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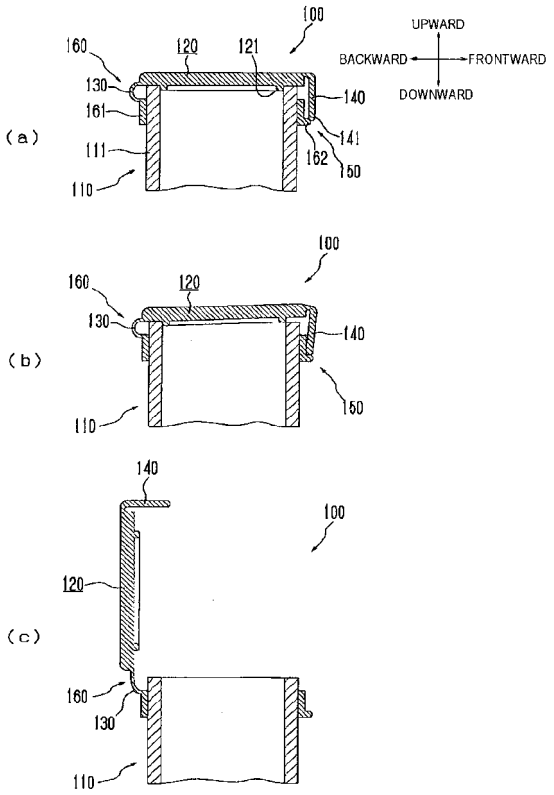
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(54) BIOCHEMICAL CONTAINER

(57) A biochemical container is provided, which can open a cover member shutting a container member and can release a tightly sealed condition, without a need for displacing the outer edge section of the cover member. In the present invention, an opening in an end of a container member 110 is openably and closably shut by a cover member 120. When an assisting-opening member 140 is pressed from the outside in such shut condition, the stress is changed to the opening direction by the changing-direction mechanism 150 to exert over the cover member 120. Consequently, the tightly sealed condition of the cover member 120 that shuts the container member 110 can be released.

FIG.1



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Description

TECHNICAL FIELD

[0001] The present invention relates to a biochemical container utilized for storage of biochemical substances, and particularly relates to a biochemical container, which is configured to openably and closably shut an opening in one end of a container member with a cover member.

BACKGROUND ART

[0002] Biochemical containers are utilized for storages of biochemical substances in the fields of biochemical experiments and the like. Such biochemical container composed of, for example, a vertically long cylindrical container member having an opening in upper end, and a disk-shaped cover member, which openably and closably shuts the opening of the container member.

[0003] Typical biochemical containers are designed to have a size, which allows being held in one hand. For example, such a biochemical container is formed to the structure that the container member and the cover member are connected with a screw structures. However, it is difficult in such type of the biochemical containers to open and close the cover member while holding the container member in one hand operation.

[0004] A biochemical container product that provides a solution for such problem is configured that the circumference section in the upper end of the container member is connected with the circumference section of the cover member in one end thereof by a hinge mechanism. When such type of chemical container is opened and closed, for example, the container member is held in one hand in an orientation that the center axis is vertically oriented, and a section of the cover member in the side opposite to the side of the hinge mechanism is vertically moved with the thumb.

[0005] Currently, various proposals are made for container configurations, which are applicable to the biochemical containers as described above (for example, see patent literatures 1 to 4).

[Patent Literature 1] Japanese Patent Laid-Open No. 2003-292,004
[Patent Literature 2] Japanese Patent Laid-Open No. 2000-313,453
[Patent Literature 3] Japanese Patent Laid-Open No. H07-315,402
[Patent Literature 4] Japanese Utility Model Laid-Open No. H02-144,552

[0006] In the biochemical containers as described above, it is necessary to ensure tightly shutting and sealing the opening of the container member with the cover member. Consequently, it is not easy to open up the cover member in the shut condition from the container member only in one hand operation. Moreover, when the circumference section of the cover member is displaced in upward direction with the thumb finger to be opened in the condition of holding the container member in the same one hand, the cover member is rapidly opened when the tightly sealed condition is released. In such occasion, biochemical substances may be splashed from the container member to pollute the fingers, and in turn, it is concerned that the polluted fingers may possibly pollute the biochemical containers and the biochemical substances.

[0007] Further, even in the condition that the finger is not polluted, when the container member is held in one hand and the cover member is opened in the other hand, or when the circumference section of the cover member is displaced in upward direction with the thumb to be opened as described above, stains on the surfaces of the fingers drop in the container when the finger passes upward of the opened container, and such droplet may cause contaminations in the biochemical substance in the container.

[0008] For example, in a container disclosed in the above-listed Patent Literature 1 (Japanese Patent Laid-Open No. 2003-292,004), a cover member is biased toward the opening direction by means of a hinge mechanism, and is maintained in a shut condition by means of a lock mechanism. Consequently, the cover member can be easily opened by simply releasing the lock mechanism with a finger.

[0009] However, in the biochemical container, the container member is required to be tightly shut with the cover member with certainty. Consequently, it is difficult to open the cover member only with an elastic force of the hinge mechanism as described above. In order to open the tightly sealed cover member with an elastic force of the hinge mechanism, the hinge mechanism is required to have considerably stronger elastic force.

[0010] In this case, the hinge mechanism must have a dedicated flat spring or the like, requiring complicated structure. Further, since the cover member rapidly opens when the tightly sealed condition is released, the probability will increase that the biochemical substance be splashed to pollute the fingers and the peripheries.

[0011] The present invention is made on the basis of the problems as described above, and is directed to provide a biochemical container, which is configured to allow releasing the tightly sealed condition of the container member without a need for displacing the circumference section of the cover member directly with a finger.

[0012] According to one aspect of the present invention, there is provided a biochemical container, comprising a container member having an opening in one end, and a cover member openably and closably shut the opening of the container member, the biochemical container comprising: a hinge mechanism, pivotably supporting the cover member in a position for shutting, and in a position for opening, the opening of the container member; an assisting-opening member, having one end connected to an outer surface of one of the container

member and the cover member and the other end facing an outer surface of the other of the members, so that the assisting-opening member being elastically bend; and a changing-direction mechanism, being capable of changing a stress acting along a direction exerting over the assisting-opening member from the outside to a stress acting along an opening direction over the cover member.

[0013] Therefore, in the above-described aspect of the biochemical container of the present invention, the opening in one end of the container member is openably and closably shut with the cover member. When the assisting-opening member is pressed from the outside in such shut condition, the stress is changed into a stress towards the opening direction by the changing-direction mechanism to exert over the cover member. Consequently, the tightly sealed condition of the container member can be released.

[0014] According to next aspect of the present invention, there is provided a biochemical container, comprising a container member having an opening in one end, and a cover member openably and closably shut the opening of the container member, the biochemical container comprising: a hinge mechanism, pivotably supporting the cover member in a position for shutting, and in a position for opening, the opening of the container member; an assisting-opening member, having one end connected to an outer surface of one of the container member and the cover member and the other end facing an outer surface of the other of the members, so that the assisting-opening member being elastically bend; and a changing-direction mechanism, being capable of changing a displacement toward an inside of at least a part of the assisting-opening member to a displacement toward an opening direction of at least a part of the cover member.

[0015] Therefore, in the above-described aspect of the biochemical container of the present invention, the opening in one end of the container member is openably and closably shut with the cover member. When the assisting-opening member is pressed from the outside in such shut condition to cause a displacement, such displacement is changed into another displacement towards the opening direction by the changing-direction mechanism to exert over the cover member. Consequently, the tightly sealed condition of the container member can be released.

[0016] According to further aspect of the present invention, there is provided a cover unit, capable of being mounted to the container body of the biochemical container according to the present invention, comprising: the cover member; a frame-like member mounted over an outer surface of one end of the container body; a hinge mechanism, connected to the frame-like member, and pivotably supporting the cover member; an assisting-opening member, configured that one end is connected to an outer surface of one of the frame-like member and the cover member and the other end faces an outer surface of the other of the members, so that the assisting-opening member being elastically bend; and a changing-direction mechanism, being capable of changing a stress acting along a direction exerting over the assisting-opening member from the outside to a stress acting along an opening direction over the cover member.

[0017] According to yet other aspect of the present invention, there is provided a cover unit, capable of being mounted to the container body of the biochemical container according to the present invention, comprising: the cover member; a frame-like member mounted over an outer surface of one end of the container body; a hinge mechanism, connected to the frame-like member, and pivotably supporting the cover member; an assisting-opening member, configured that one end is connected to an outer surface of one of the frame-like member and the cover member and the other end faces an outer surface of the other of the members, so that the assisting-opening member being elastically bend; and a changing-direction mechanism, being capable of changing a displacement toward an inside of at least a part of the assisting-opening member to a displacement toward an opening direction of at least a part of the cover member.

[0018] In addition to above, various constituents of the present invention are not required to be individually independent constituents, and a plurality of constituents may form an integrated member, a single constituent may be composed of a plurality of members, a certain constituent may form a part of other constituent, a part of a certain constituent may overlap a part of other constituent, and so on.

[0019] In the biochemical container of the present invention, when the assisting-opening member is pressed from the outside in the condition that the opening in one end of the container member is openably and closably shut with the cover member, the stress is changed into a stress towards the opening direction by the changing-direction mechanism to exert over the cover member. Consequently, the tightly sealed condition of the cover member that provides the shut condition of the container member can be released. Therefore, it is not necessary to cause a displacement of an edge of the cover member toward the upper direction directly with the fingers, for the purpose of opening the cover member that provides the shut condition of the container member. Consequently, a pollution of the fingers with a biochemical substance stored in the container member, a pollution of a biochemical substance stored in the container member with droplets from the finger surfaces in the operation for opening the cover member, and the like, can be prevented.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The above and other objects, advantages and features of the present invention will be more apparent from the following description of certain preferred embodiments taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a schematic vertical side sectional view,

illustrating a structure of a biochemical container of an embodiment of the present invention;

Fig. 2 is a perspective view, illustrating an outer appearance of the biochemical container;

Fig. 3 is an enlarged schematic vertical side sectional view of a main part of the biochemical container;

Fig. 4 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in a modified embodiment;

Fig. 5 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in another modified embodiment;

Fig. 6 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in further modified embodiment;

Fig. 7 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 8 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 9 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 10 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 11 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 12 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment;

Fig. 13 is a perspective view, illustrating a main part of a biochemical container of yet other modified embodiments; and

Fig. 14 is an enlarged schematic vertical side sectional view of a main part of a biochemical container in yet other modified embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

[0021] An embodiment of the present invention will be described as follows in reference to Fig. 1 to Fig. 3. Further, in the present embodiment, as shown in Fig. 1, the directions of the frontward and the backward, the rightward and the leftward, and the upward and the downward will be defined for the description. However, this is to provide a convenient definition for easily describing the relations of the constituents, and it is not intended to limit the direction or the orientation in the manufacture or in the use of the product according to the present invention.

[0022] A biochemical container 100 of the present embodiment comprises a container member 110 having an opening in one end, a cover member 120 openably and closably shut the opening of the container member 110, a hinge mechanism 130, pivotably supporting the cover member 120 in a position for shutting, and in a position for opening, the opening of the container member 110, an assisting-opening member 140, having one end connected to an outer surface of one of the container member 110 and the cover member 120 and the other end facing an outer surface of the other of the members, so that the assisting-opening member 140 is elastically bend, and a changing-direction mechanism 150, being capable of changing a stress acting along a direction exerting over the assisting-opening member 140 from the outside to a stress acting along an opening direction over the cover member 120 and being capable of changing a displacement toward an inside of at least a part of the assisting-opening member 140 to a displacement toward an opening direction of at least a part of the cover member 120.

[0023] More specifically, the container member 110 comprises a cylindrical container main body 111 having an opening in the upper end that serves an end. An independent cover unit 160 is mounted on the upper end of the container main body 111.

[0024] Such cover unit 160 comprises an annular frame-like member 161 mounted to an outer surface in an end of the container main body 111, and the annular frame-like member 161 is fixed on a part of the container member 110. The hinge mechanism 130 is connected to such frame-like member 161.

[0025] Here, in addition to the above-mentioned cover member 120, an assisting-opening member 140 and a changing-direction mechanism 150 are also mounted to the cover unit 160. In addition to above, the cover unit 160 is mounted to the container main body 111 with, for example, a screw structures (not shown).

[0026] The cover member 120 is formed to be disk-shaped, and the lower surface thereof is provided with an annular section 121, which seals the upper end opening of the container main body 111 from the inside. The assisting-opening member 140 is formed in longitudinal direction by the plate which is long and narrow.

[0027] The upper end of the assisting-opening member 140 is connected to a front section of the outer surface of the cover member 120, the bottom end thereof faces the front section of the outer surface of the frame-like member 161 in the shut condition of the cover member 120. The assisting-opening member 140 is formed to have a thinner upper end section that is connected to the cover member 120.

[0028] Consequently, when the assisting-opening member 140 is pressed from the front direction, the bottom end thereof is elastically displaced backward as shown in Fig. 1 and Fig. 3. The bottom end section 141 of the assisting-opening member 140 is formed to be semicylindrical.

[0029] On the other hand, a semicylindrical convex section 162 is formed in the front surface of the frame-like member 161. Then, the bottom end section 141 of the assisting-opening member 140 is located at a height, which is higher than a height of a convex section 162 of the frame-like member 161 by a distance of equal to or smaller than a radius of the semicylindrical geometry.

[0030] Consequently, the rear half section of the peripheral surface of the bottom end section 141 of the assisting-opening member 140 is in contact with the peripheral surface of the convex section 162 of the frame-like member 161, functioning as a slope displacing in the rear direction that is equivalent to the inside, in the upper side that is equivalent to the opening direction of the cover member 120.

[0031] On the other hand, the upper half section of the peripheral surface of the convex section 162 of the frame-like member 161 is in contact with the peripheral surface of the bottom end section 141 of the assisting-opening member 140, functioning as a slope displacing in the rear direction that is equivalent to the inside, in the upper side that is equivalent to the opening direction of the cover member 120.

[0032] Then, the bottom end section 141 and the convex section 162 that function as described above achieve the changing-direction mechanism 150, which changes a stress along a direction acting over the assisting-opening member 140 from the front side into a stress acting over the cover member 120 from the upper side.

[0033] In the biochemical container 100 of the present embodiment, as shown in Fig. 3, an overall height "a" of the annular section 121 of the cover member 120, which provides a tight seal for the container main body 111 of the container member 110, and a distance "b" for relative displacement between the bottom end section 141 and the convex section 162 caused when the assisting-opening member 140 is pressed, satisfies the following relation: $a < b$.

[0034] Further, the hinge mechanism 130 is elastically biasing the cover member 120 in the direction for opening the cover member 120, and elastically retains the opened cover member 120 in the position arriving by pivoting to be substantially perpendicular from the opening of the container member 110 as shown in Fig. 1(c).

[0035] Here, the condition of the cover member 120 retained to be substantially perpendicular may be, for example, a condition that the cover member 120 in the opened condition does not intercept an access of a pipette or the like (not shown) to the container main body 111 and a condition that the cover member 120 in the opened condition does not collide with a cover member 120 of adjacent other biochemical containers 100, even if a plurality of biochemical containers 100 are stood in a stand or the like in close-packed manner, and more specifically, may be within a range of from 70 degrees to 120 degrees.

[0036] Besides, the hinge mechanism 130, which is capable of elastically biasing the cover member 120 for the opening direction as described above to elastically retain thereof at a certain angle is conventionally known, and for example, is disclosed in the above-mentioned Patent Literatures 1 and 2 (Japanese Patent Laid-Open No. 2003-292,004 and Japanese Patent Laid-Open No. 2000-313,453).

[0037] Further, in the biochemical container 100 of the present embodiment, as shown in Fig. 2, a semicircular convex section 122 is formed downwardly from side to side of the circumference section of the cover member 120. Thus, in the frame-like member 161, the semicircular concave section 164 corresponding to the convex section 122 as described above is formed from side to side of the outer surface.

[0038] In the above-described configuration, the biochemical container 100 of the present embodiment is held in one hand, similarly as in the conventional biochemical container (not shown). However, as shown in Fig. 1 (a) and Fig. 2 (a), when the cover member 120 shutting the container member 110 is opened, the assisting-opening member 140 is pressed with the thumb (not shown).

[0039] This causes the lower half section of the bottom end section 141 of the elastically bent assisting-opening member 140 being pressed against the upper half section of the convex section 162 of the container member 110, resulting in the bottom end section 141 of the assisting-opening member 140 being displaced upward above the convex section 162 of the container member 110, as shown in Fig. 1 (b) and Fig. 3 (b).

[0040] This allows the cover member 120 displaced upward together with the assisting-opening member 140. Since the distance b of this displacement is larger than an overall height "a" of the annular section 121 of the cover member 120, the tightly sealed condition of the container member 110 sealed by the cover member 120 is released.

[0041] Then, the cover member 120 is opened upward by the elastic biasing of the hinge mechanism 130, and is elastically retained in the condition of being opened substantially perpendicularly from the opening of the container member 110 as shown in Fig. 1 (b) and Fig. 2 (b).

[0042] In the biochemical container 100 of the present embodiment, the tightly sealed condition of the cover member 120 against the container member 110 can be released by pressing the assisting-opening member 140 with the finger as described above.

[0043] Therefore, it is not necessary to cause an upward displacement of an edge of the cover member 120 directly with the fingers, for the purpose of opening the cover member 120 that provides the shut condition of the container member 110. Consequently, a pollution of the fingers with a biochemical substance (not shown) stored in the container member 110, a pollution of a biochemical substance stored in the container member 110 with droplets (not shown) from the finger surfaces in the operation for opening the cover member 120, a generation of a pollution cause by a contact of the finger with the upper edge section of the container member 110, when the finger cause an upward displacement of the circumference section of the cover member 120, and the like, can be prevented.

[0044] In particular, since the assisting-opening member 140 formed downward from the circumference section of the cover member 120 is located on the outer

surface of the container member 110 in the biochemical container 100 of the present embodiment, a contact of the finger with the upper edge section of the container member 110 can be effectively prevented.

[0045] Further, since the cover member 120 is elastically biased toward the opening direction by the hinge mechanism 130, the cover member 120 in the condition that the tightly sealed condition for the container member 110 is released as described above can be automatically opened.

[0046] In addition to above, even if the cover member 120 is not completely opened with an elastic force of the hinge mechanism 130, the cover member 120 can still be opened by displacing the assisting-opening member 140 located on the outer surface of the container member 110 upward with the finger.

[0047] For example, when the circumference section of the cover member is displaced upward by the finger in one hand that also holds the container member for the purpose of opening the cover member in the conventional biochemical container (not shown), the finger is easily brought into contact with the upper edge section of the container member, and such contact may possibly cause a pollution in the container member and the biochemical substance.

[0048] To the contrary, in the biochemical container 100 of the present embodiment, since the cover member 120 can be opened by displacing the assisting-opening member 140 toward the upper direction with the finger as described above, a generation of a pollution due to a contact of the finger with the upper edge section of the container member 110 can be more effectively prevented.

[0049] Moreover, the hinge mechanism 130 elastically retains the opened cover member 120 in the position arriving by pivoting to be substantially perpendicular from the opening of the container member 110. Thus, the cover member 120 in the opened condition does not intercept an access of a pipette or the like (not shown) to the container main body 111 and the cover member 120 in the opened condition does not collide with a cover member 120 of adjacent other biochemical containers 100, even if a plurality of biochemical containers 100 are stood in a stand or the like in close-packed manner.

[0050] Further, the changing-direction mechanism 150 for changing a direction of a stress as described above is composed of the bottom end section 141 of the assisting-opening member 140 and the convex section 162 of the container member 110. Thus, and adequately working changing-direction mechanism 150 can be achieved with a simple structure.

[0051] Moreover, an overall height "a" of the annular section 121 of the cover member 120, which provides a tight seal for the container main body 111 of the container member 110, is smaller than a distance "b" as a bump generated between the bottom end section 141 of the assisting-opening member 140 and the convex section 162 of the container member 110. Thus, the tight seal between the container member 110 and the cover member 120 can be released with certainty by the changing-direction mechanism 150 composed of the bottom end section 141 and the convex section 162.

[0052] Further, the container main body 111 and the cover unit 160 are provided as separate parts. Thus, the most suitable materials can be individually selected for forming the container main body 111, which requires resistance for biochemical substances and the like, and for forming the cover unit 160, which requires better sealability by the annular section 121 or better elasticity of the hinge mechanism 130.

[0053] Typical materials preferable for the container main body 111 include, for example, polyethylene, polypropylene, poly 4-methyl 1-pentene, polystyrene, nylon, polyethylene terephthalate, polybutylene terephthalate and the like. Besides, typical materials preferable for the cover unit 160 include, for example, polyethylene, polypropylene, nylon, polystyrene, and the like.

[0054] Moreover, the cover member 120 is detachably engaged with the opening of the container main body 111. Thus, even if the container main body 111 and the cover unit 160 are the separate parts as described above, the container main body 111 can be certainly sealed by the cover member 120.

[0055] In addition to above, it is not intended to limit the present invention to the present embodiment, and various modifications are also permitted without departing from the scope and the spirit of the invention. For example, the above-described embodiment illustrates that the semicylindrical bottom end section 141 of the assisting-opening member 140 is in contact with the semicylindrical convex section 162 of the frame-like member 161.

[0056] Nevertheless, as shown in Fig. 4, for a biochemical container 300, a semicylindrical convex section 311 may alternatively be formed in a bottom end of rear surface of an assisting-opening member 310, and the the convex section 311 may be in contact with the semicylindrical convex section 162 of the frame-like member 161.

[0057] In addition, it is exemplified in the above-described configuration that the lower half section of the semicylindrical bottom end section 141 of the bottom end of rear surface of the assisting-opening member 140 connected to the cover member 120 at the upper end is in contact with the upper half section of the semicylindrical convex section 162 of the front surface of the container member 110 to achieve the changing-direction mechanism 150.

[0058] Alternatively, as shown in Fig. 5, for a biochemical container 200, a changing-direction mechanism 204 may be achieved by forming a slope 201 displaced backward in the upside in a front surface of a container member 202, and facing a bottom end of an assisting-opening member 203 to the slope 201.

[0059] Alternatively, as shown in Fig. 6, for a biochemical container 210, a changing-direction mechanism 215

may be achieved by forming a slope 211 displaced backward in the upside in a bottom end of rear surface of an assisting-opening member 212, and facing a convex section 214 of a front surface of a container member 213 to the slope 211.

[0060] Further alternatively, as shown in Fig. 7, for a biochemical container 220, a changing-direction mechanism 225 may be achieved by forming a slope 221 displaced forward in the upside in a front surface of a cover member 222, and facing an upper end of an assisting-opening member 224 that is connected to a container member 223 at the bottom end to the slope 221 of the cover member 222.

[0061] Alternatively, as shown in Fig. 8, for a biochemical container 230, a changing-direction mechanism 236 may be achieved by forming a slope 231 displaced forward in the upside in an upper end of an assisting-opening member 233 that is connected to a container member 232 at a bottom end, and facing a convex section 235 of a front surface of a cover member 234 to the slope 231.

[0062] In addition to above, angles of the slopes 201, 211, 221 and 231 as described above may be suitably controlled to adjust a rate of changing pressurizing stress and displacement to downward stress and displacement.

[0063] The above-described embodiment also illustrates that the container main body 111 and the cover unit 160 are formed as separate parts. Alternatively, as shown in Fig. 9, for a biochemical container 240, a container member 241, a cover member 242 and a hinge mechanism 243 may be formed integrally. In addition to above, materials preferably usable in such embodiments include, for example, polyethylene, polypropylene, nylon, polystyrene and the like.

[0064] The above-described embodiment also illustrates that the cover member 120 of the cover unit 160 tightly seals the container main body 111. Alternatively, as shown in Fig. 10, for a biochemical container 250, a cover member 254 may tightly seal a frame-like member 253 of a cover unit 252 installed in a container main body 251.

[0065] Further, the above-described embodiment illustrates that a distance "b" created by the changing-direction mechanism 150 is larger than an overall height "a" of the annular section 121 of the cover member 120, which provides a tight seal for the container main body 111 of the container member 110 so that the cover member 120 is completely opened by the changing-direction mechanism 150.

[0066] Even in this configuration, the cover member 120 may not completely shut the container main body 111. If such situation, the above-described overall height "a" may be selected to be larger than the distance "b" of the displacement (not shown).

[0067] Although the cover member 120 cannot be completely opened by the changing-direction mechanism in such configuration, the tightly sealed condition can be released. Consequently, for example, the cover member 120 in the condition that the tightly sealed condition is released may be just displaced with the finger to achieve simple and safe opening.

[0068] Even in such case, the cover member 120 can also be opened by displacing the assisting-opening member 140 located on the outer surface of the container member 110 upward with a finger, and thus a generation of a pollution due to a contact of the finger with the upper edge section of the container member 110 can be more effectively prevented.

[0069] Here, the condition of releasing the tightly sealed condition means that the condition of the entire peripheral surface of the annular section 121 of cover member 120 being in close contact with the internal circumference surface of the container main body 111 is released. More specifically, it may be sufficient to indicate a change of the condition that the lower surface of the cover member 120 is in contact with the upper surface of the container main body 111 to the condition that these are spaced apart at a predetermined distance.

[0070] Further, when the cover member 120 in the condition that the tight seal is released by the changing-direction mechanism 150 is opened with a finger as described above, for example, as shown in Fig. 2, the convex section 122 is formed from side to side of the cover member 120, the convex section 122 may be held with the thumb and the middle fingers of a hand that is also employed for holding the container member 110 (not shown).

[0071] Even if the cover member 120 is not completely opened by the changing-direction mechanism as described above in such case, the cover member 120 can be easily opened. Moreover, since the finger used for opening the cover member 120 is covered by the convex section 122, a pollution of such finger with a biochemical substance can be effectively prevented.

[0072] Alternatively, as shown in Fig. 11, for a biochemical container 260, a robust cylindrical engaging section 263 may be formed in an upper section of an annular section 262 of a cover member 261, and a multiple-layered seal-like sealing section 264 may be formed in the lower section thereof.

[0073] In such case, the presence of the sealing section 264 ensures a sealability of the cover member 261. Besides, the overall height "a" of the engaging section 263 is selected to be smaller than the distance "b" of the displacement by the changing-direction mechanism 150, so that an engaging presented by the engaging section 263 can be easily released by the changing-direction mechanism 150. Consequently, the cover member 261 can be completely opened by the changing-direction mechanism 150, otherwise ensuring the tight sealing of the cover member 261.

[0074] Further, as shown in Fig. 12, for a biochemical container 270, a concave section 273 having a triangle cross-sectional geometry may be formed in a peripheral surface of a bottom end of an annular section 272 of a cover member 271, and a convex section 274, which engages with such concave section 273, may be formed

inner circumference surface of a container member 275.

[0075] In such case, the presence of the annular section 272 having sufficient overall height ensures a sealability of the cover member 271. Besides, a displacement "c" required for releasing the engage of the concave section 273 with the convex section 274 is selected to be smaller than the distance "b" of the displacement by the changing-direction mechanism 150, so that an engaging of the concave section 273 with the convex section 274 can be easily released by the changing-direction mechanism 150. Consequently, the cover member 271 can be completely opened by the changing-direction mechanism 150, otherwise ensuring the tight sealing of the cover member 271.

[0076] Further, the above-described embodiment illustrates that the changing-direction mechanism 150 is located in the side opposite to the hinge mechanism 130, so that an end of the cover member 120 is displaced by a single changing-direction mechanism 150 to open thereof.

[0077] Alternatively, as shown in Fig. 13, for a biochemical container 280, a pair of changing-direction mechanisms 150 may be formed from side to side. In such case, for example, a pair of assisting-opening members 140 are pressed from both sides with the thumb and the first finger in the condition that the container main body 111 is held in one hand, so that the right and the left edges of the cover member 120 are simultaneously displaced in the upward direction by a pair of changing-direction mechanisms 150 to open thereof.

[0078] In this case, similarly as the convex section 122 shown in Fig. 2, the assisting-opening member 140 of the cover member 120 can be held with a finger of another hand. Therefore, a pollution of the finger that opens the cover member 120 with a biochemical substance can be prevented by utilizing the assisting-opening member 140 as a cover.

[0079] Consequently, a pollution of the biochemical container 280 or the biochemical substance by the polluted finger, or a pollution of the biochemical substance within the container member 110 with droplets from the finger surface in the opening operation for the cover member 120, can be prevented.

[0080] Further, the above-described embodiment illustrates that the bottom end section 141 of the assisting-opening member 140 connected to the cover member 120 is in contact with the upper half section of the convex section 162 of the container member 110 to cause a displacement to achieve the changing-direction mechanism 150.

[0081] Alternatively, as shown in Fig. 14, for a biochemical container 290, an end of an assisting-opening member 291 curved outward to form an arc-like shape may be connected to one of a cover member 292 and a container main body 293, and the other end may be engaged with a convex section 294 of the other thereof to achieve a changing-direction mechanism 295.

[0082] In such case, since the assisting-opening member 291 bent to form an arc-like shape is elongated by being pressed from the outside as shown in Fig. 14 (b), the cover member 292 can be separated from the container main body 293 by such elongation to open thereof.

[0083] In addition to above, it is needless to point out that the embodiment and a plurality of modified embodiments described above may be combined unless the concept of these is conflicted.

Claims

1. A biochemical container, comprising a container member having an opening in one end, and a cover member openably and closably shut the opening of said container member, said biochemical container comprising:

a hinge mechanism, pivotably supporting said cover member in a position for shutting, and in a position for opening, said opening of said container member;
an assisting-opening member, having one end connected to an outer surface of one of said container member and said cover member and the other end facing an outer surface of the other of the members, so that said assisting-opening member being elastically bent; and
a changing-direction mechanism, being capable of changing a stress acting along a direction exerting over said assisting-opening member from the outside to a stress acting along an opening direction over said cover member.

2. A biochemical container, comprising a container member having an opening in one end, and a cover member openably and closably shut the opening of said container member, said biochemical container comprising:

a hinge mechanism, pivotably supporting said cover member in a position for shutting, and in a position for opening, said opening of said container member;
an assisting-opening member, having one end connected to an outer surface of one of said container member and said cover member and the other end facing an outer surface of the other of the members, so that said assisting-opening member being elastically bend; and
a changing-direction mechanism, being capable of changing a displacement toward an inside of at least a part of said assisting-opening member to a displacement toward an opening direction of at least a part of said cover member.

3. The biochemical container as set forth in claim 1 or 2, wherein said assisting-opening member is formed

to have a geometry, in which one end is connected to an outer surface of said cover member and the other end faces an outer surface of said container member in a shut condition, and
wherein said changing-direction mechanism has a slope formed in a position facing the other end of said assisting-opening member in an outer surface of said container member, said slope being inwardly displaced toward a direction for opening said cover member.

4. The biochemical container as set forth in claim 1 or 2, wherein said assisting-opening member is formed to have a geometry, in which one end is connected to an outer surface of said cover member and the other end faces an outer surface of said container member in a shut condition, and
wherein said changing-direction mechanism has a convex section formed in a position facing the other end of said assisting-opening member in an outer surface of said container member, and a slope formed in an inside of the other end of said assisting-opening member, said slope being inwardly displaced toward a direction for opening said cover member.

5. The biochemical container as set forth in claim 1 or 2, wherein said assisting-opening member is formed to have a geometry, in which one end is connected to an outer surface of said container member and the other end faces an outer surface of said cover member in a shut condition, and
wherein said changing-direction mechanism has a slope formed in a position facing the other end of said assisting-opening member in an outer surface of said cover member, said slope being inwardly displaced toward a direction for opening said cover member.

6. The biochemical container as set forth in claim 1 or 2, wherein said assisting-opening member is configured that one end is connected to an outer surface of said container member and the other end faces an outer surface of said cover member in a shut condition, and
wherein said changing-direction mechanism has a convex section formed in a position facing the other end of said assisting-opening member in an outer surface of said cover member, and a slope formed in an inside of the other end of said assisting-opening member, said slope being inwardly displaced toward a direction for opening said cover member.

7. The biochemical container as set forth in any one of claims 1 to 6, wherein said hinge mechanism is elastically biased toward a direction for opening said cover member.

8. The biochemical container as set forth in claim 7, wherein said hinge mechanism elastically supports said opened cover member in a position being pivotably moved in substantially perpendicular direction from the opening of said container member.

9. The biochemical container as set forth in any one of claims 1 to 8, wherein said container member comprises a container body having an opening in one end, and a frame-like member mounted over an outer surface of one end of said container body,
wherein said hinge mechanism is connected to said frame-like member, and
wherein said assisting-opening member is configured that one end is connected to an outer surface of one of said frame-like member and said cover member and the other end faces an outer surface of the other of the members.

10. The biochemical container as set forth in claim 9, wherein said cover member is detachably engaged with the opening of said container body.

11. A cover unit, capable of being mounted to said container body of the biochemical container as set forth in claim 9 or 10, comprising:

said cover member;
a frame-like member mounted over an outer surface of one end of said container body;
a hinge mechanism, connected to said frame-like member, and pivotably supporting said cover member;
an assisting-opening member, configured that one end is connected to an outer surface of one of said frame-like member and said cover member and the other end faces an outer surface of the other of the members, so that said assisting-opening member being elastically bend; and
a changing-direction mechanism, being capable of changing a stress acting along a direction exerting over said assisting-opening member from the outside to a stress acting along an opening direction over said cover member.

12. A cover unit, capable of being mounted to said container body of the biochemical container as set forth in claim 9 or 10, comprising:

said cover member;
a frame-like member mounted over an outer surface of one end of said container body;
a hinge mechanism, connected to said frame-like member, and pivotably supporting said cover member;
an assisting-opening member, configured that one end is connected to an outer surface of one of said frame-like member and said cover mem-

ber and the other end faces an outer surface of the other of the members, so that said assisting-opening member being elastically bend; and

a changing-direction mechanism, being capable of changing a displacement toward an inside of at least a part of said assisting-opening member to a displacement toward an opening direction of at least a part of said cover member.

FIG.1

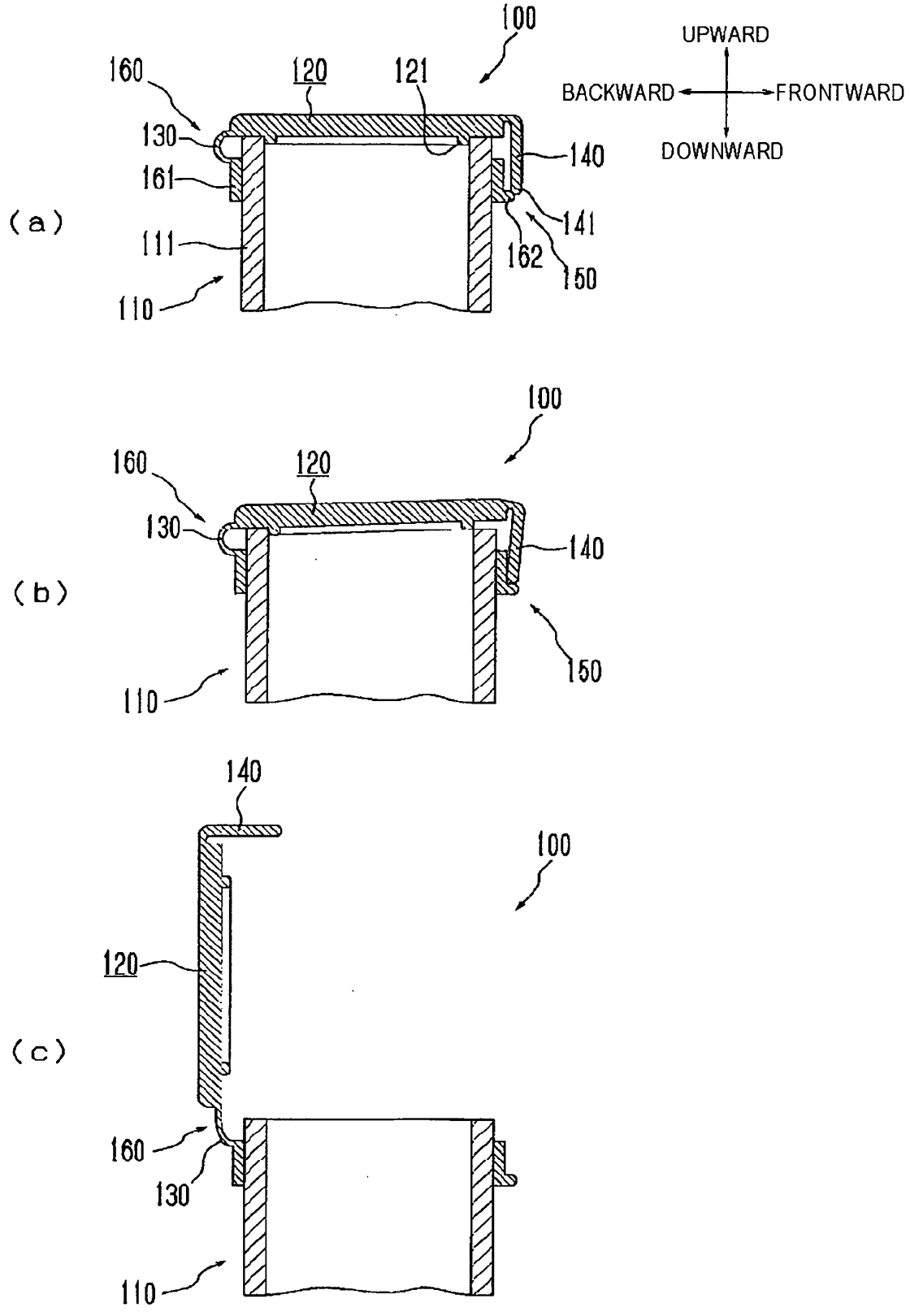

(a)
100
160
120
121
130
140
161
141
111
162
150
110
UPWARD
BACKWARD
FRONTWARD
DOWNWARD
(b)
100
160
120
130
140
150
110
(c)
140
100
120
160
130
110

FIG.2

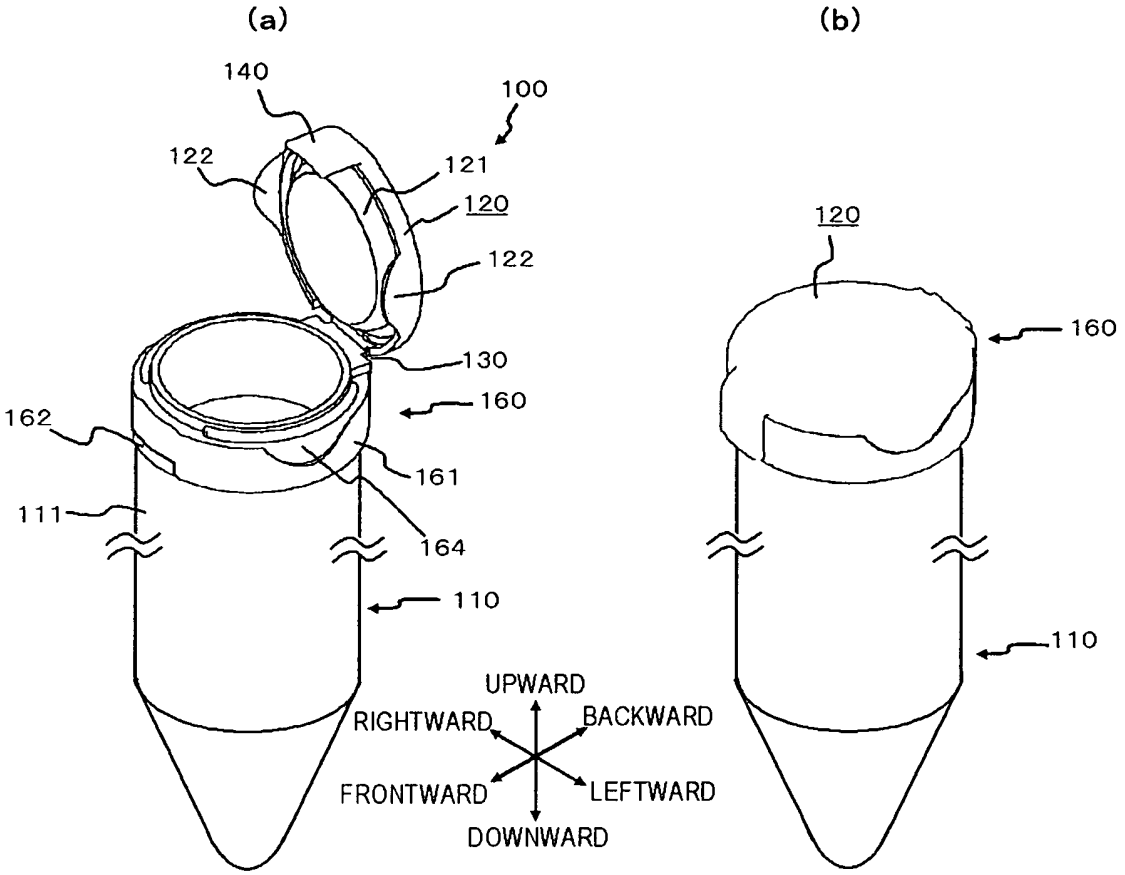

(a)
(b)
140
100
122
121
120
122
130
160
162
161
111
164
110
UPWARD
RIGHTWARD
BACKWARD
FRONTWARD
LEFTWARD
DOWNWARD
120
160
110

FIG.3

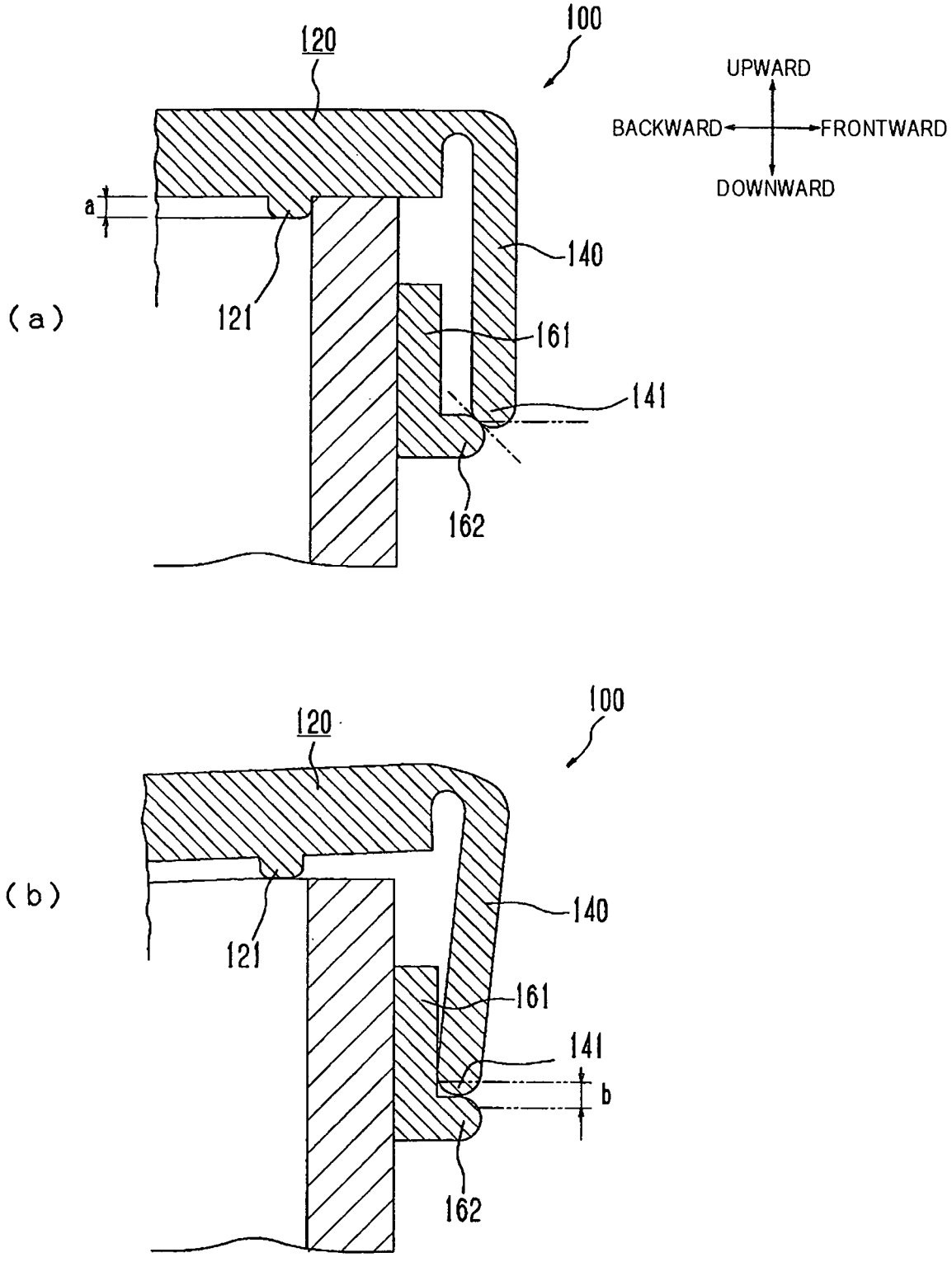

(a)
100
120
UPWARD
BACKWARD
FRONTWARD
DOWNWARD
a
121
140
161
141
162
(b)
100
120
121
140
161
141
b
162

FIG.4

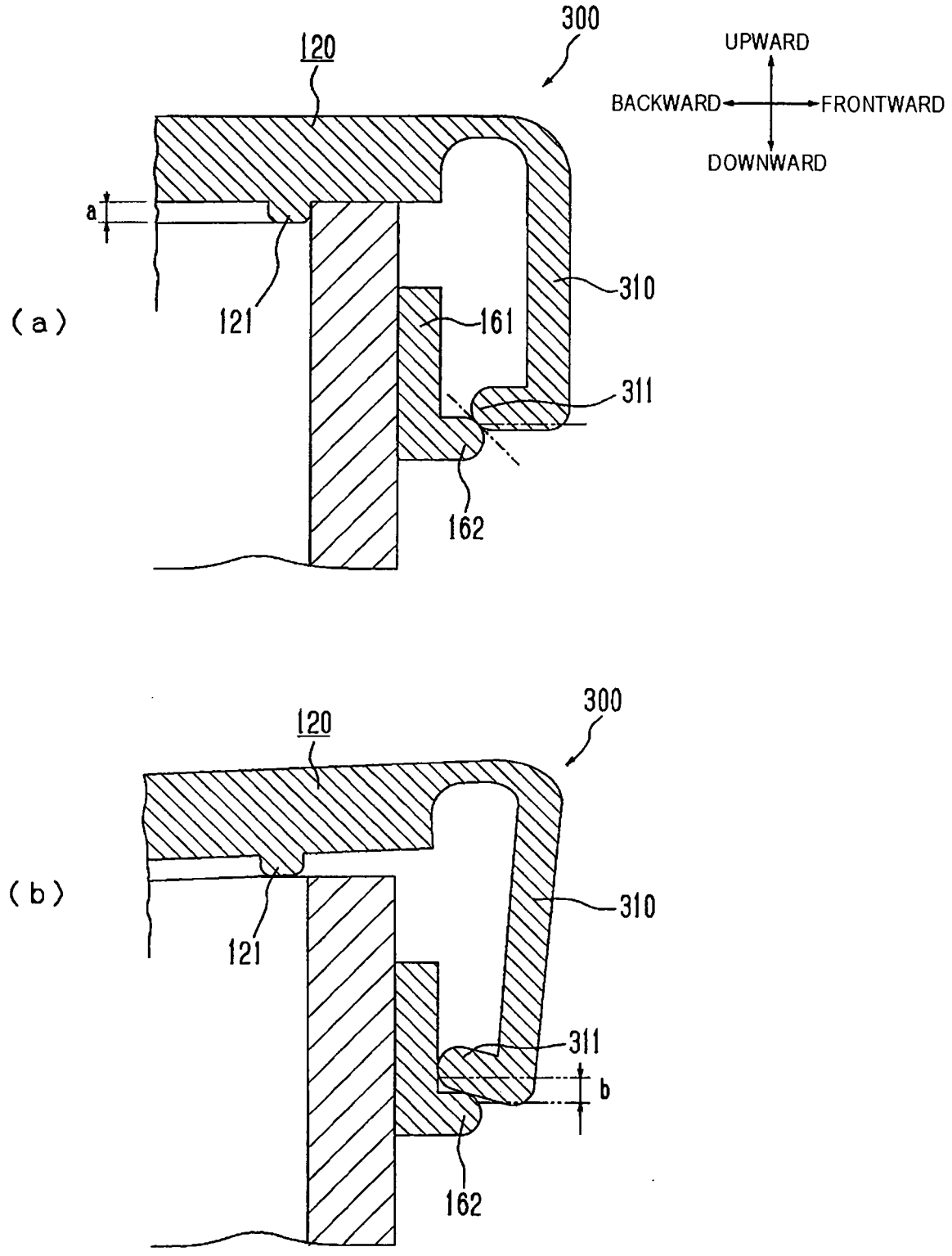

300
120
UPWARD
BACKWARD
FRONTWARD
DOWNWARD
a
121
161
310
311
162
(a)
300
120
310
121
311
b
162
(b)

FIG.5

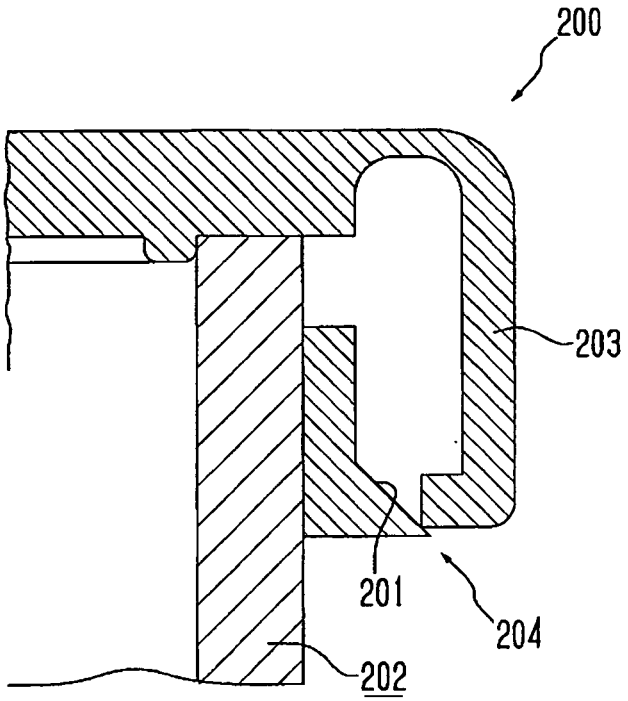


FIG.6

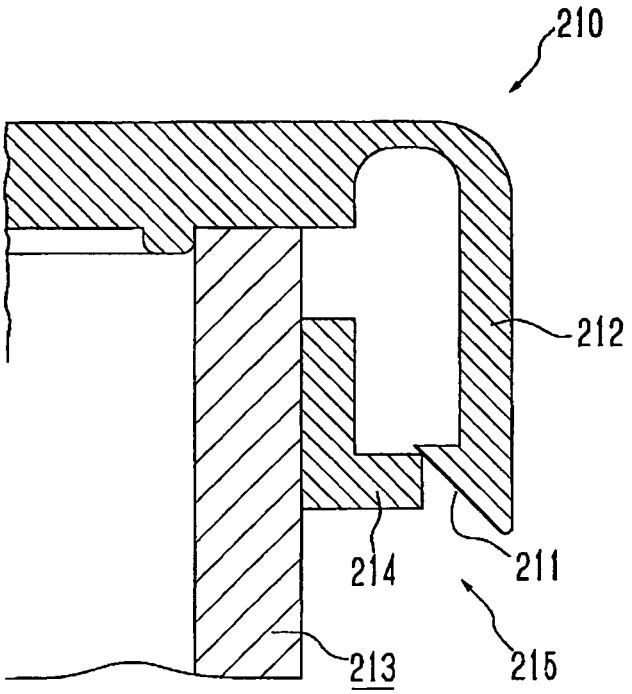


FIG.7

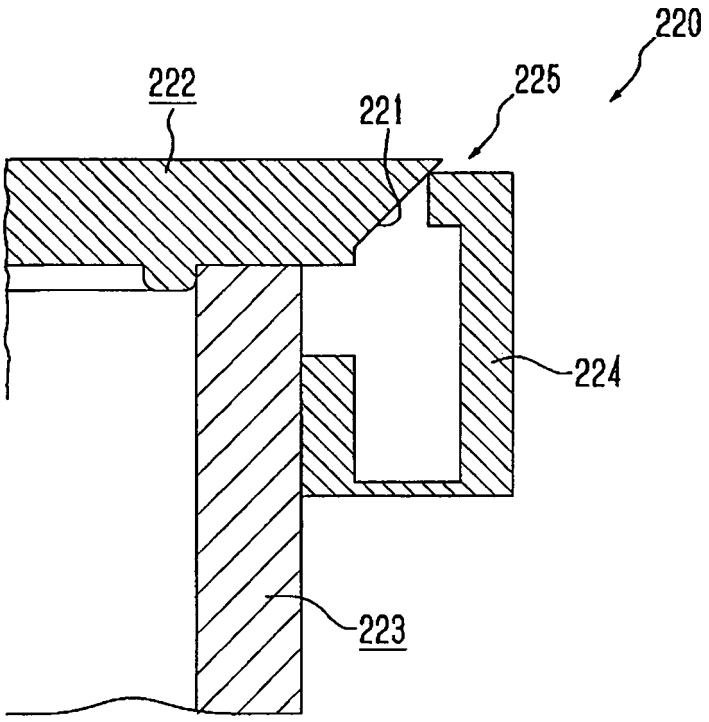


FIG.8

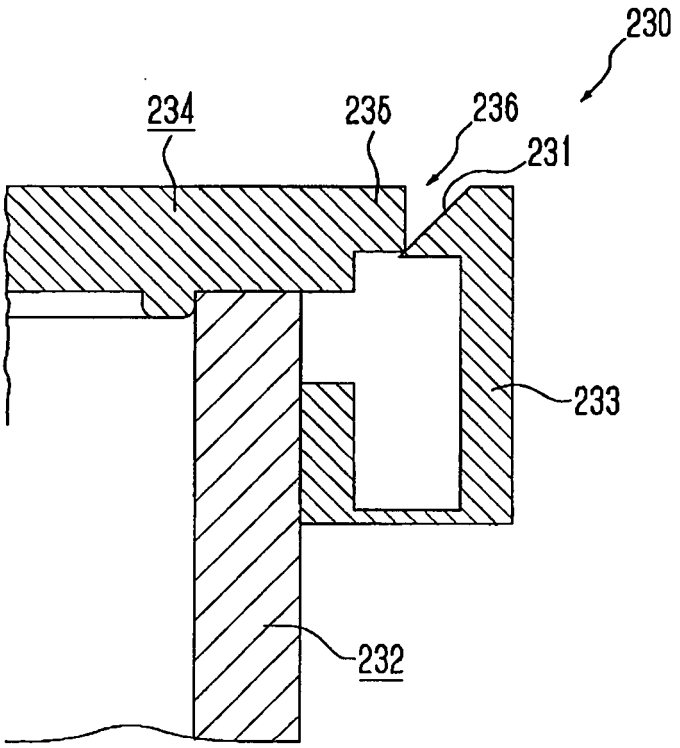


FIG.9

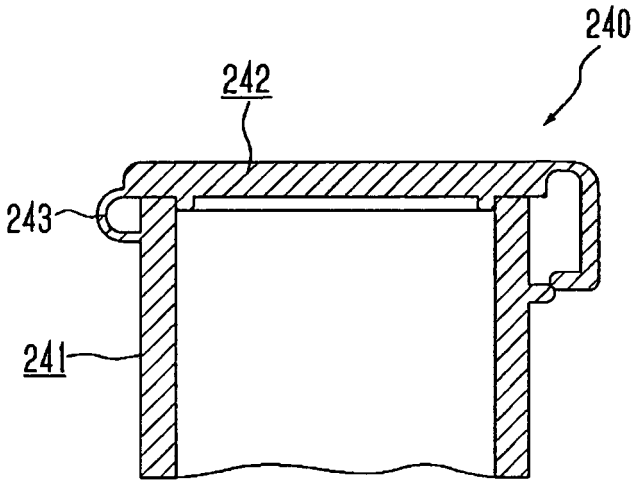


FIG.10

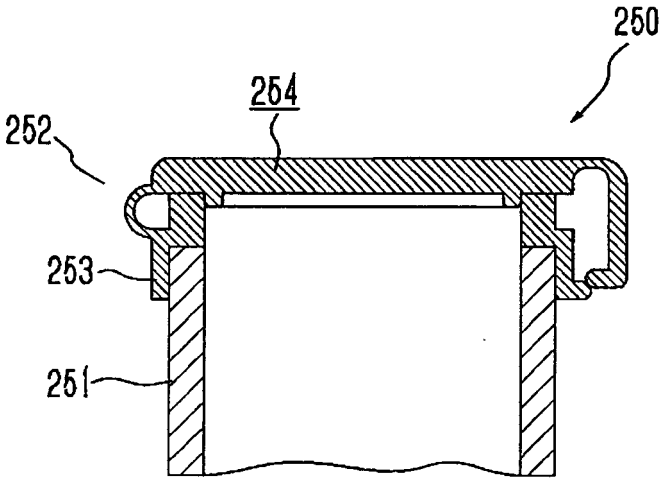


FIG.11

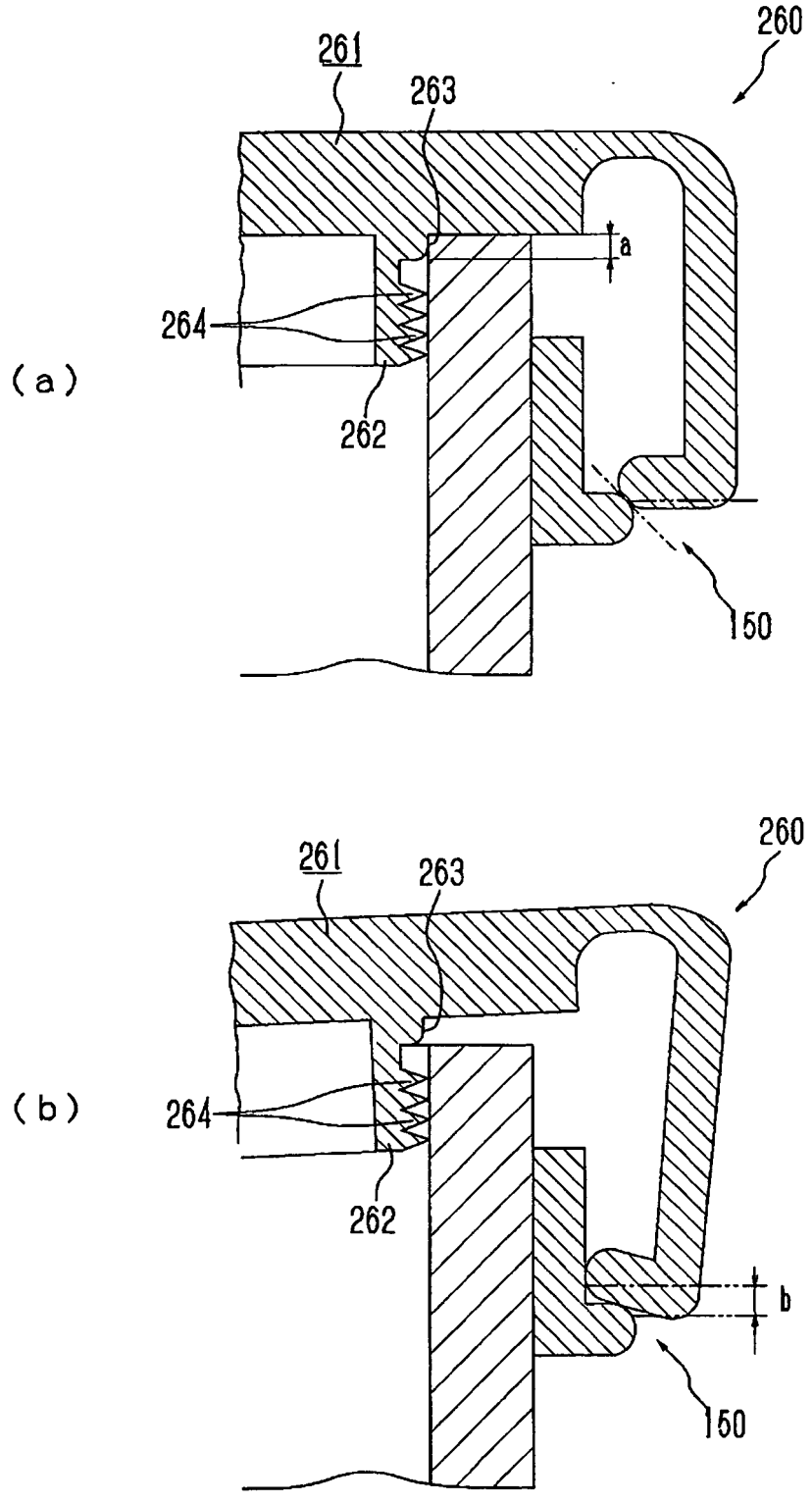
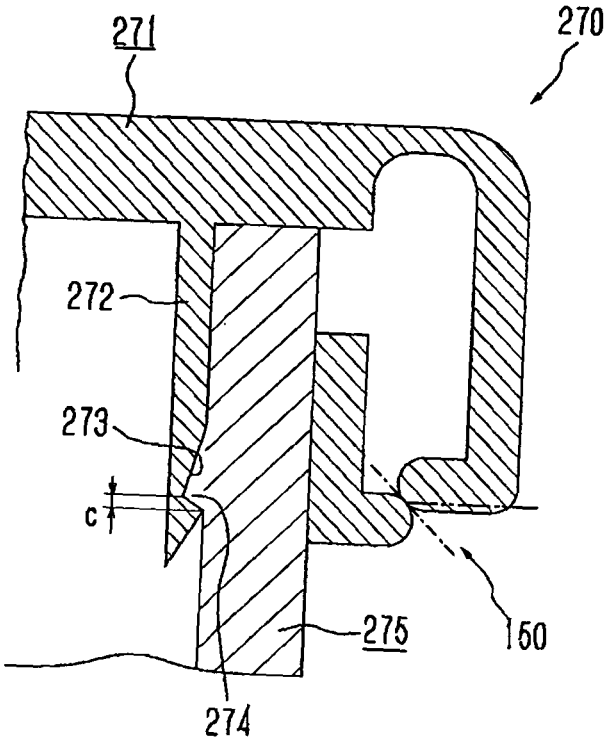


FIG.12

(a)



(b)

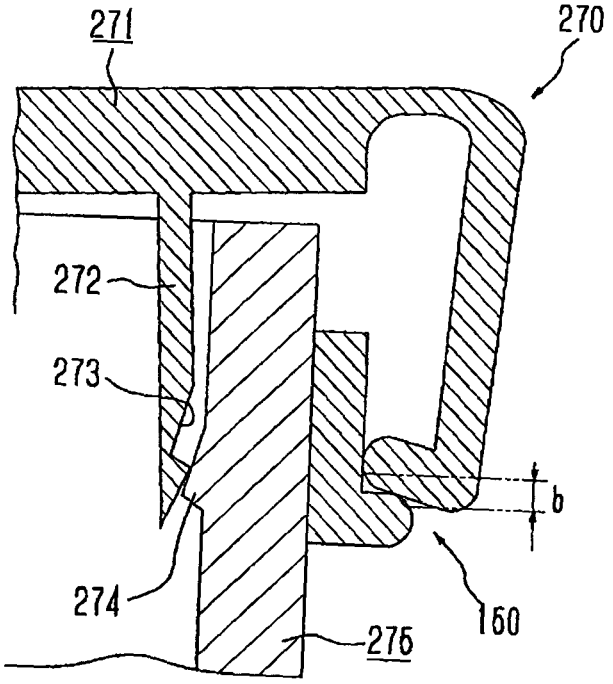


FIG.13

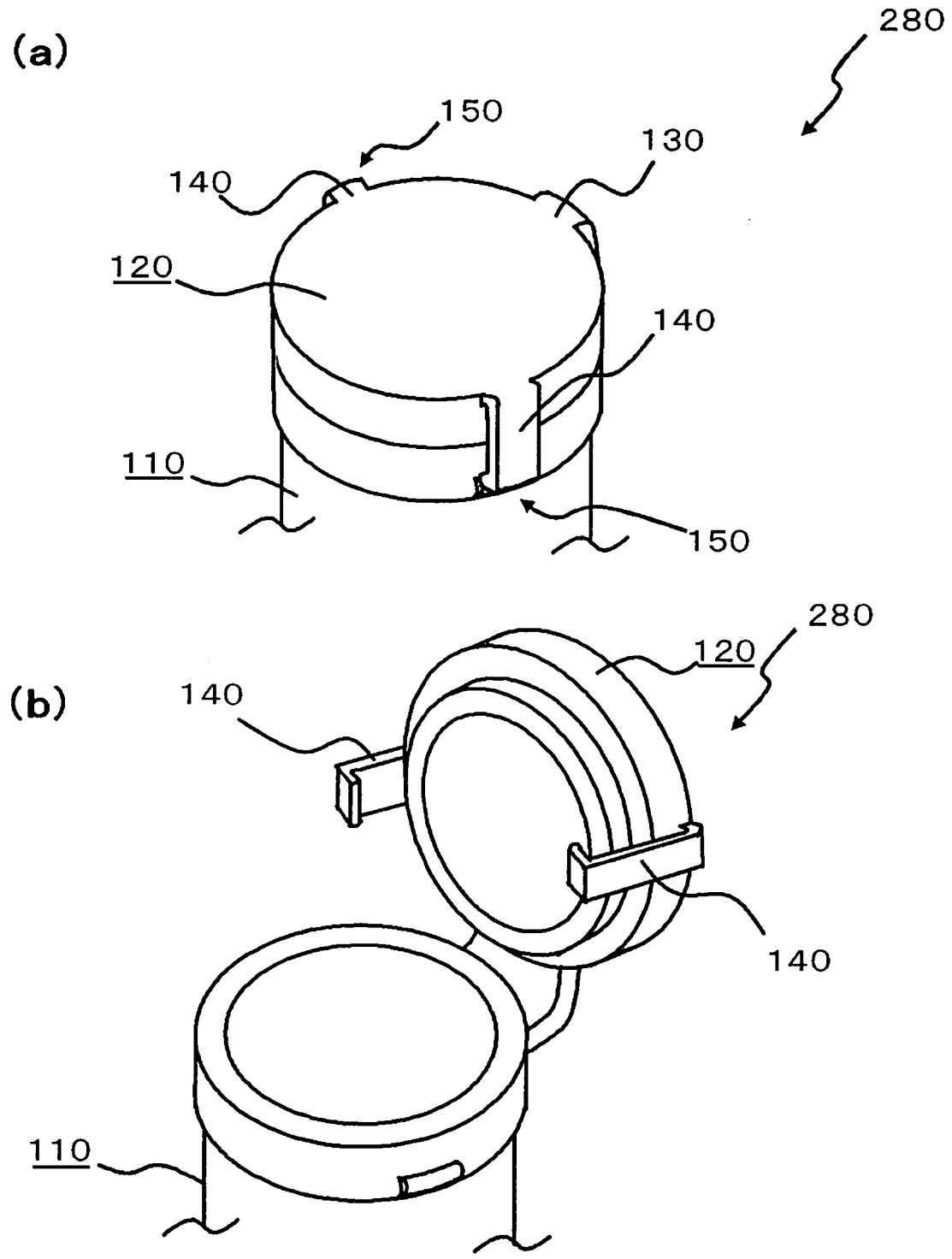
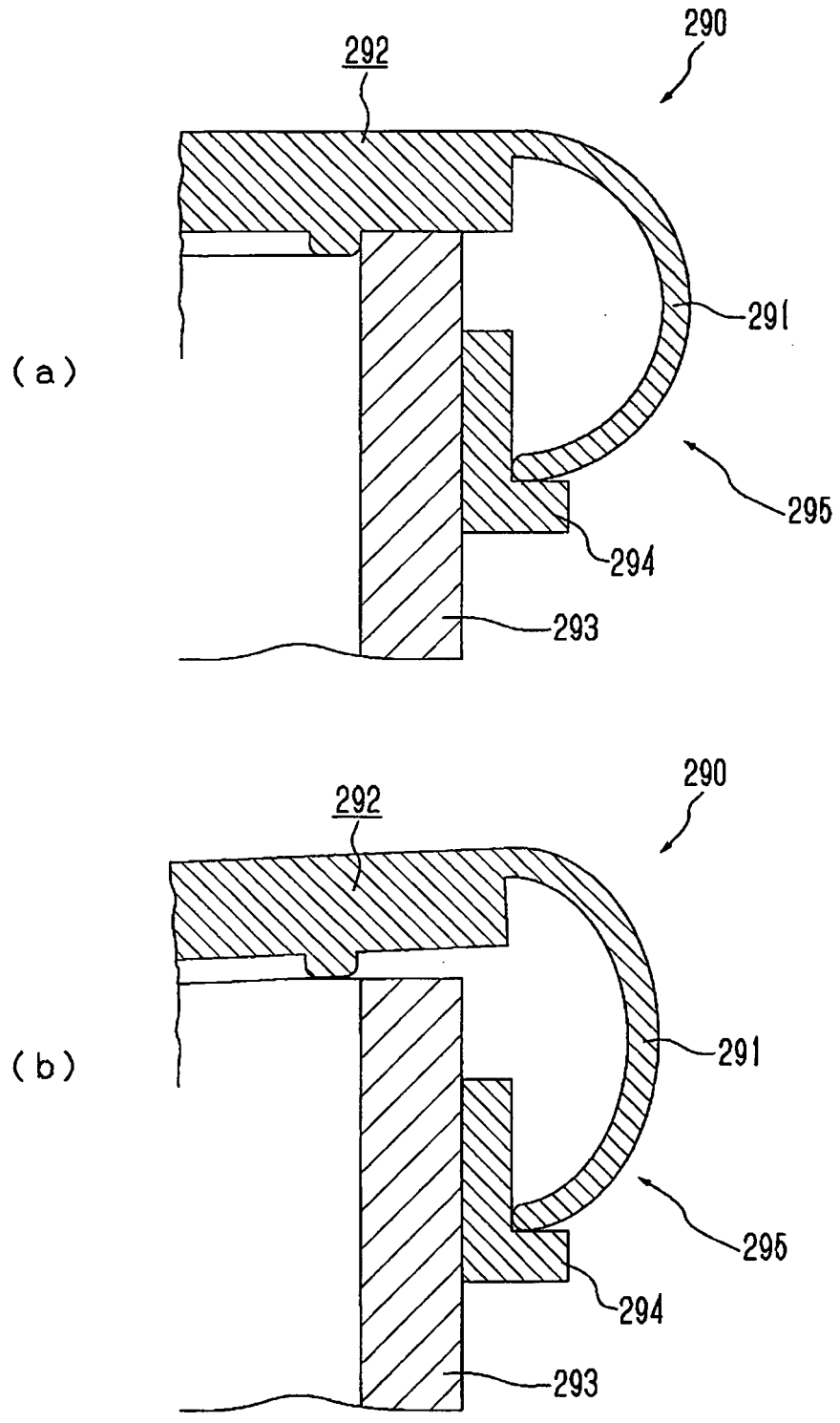


FIG.14



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2007/001350

A. CLASSIFICATION OF SUBJECT MATTER
B65D47/08(2006.01)i, *C12M1/00*(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)
B65D47/08, C12M1/00

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 1996-2008
Kokai Jitsuyo Shinan Koho 1971-2008 Toroku Jitsuyo Shinan Koho 1994-2008

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	WO 2005/087603 A1 (Prescribe Genomics Co.), 22 September, 2005 (22.09.05), Par. Nos. [0055] to [0068]; Figs. 1 to 2 & US 2007/0272689 A1 & EP 1731443 A1	1-12
Y	JP 2-205565 A (Owens-Illinois Closure Inc.), 15 August, 1990 (15.08.90), Full text; Figs. 1 to 7 & US 4940167 A & EP 0379775 A1	1-2,9-12

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

* Special categories of cited documents:
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 February, 2008 (01.02.08)	26 February, 2008 (26.02.08)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2007/001350

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 090310/1986(Laid-open No. 200566/1987) (Yoshino Kogyosho Co., Ltd.), 21 December, 1987 (21.12.87), Full text; Figs. 1 to 2 (Family: none)	1-4,7-8
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 090311/1986(Laid-open No. 200567/1987) (Yoshino Kogyosho Co., Ltd.), 21 December, 1987 (21.12.87), Full text; Figs. 1 to 2 (Family: none)	1-2,5-8
Y	JP 9-141135 A (Kabushiki Kaisha Buru Juji), 03 June, 1997 (03.06.97), Par. No. [0050]; Fig. 13 (Family: none)	10

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2003292004 A **[0005] [0008] [0036]**
- JP 2000313453 A **[0005] [0036]**
- JP H07315402 B **[0005]**
- JP H02144552 B **[0005]**