nutritional supplement container in order to deliver a liquid substance filled in the main container unit, the main container unit comprises a thin film that is attached to the mouth part so as to seal the interior of the main container unit, the cap comprises:

- a base part comprising a top panel part to block an opening of the mouth part and a side wall part to surround an outer peripheral surface of the mouth part at the time of mounting the cap to the mouth part;
- a connection part that comprises a tubular part protruding from an outer main surface of the top plate part and to which a connector can be connected; and
- a hollow nozzle that protrudes from an inner main surface of the top plate part and that has a through hole in communication with a through hole of the tubular part,
- the cap is allowed to take a first mounted state and a second mounted state with respect to the mouth part,
- in the first mounted state, the mounted state of the cap with respect to the mouth part is held in a state where an end surface of the hollow nozzle is located not in contact with the thin film or in contact with the thin film but not pressing the thin film, and
- in the second mounted state, the mounted state of the cap with respect to the mouth part is held in a state where the thin film is broken by the hollow nozzle and the hollow nozzle is located inside the mouth part.
2. The cap according to claim 1, wherein the mouth part comprises a distal cylindrical part having an outer peripheral surface on which a male thread is formed, and a proximal cylindrical part having a larger outer diameter in comparison with the distal cylindrical part and having an outer peripheral surface on which a first protrusion is formed, the side wall part of the cap comprises a small-diameter cylindrical part facing the distal cylindrical part in the second mounted state and having an inner peripheral surface on which a female thread to be engaged with the male thread is formed, and a large-diameter cylindrical part facing the proximal cylindrical part in the second mounted state and having an inner peripheral surface on which a second protrusion is formed, the first mounted state is obtained by pushing the mouth part into the cap so that the second protrusion surmounts the first protrusion, and the second mounted state is obtained by puncturing the thin film with the hollow nozzle while rotating the cap in the first mounted state so as to engage the female thread with the male thread and by rotating the cap to its rotational limit.
 3. The cap for a container according to claim 2, wherein a slit is formed on the large-diameter cylindrical part from the opening end side of the cap toward the top plate part side.
 4. The cap according to claim 1, wherein the mouth part has an outer peripheral surface on which a male thread is formed, in the cap, a notched part is formed on the side wall part, and a female thread that can be engaged with the male thread in the second mounted state is formed on the inner peripheral surface of the side wall part at a position closer to the top plate part than the notched part, and a third protrusion is formed on the inner peripheral surface of the side wall part at a position farther from the top plate part than the position at which the female thread is formed, where the first mounted state is obtained by pushing the mouth part into the cap so that the third protrusion surmounts the male thread, and the second mounted state is obtained by puncturing the thin film with the hollow nozzle while rotating the cap in the first mounted state so as to engage the female thread with the male thread and further rotating the cap to its rotational limit.
 5. The cap according to any of claims 1 to 4, wherein the connection part comprises further a seat part that is formed in the circumference of the tubular part and a claw part that protrudes outward from the outer peripheral surface of the seat part.
 6. The cap according to any of claims 1 to 5, further comprising a sealer arranged on the inner main surface of the top plate part.
 7. The cap according to any of claims 1 to 6, wherein the top plate part has a vent hole formed to penetrate in the thickness direction, and a vent filter is attached to the top plate part so as to cover the vent hole, so that in the second mounted state, air outside the main container unit flows into the main container unit through the vent filter.
 8. The cap according to any of claims 1 to 7, further comprising a rib for partitioning the through hole of the tubular part, the through hole of the tubular part is partitioned into at least three by the rib when viewing the cylindrical part from the distal side.
 9. A nutritional supplement container comprising:
 - a main container unit comprising a mouth part;
 - a liquid substance filled in the main container unit;
 - a thin film attached to the mouth part so as to seal the interior of the main container unit; and
 - the cap according to any of claims 1 to 8, which is mounted to the mouth part, wherein the cap is mounted to the mouth part in

the first mounted state.

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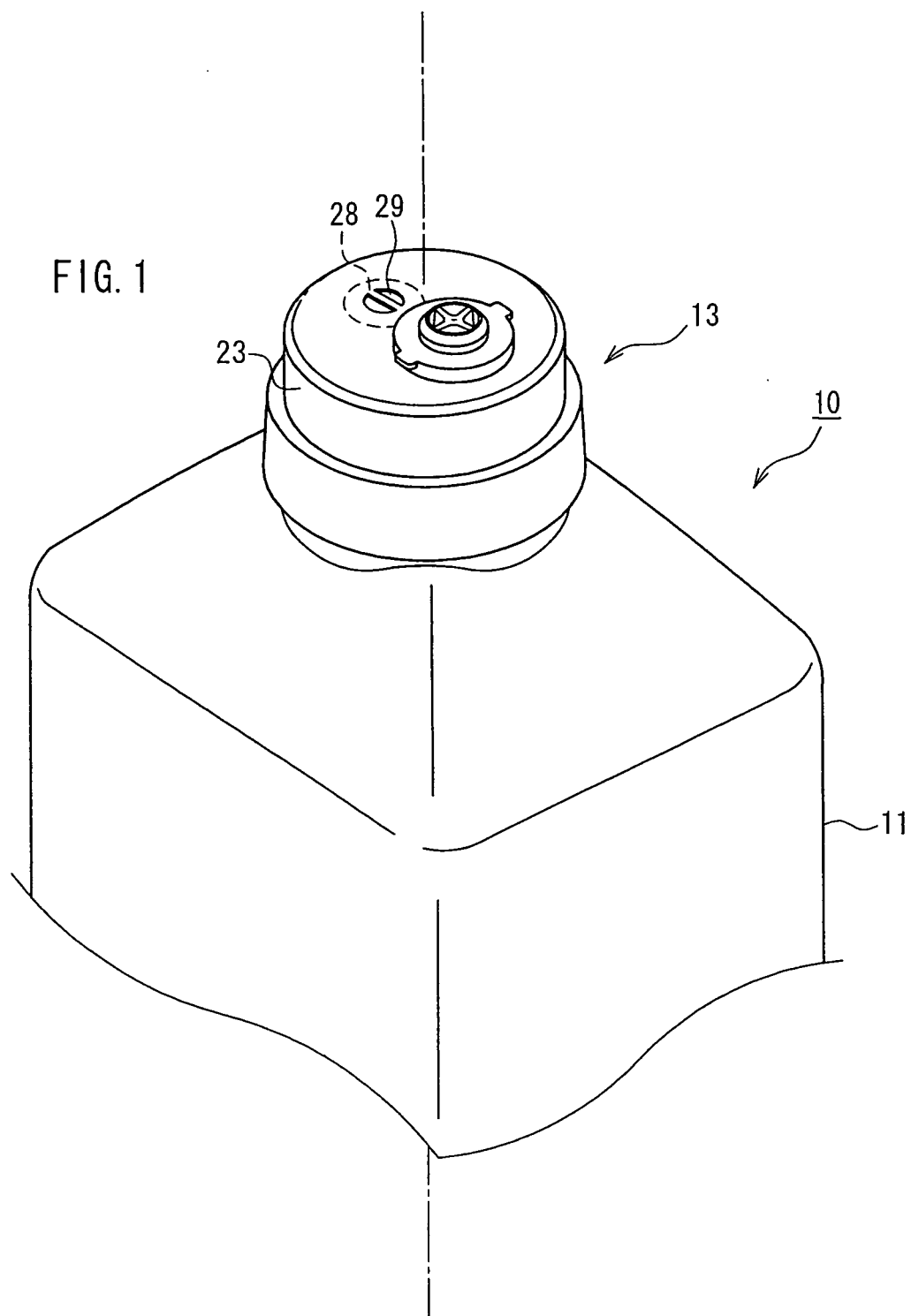
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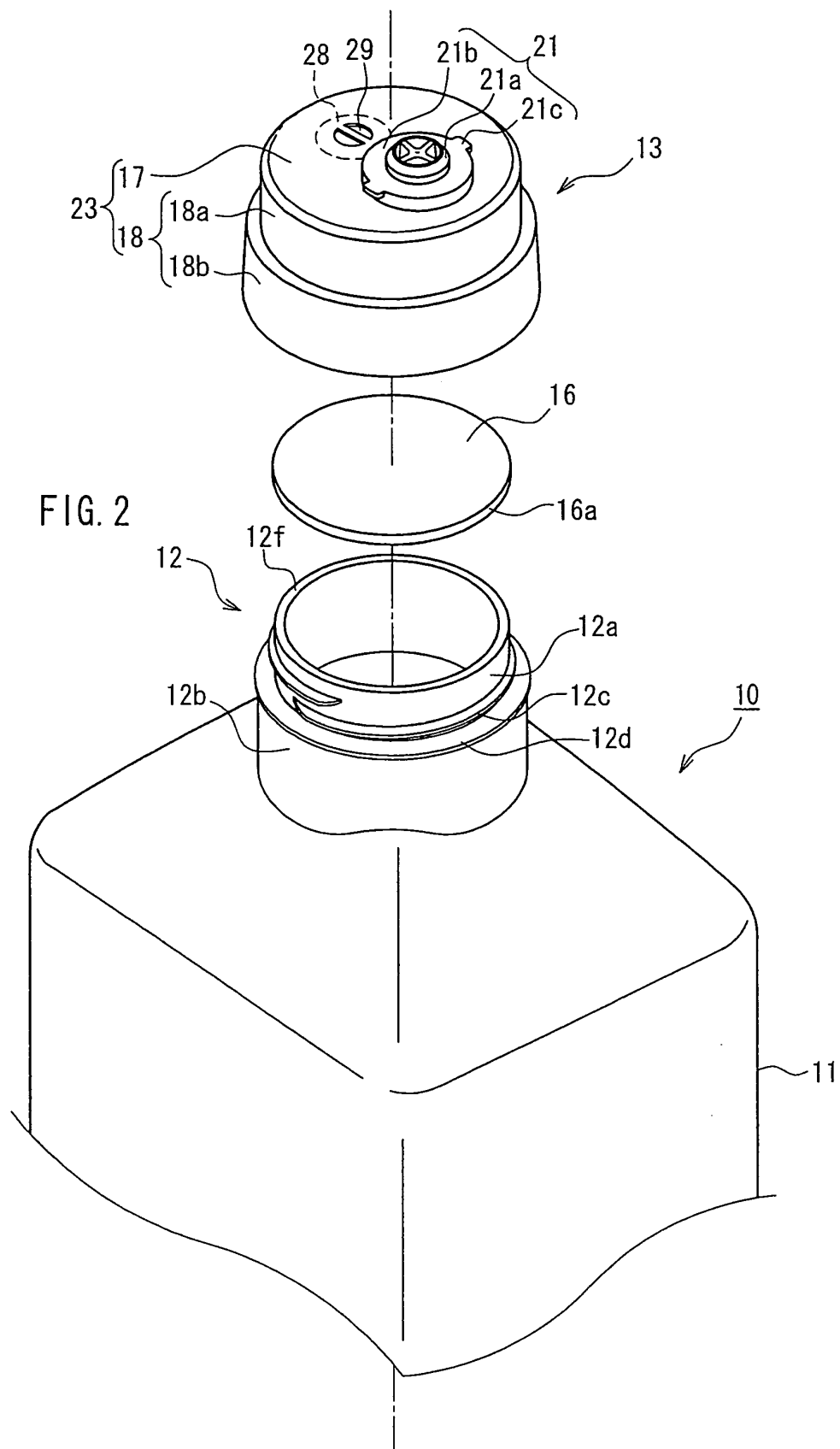


FIG. 3

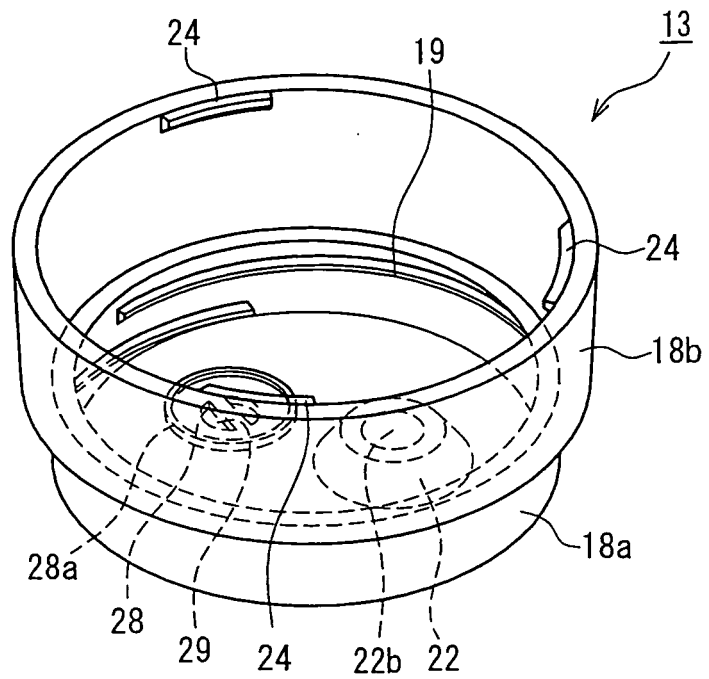
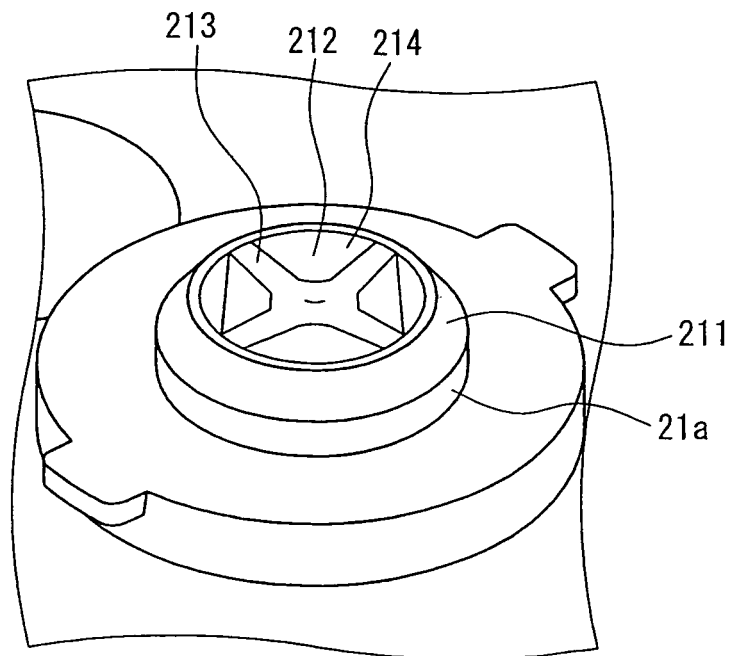
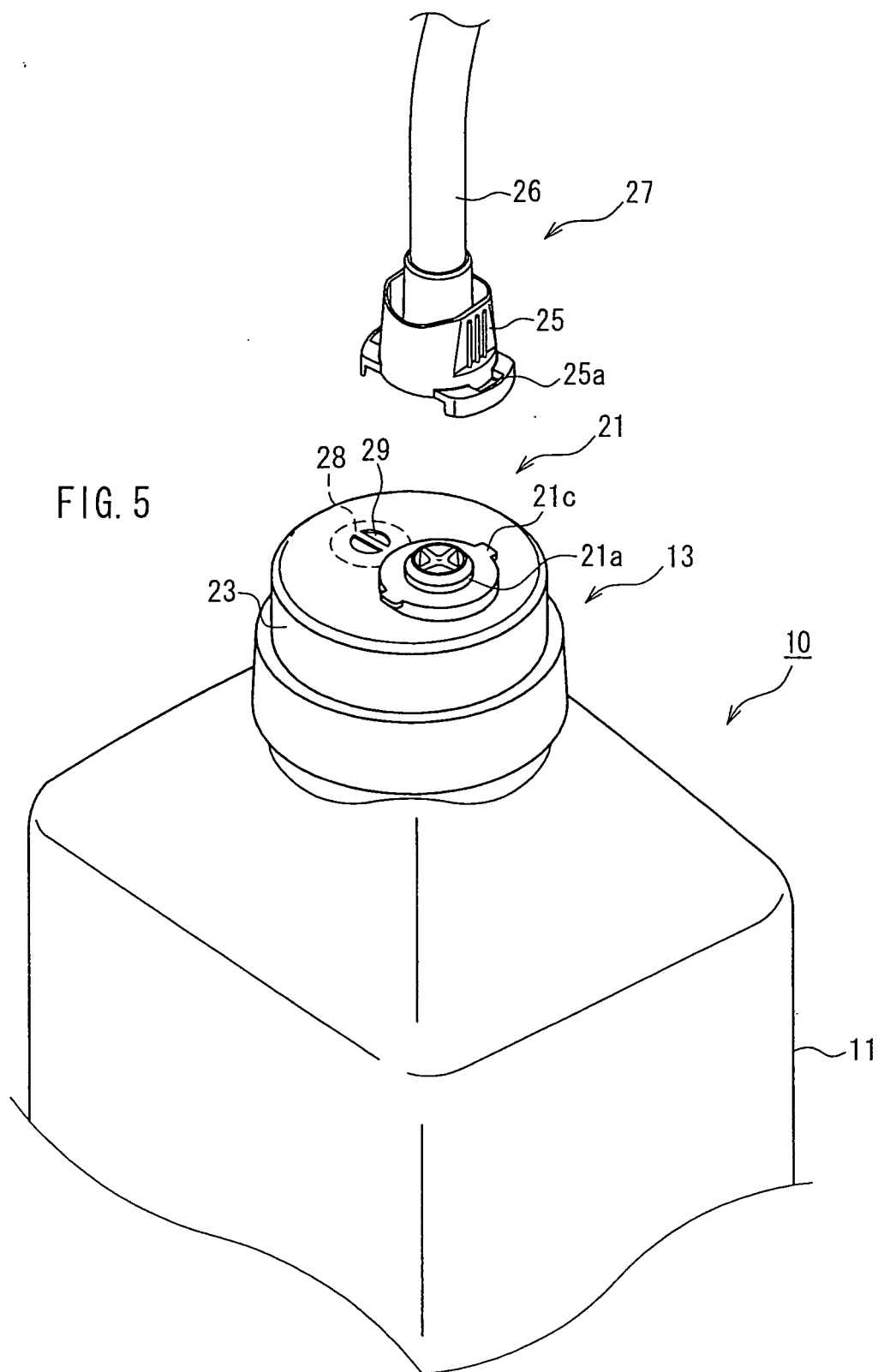


FIG. 4





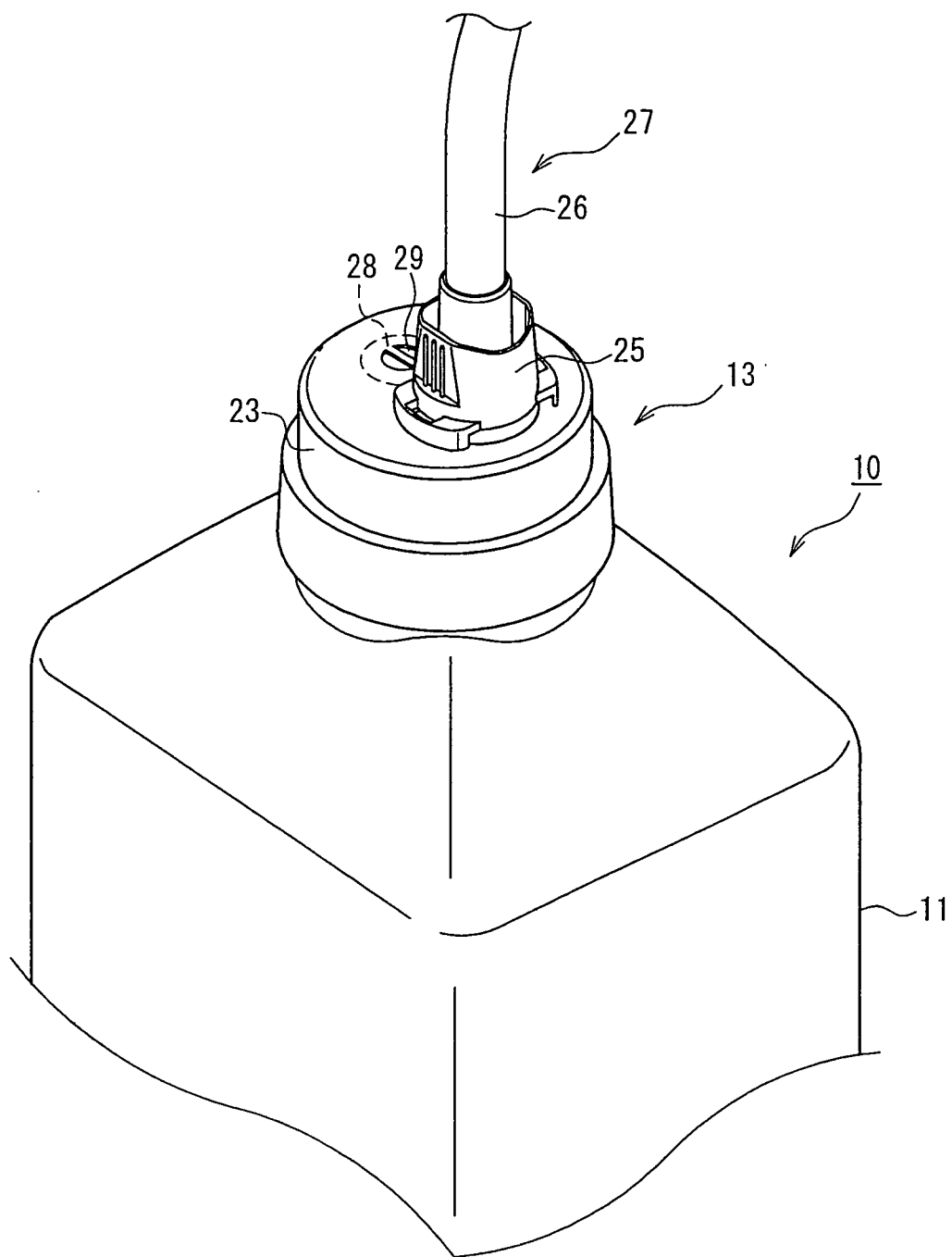
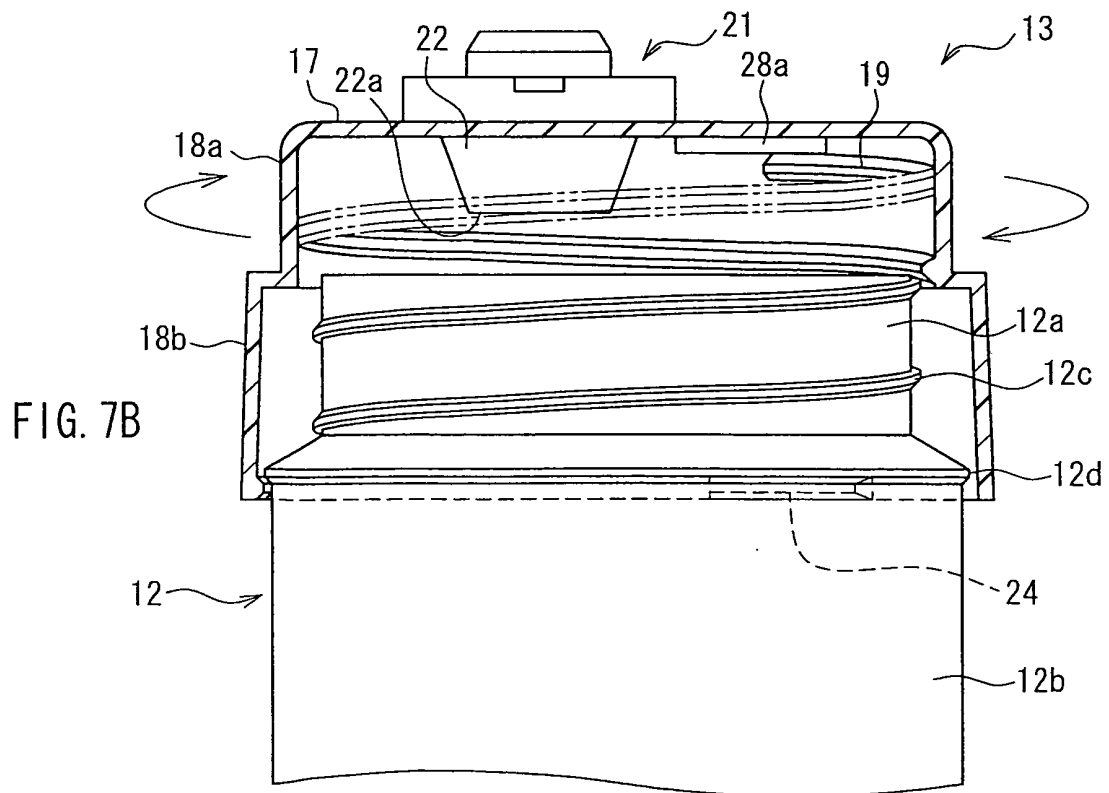
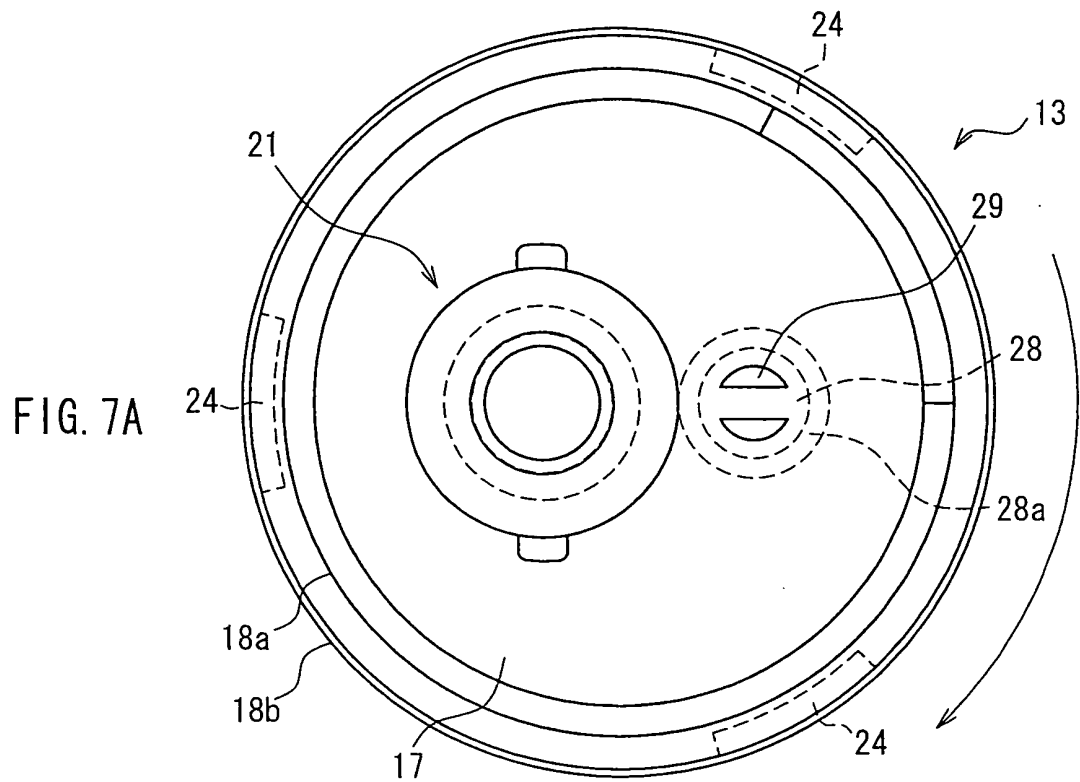


FIG. 6



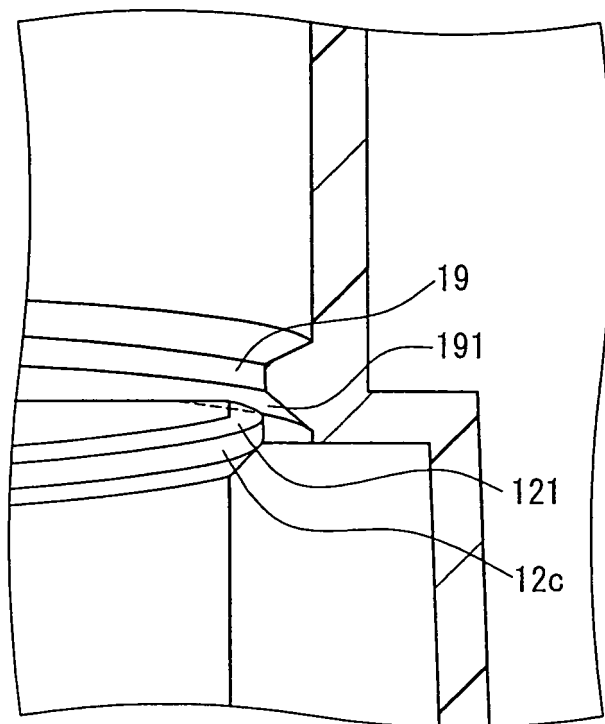


FIG. 8

FIG. 9A

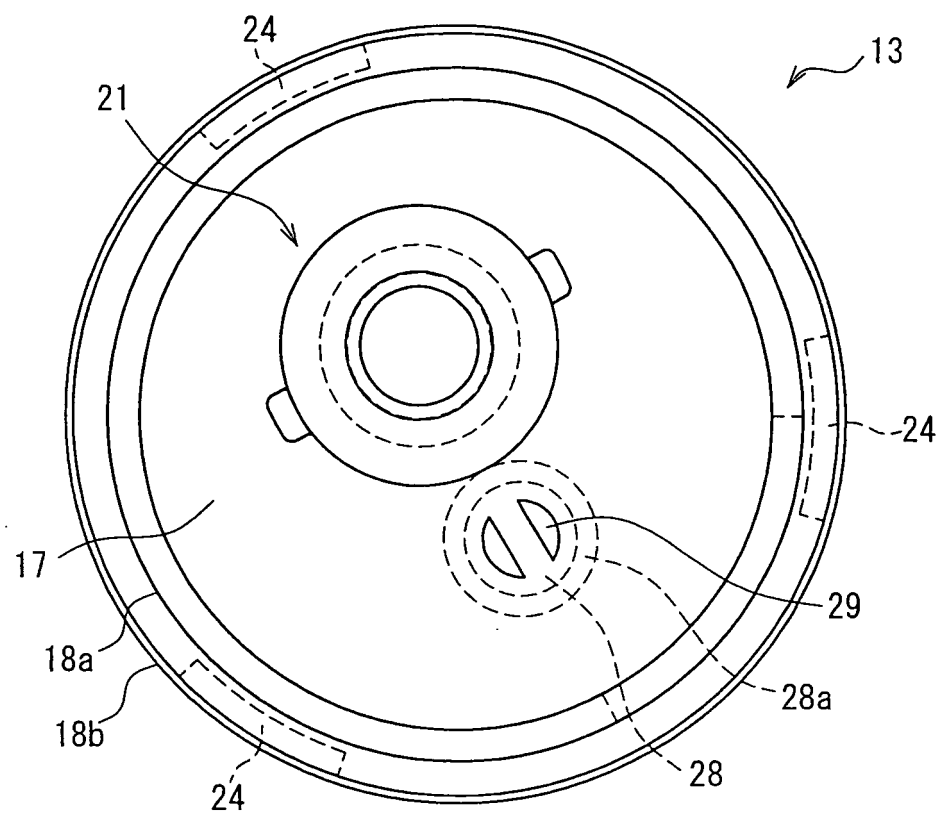
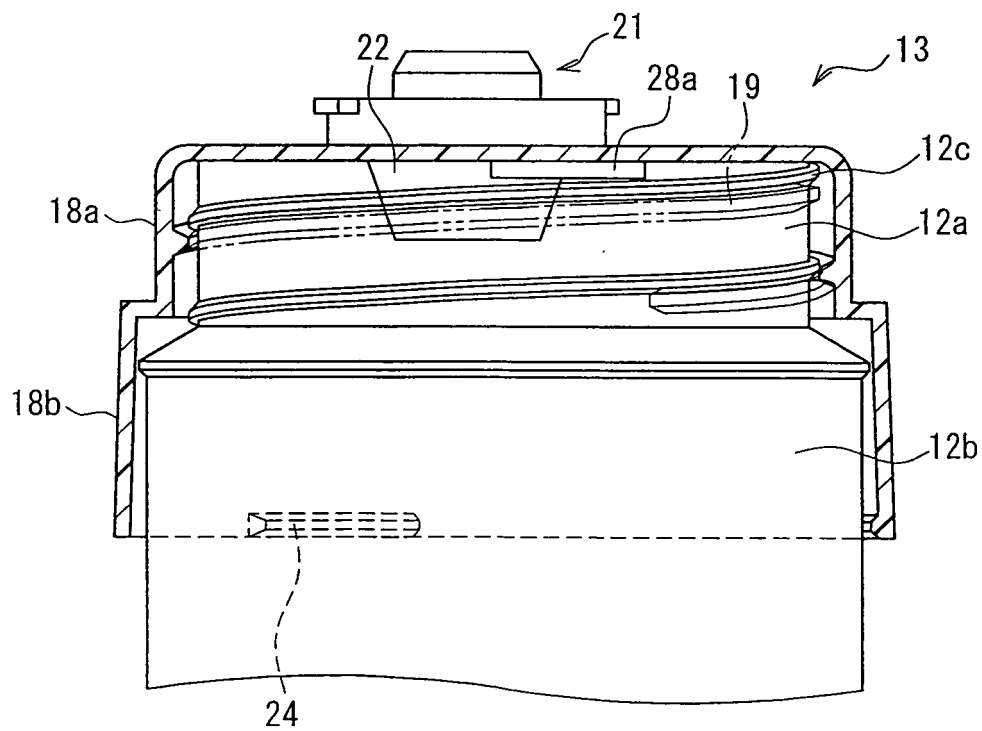
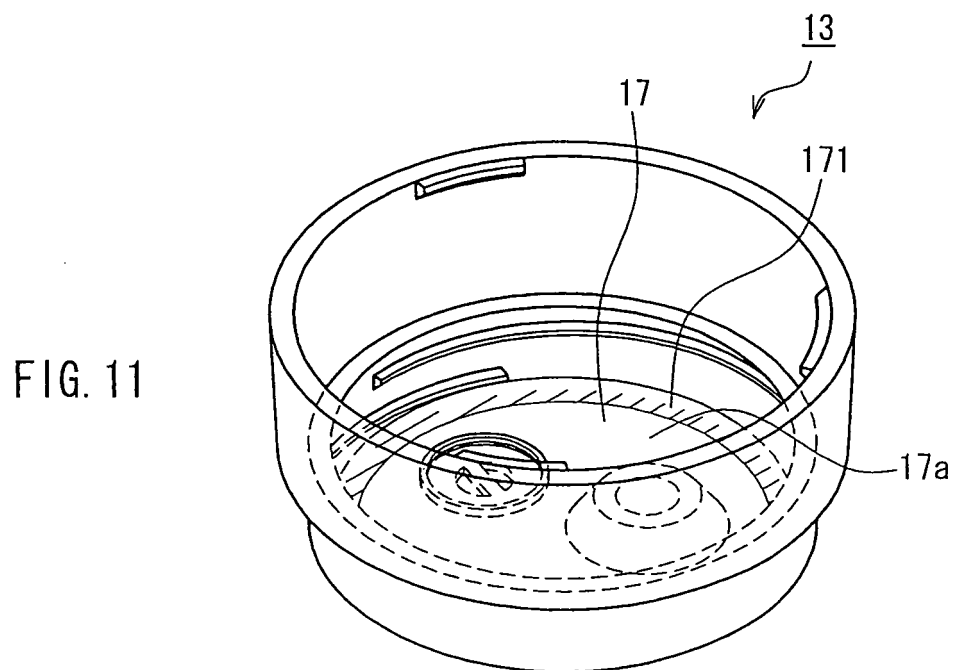
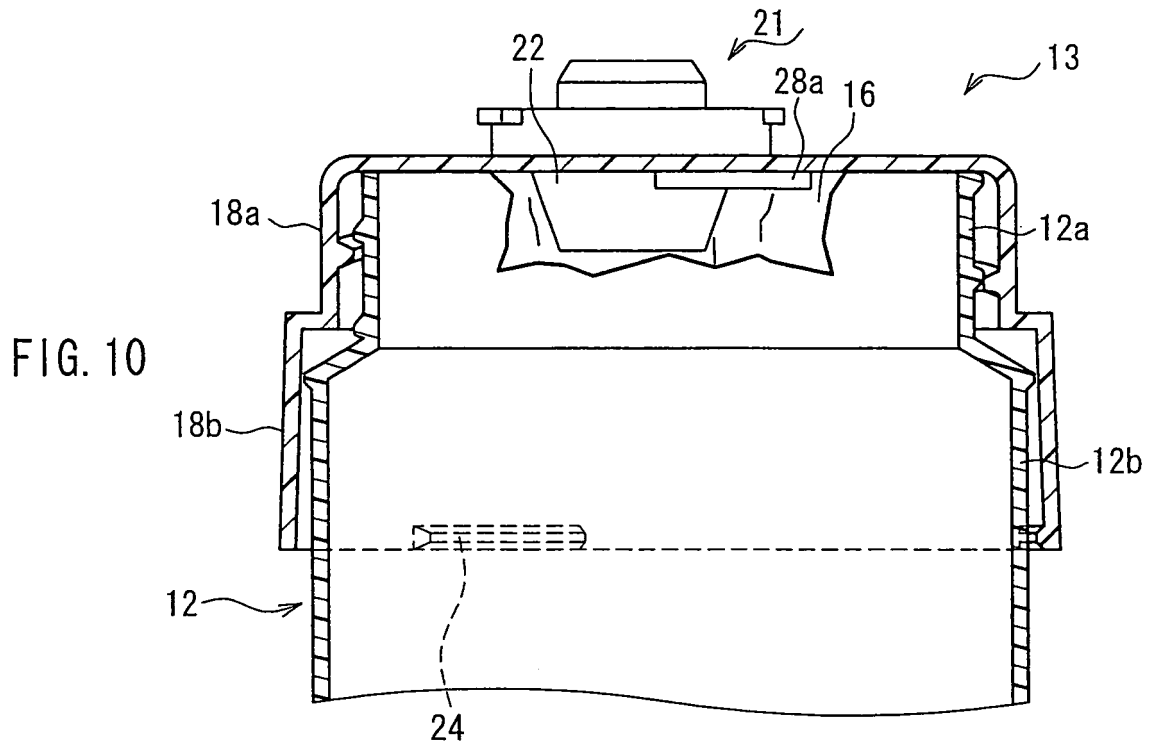
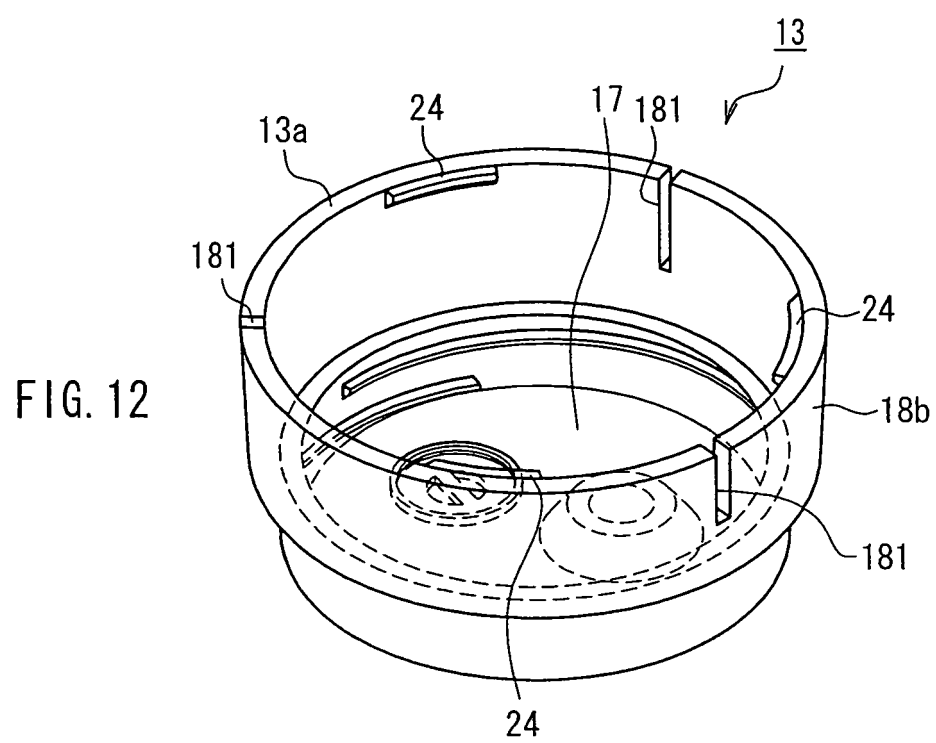


FIG. 9B







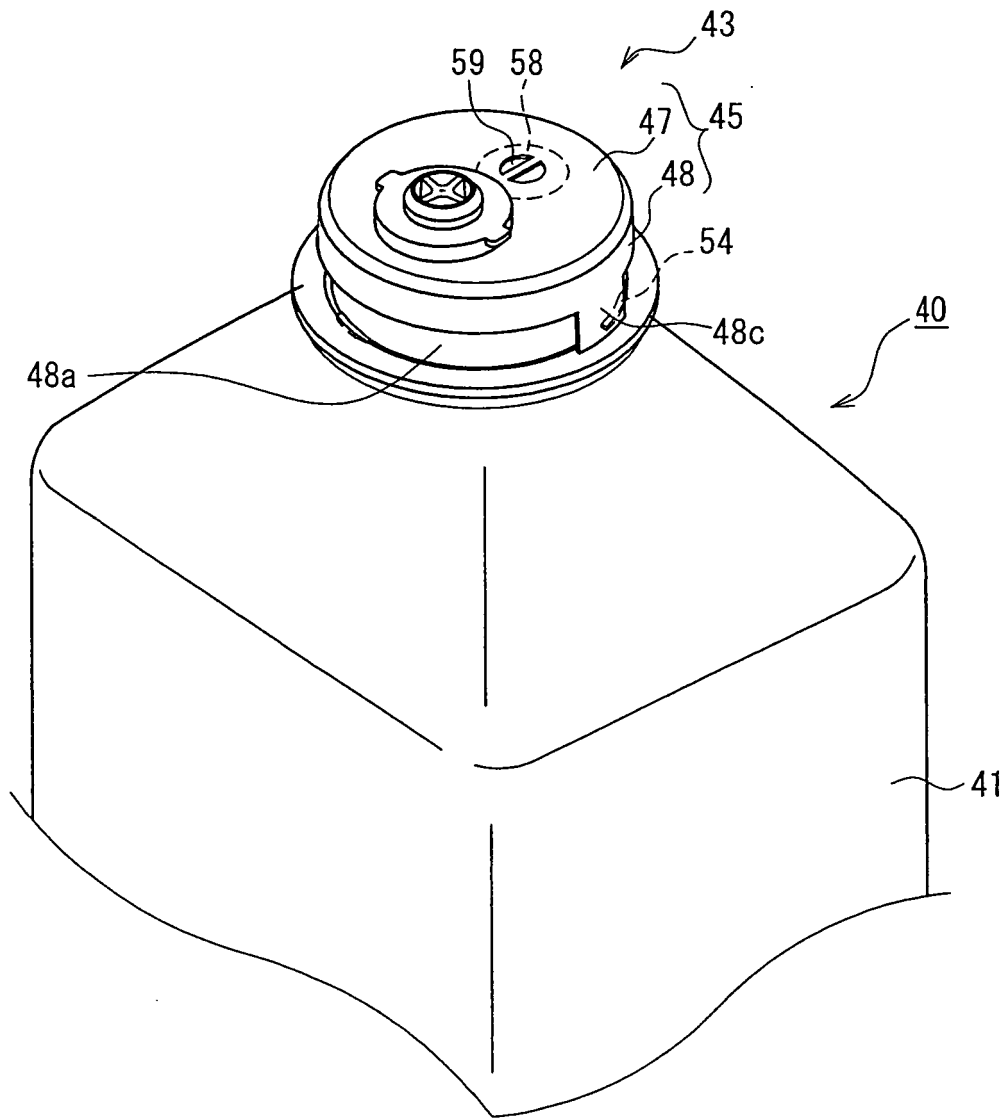


FIG. 13

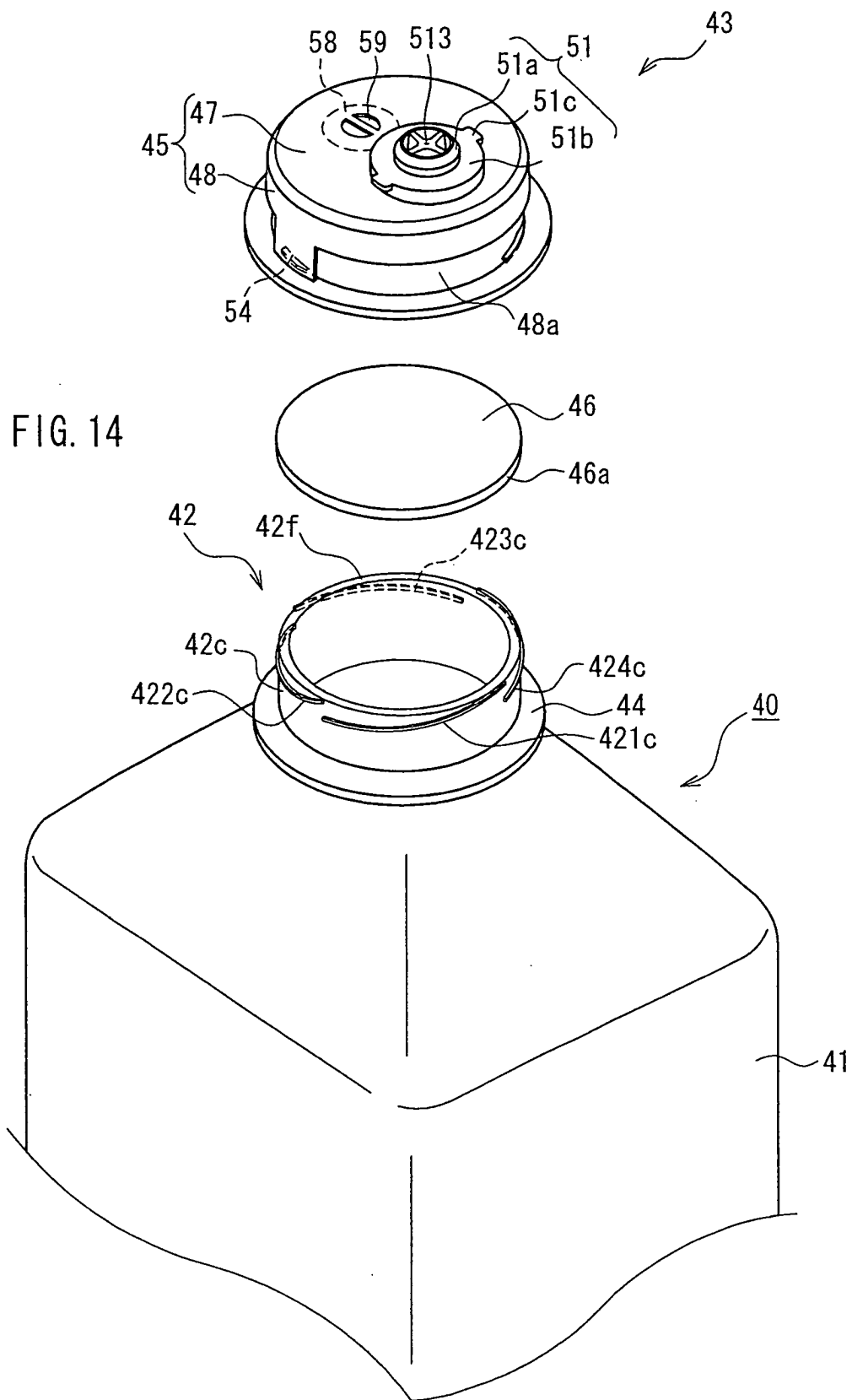


FIG. 15

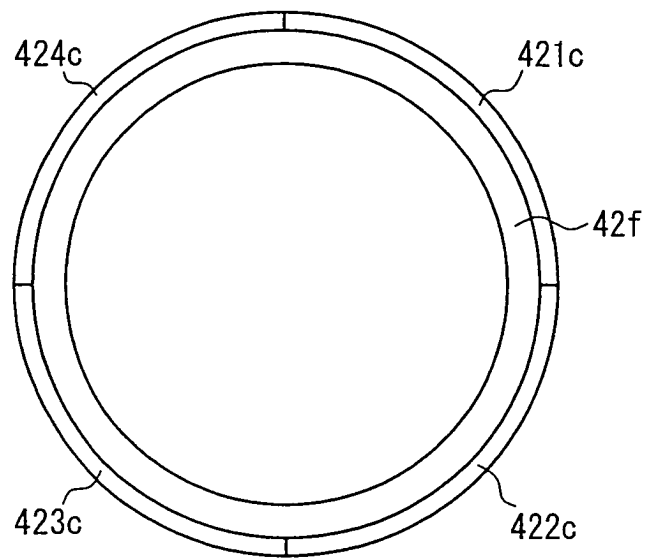
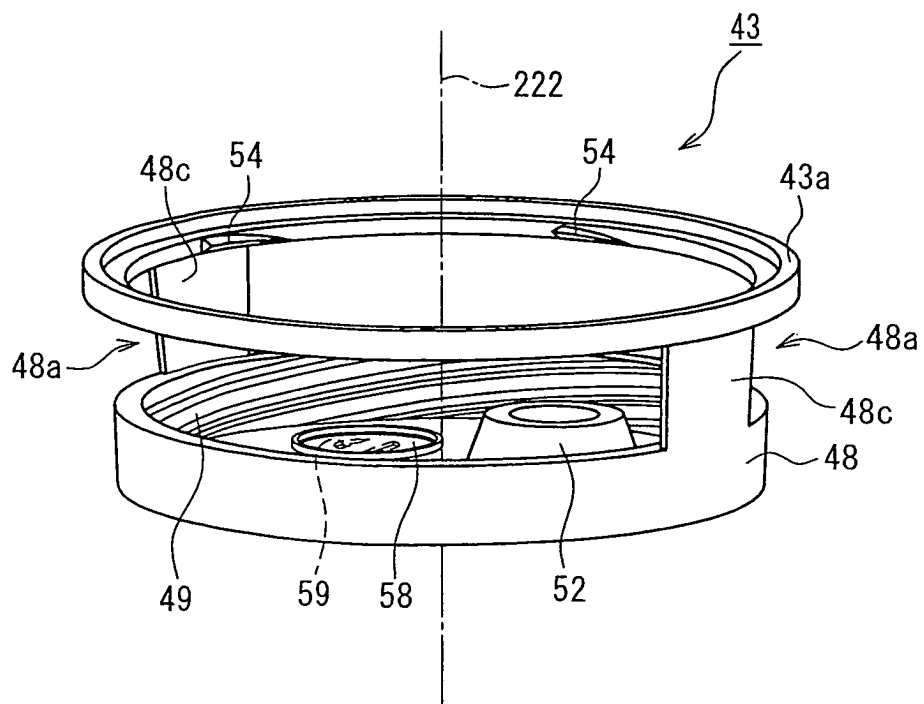
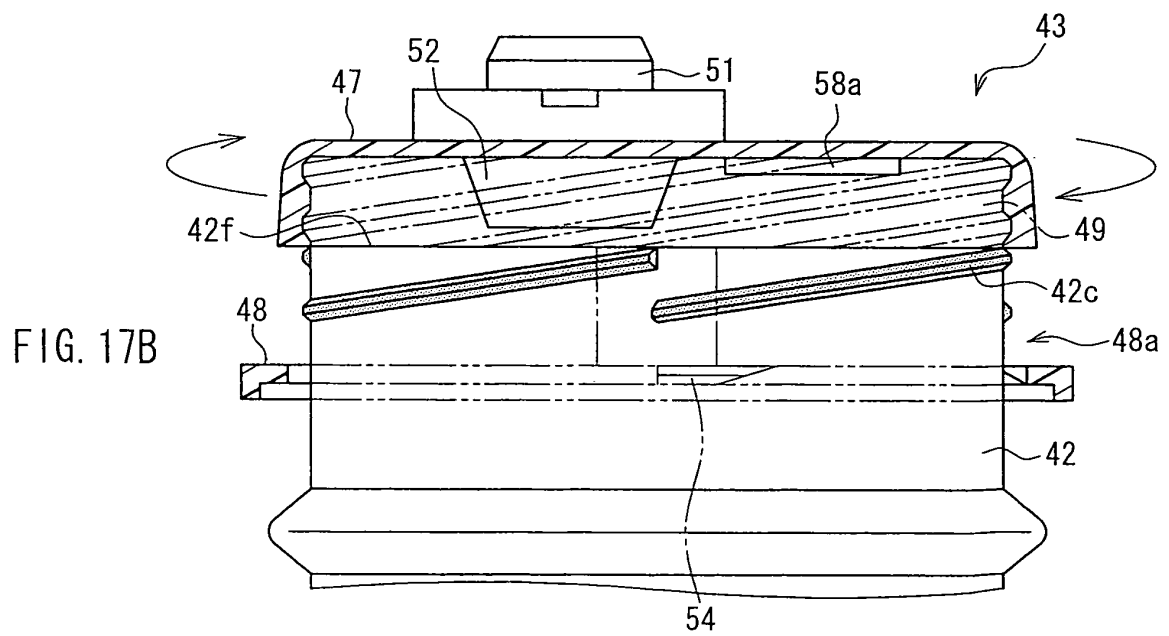
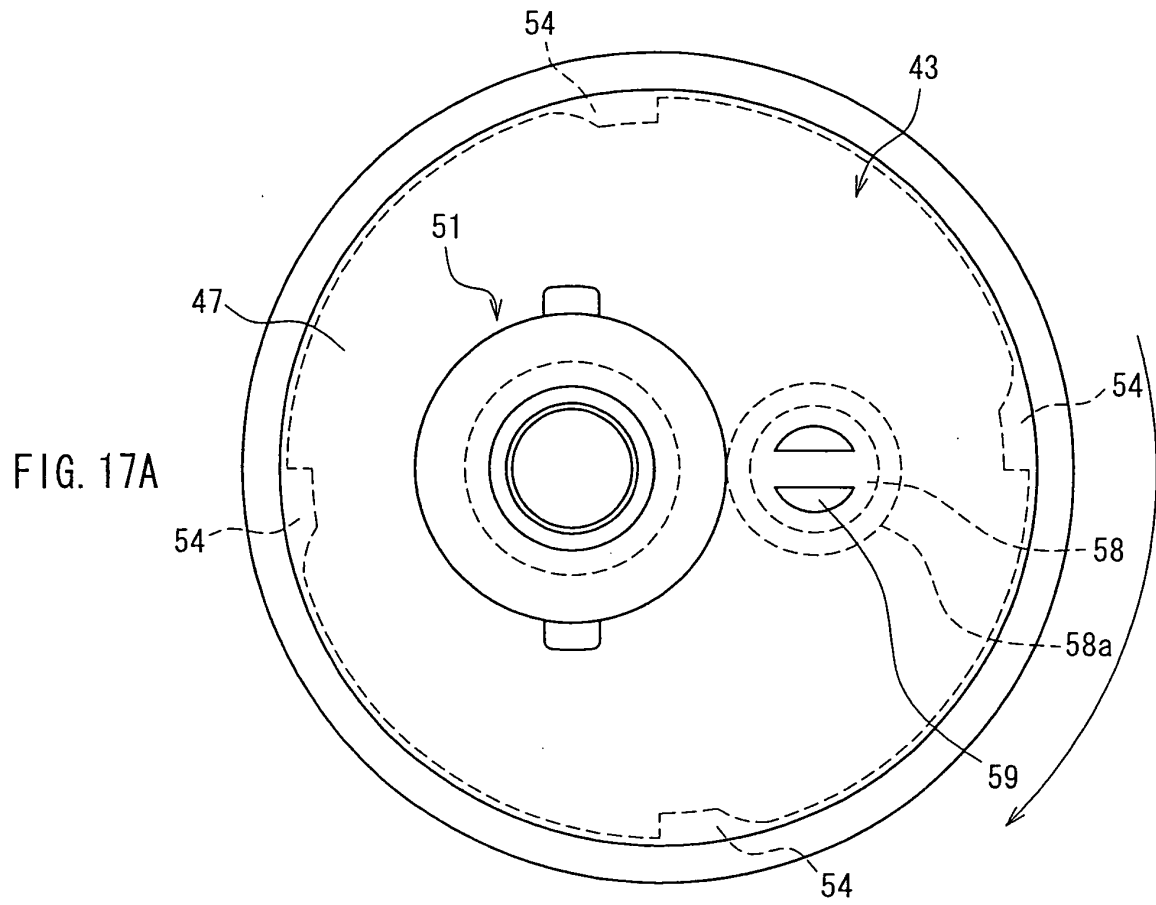


FIG. 16





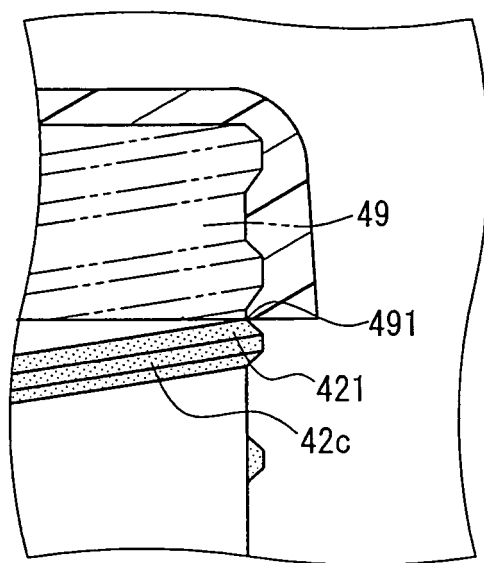


FIG. 18

FIG. 19A

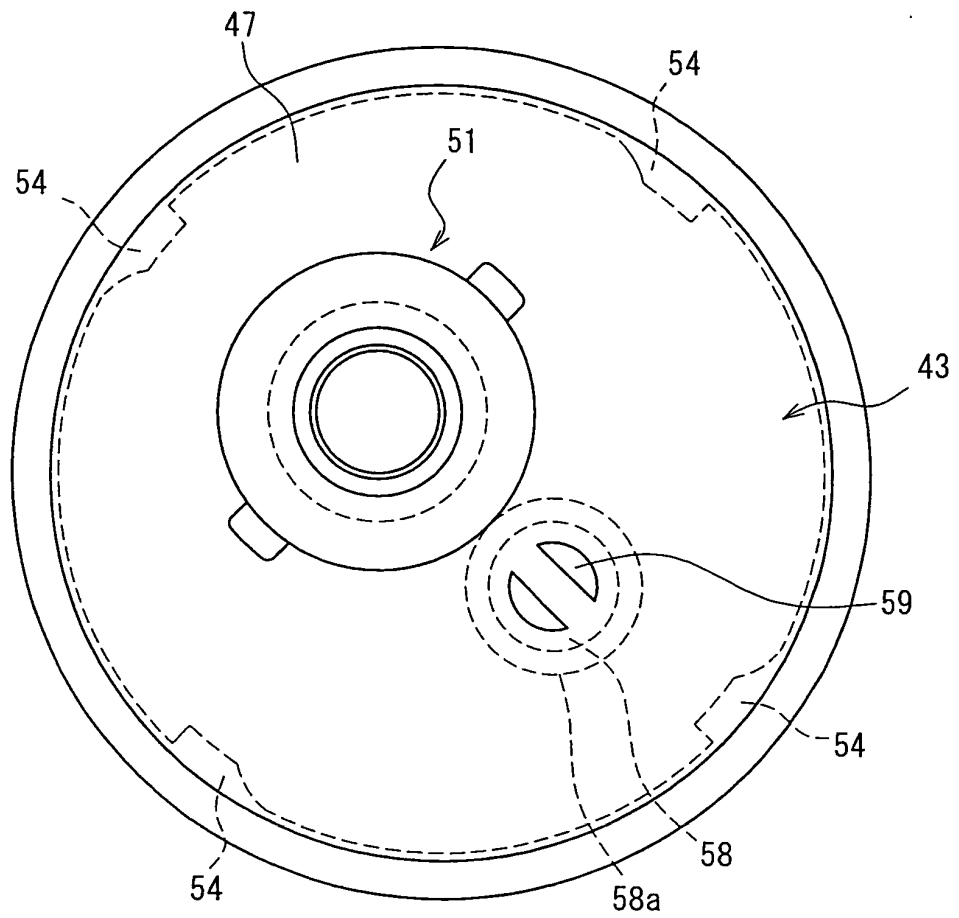


FIG. 19B

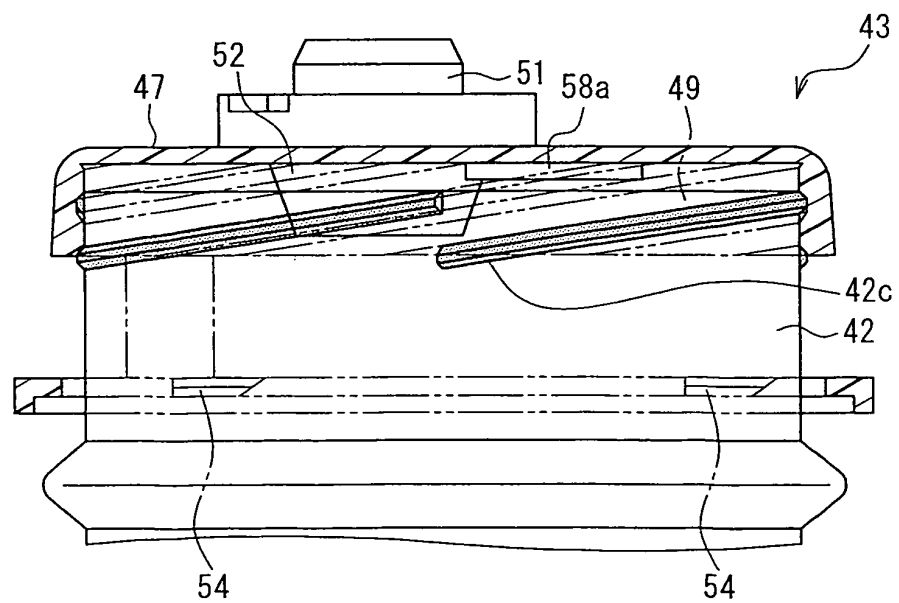


FIG. 20A

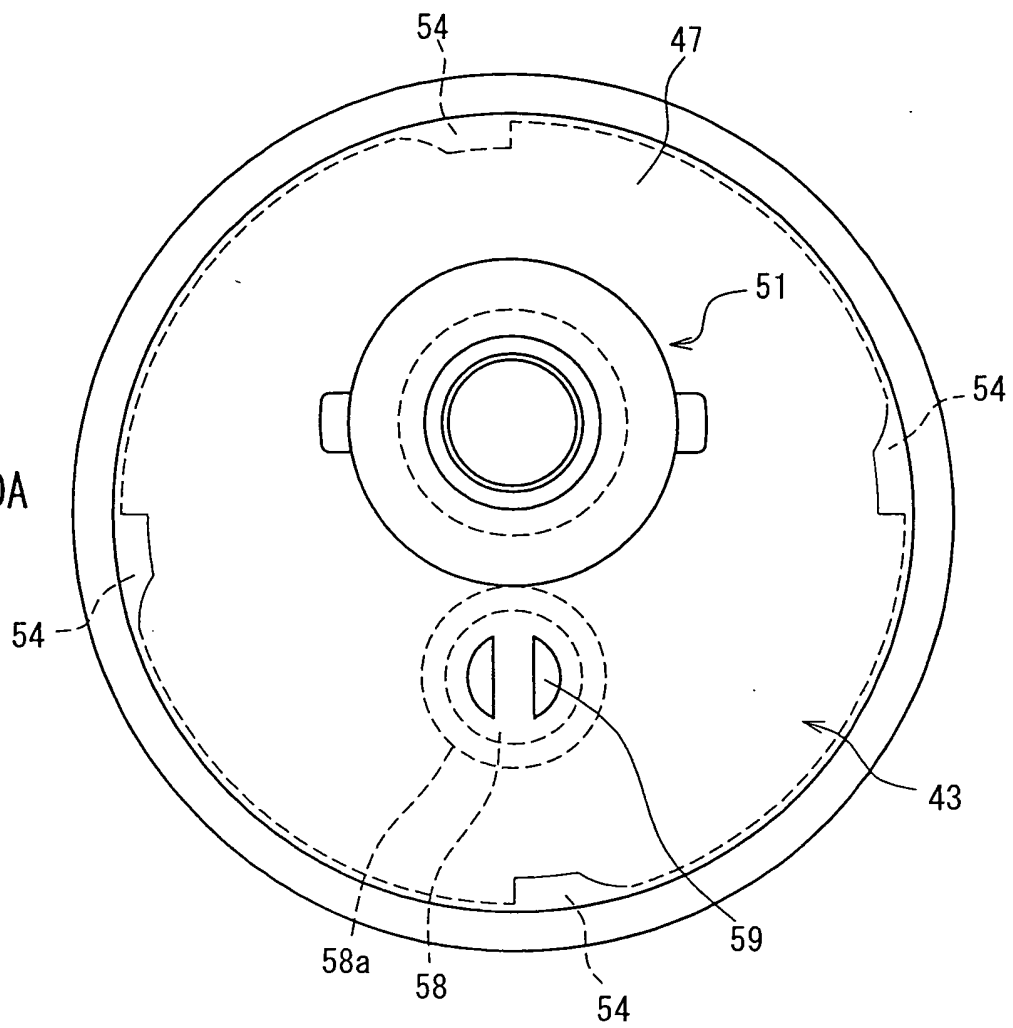
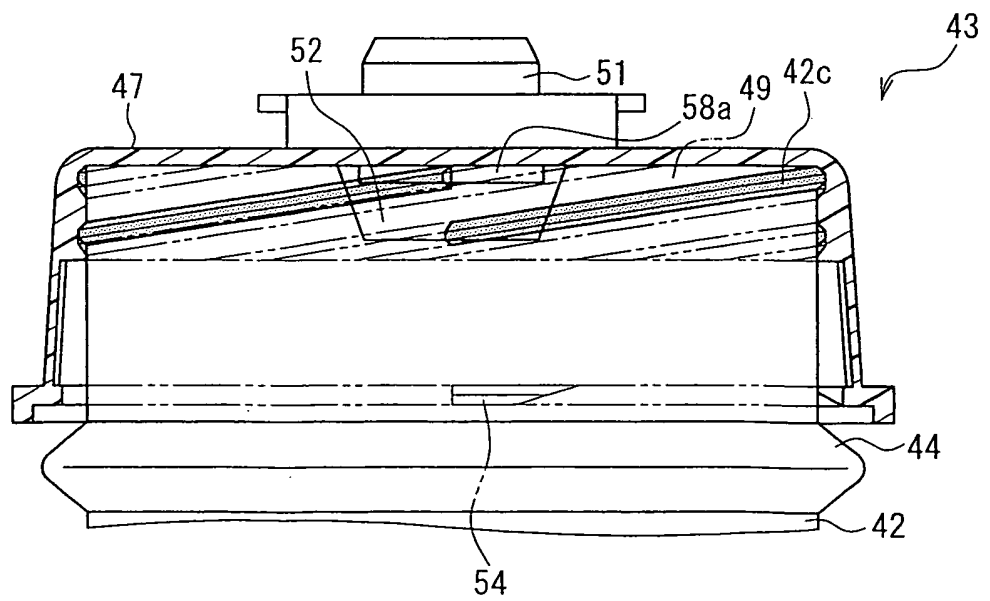


FIG. 20B



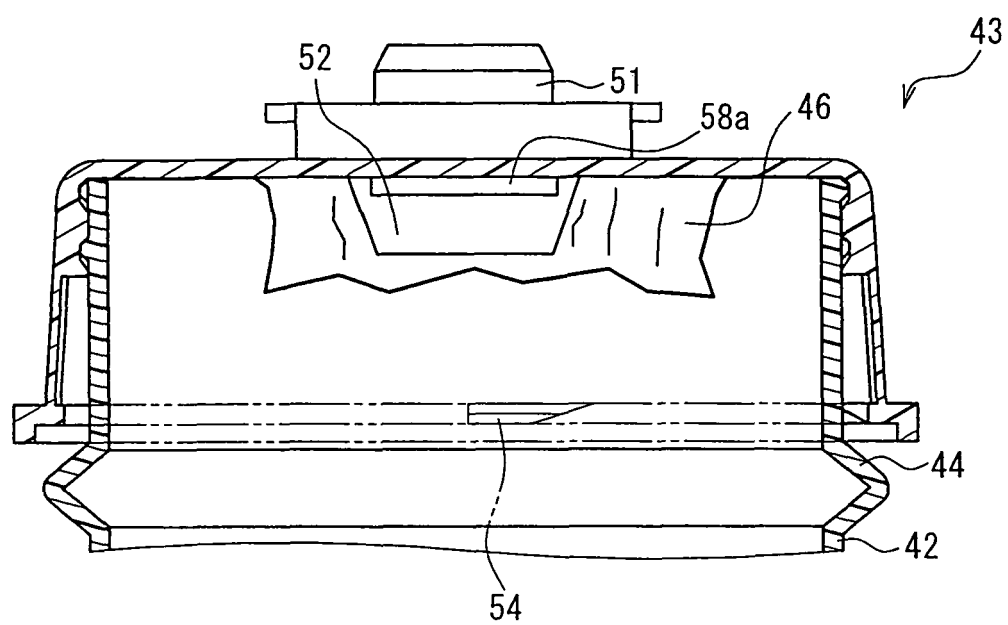
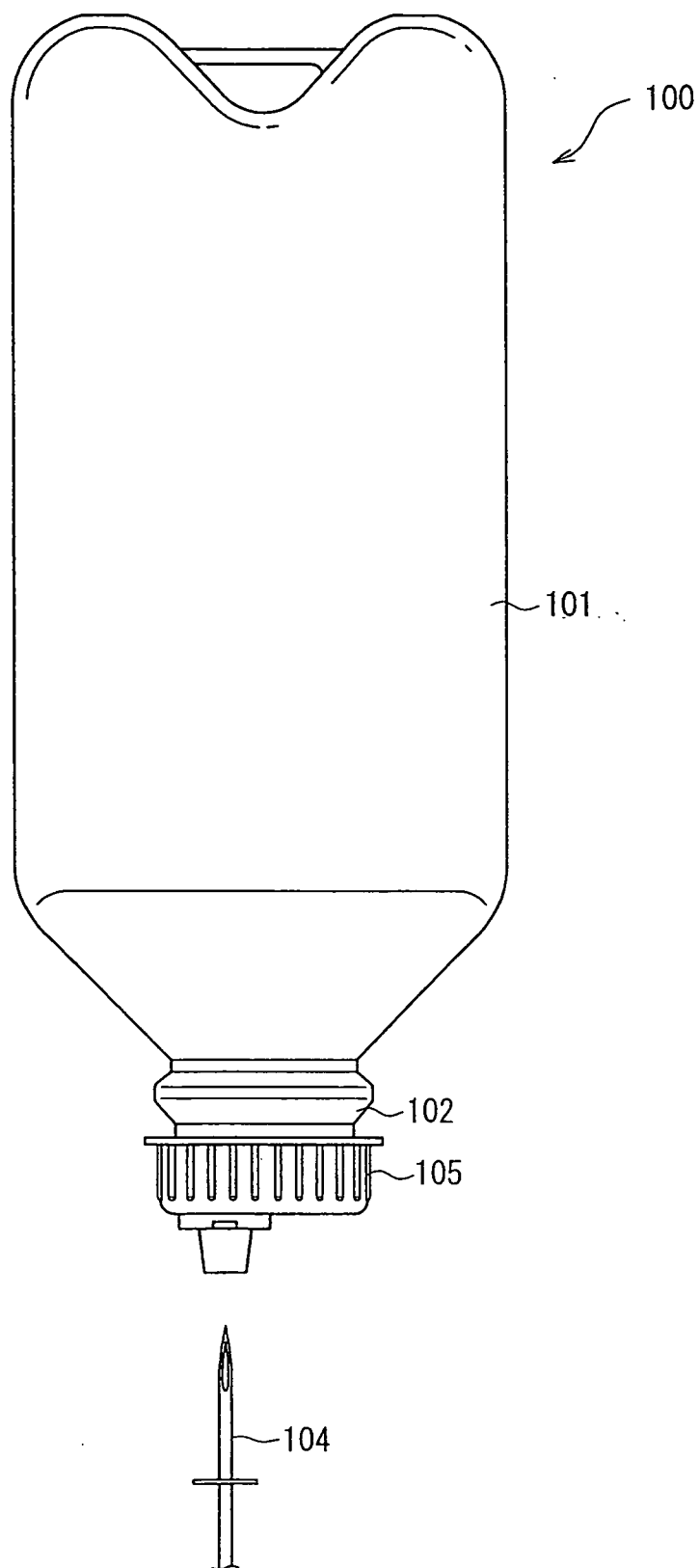


FIG. 21

FIG. 22



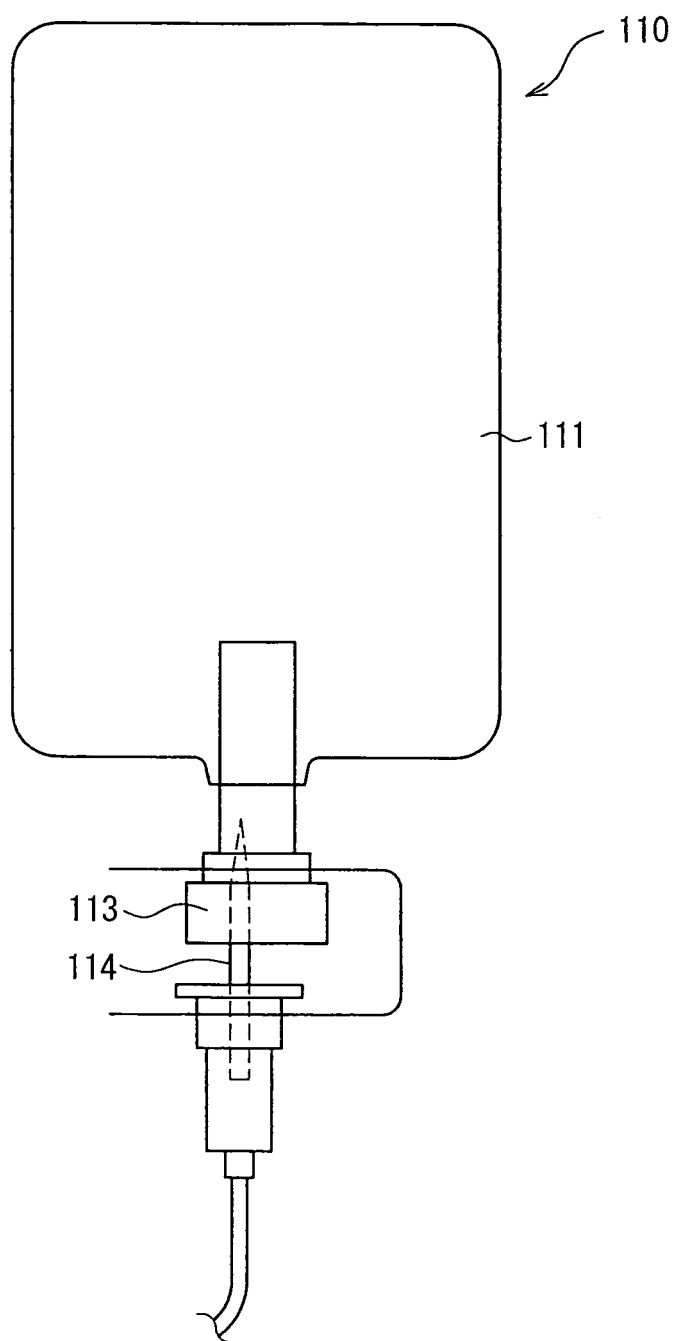


FIG. 23

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/059374

A. CLASSIFICATION OF SUBJECT MATTER

A61J1/05(2006.01) i, A61J1/10(2006.01) i, A61J1/14(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61J1/05, A61J1/10, A61J1/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho	1922-1996	Jitsuyo Shinan Toroku Koho	1996-2010
Kokai Jitsuyo Shinan Koho	1971-2010	Toroku Jitsuyo Shinan Koho	1994-2010

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5817082 A (BRACCO DIAGNOSTICS INC.), 06 October 1998 (06.10.1998), column 5, line 40 to column 7, line 15; fig. 1, 5, 6, 8 (Family: none)	1-9
Y	JP 2-228966 A (Abbot Laboratories), 11 September 1990 (11.09.1990), page 4, upper left column, lines 5 to 16; upper right column, line 6 to lower right column, line 9; fig. 1 to 5 & US 4934545 A & EP 379047 A1	1-9

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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Date of the actual completion of the international search
12 July, 2010 (12.07.10)Date of mailing of the international search report
20 July, 2010 (20.07.10)Name and mailing address of the ISA/
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Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/059374

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 8-500563 A (The West Co., Inc.), 23 January 1996 (23.01.1996), page 15, lines 20 to 22; fig. 5, 8 & US 5314084 A & EP 655042 A1 & WO 1994/004424 A1	3

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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