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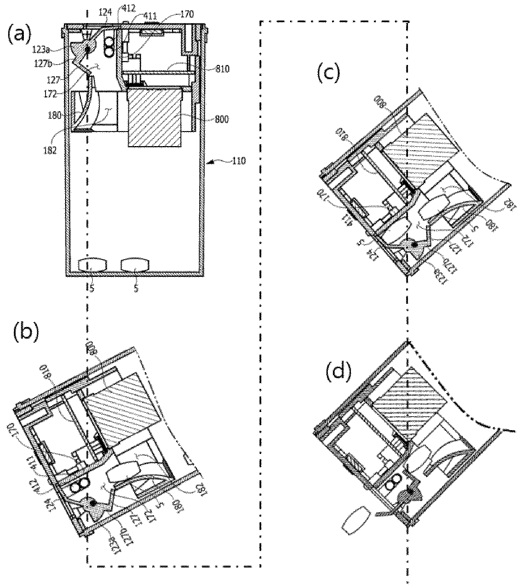
(54) DEVICE FOR DISCHARGING FIXED QUANTITY OF CONTENT, STORAGE CONTAINER HAVING SAME AND CONTENT MANAGEMENT SYSTEM

(57) A discharge device coupled to a storage container accommodating contents to discharge a fixed quantity of the contents includes: a fixed portion configured to fix the discharge device to the storage container; a passage portion having an opening formed in a shape of a through-hole, through which the contents are discharged, at an upper end and configured to form a movement path for discharging the fixed quantity of the contents; and a passing movement portion rotatably installed at the fixed portion and configured to rotate for the contents to pass, wherein the passing movement portion includes an opening member configured to open or close the opening, a rotating shaft portion connected to the opening member and having a rotating shaft that serves as a center of rotational movement, and a blocking member connected to the rotating shaft portion and configured to rotate together with the opening member, while the storage container and the discharge device are tilted at a critical angle of inclination from an angle of inclination of 0° at which the storage container and the discharge device stand upright, a center of gravity of the passing movement portion is configured to be positioned relative to the rotating shaft for rotation of the passing movement portion to be suppressed, and the critical angle of inclination is an angle of the storage container relative to the angle of inclination of 0° at which the contents come in contact with the opening member.

Fig. 4



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Description

[Technical Field]

[0001] The present invention relates to a device for discharging a fixed quantity of contents, and more particularly, to a discharge device for discharging a fixed quantity of contents such as pills, tablets, or parts accommodated in a container, a content storage container having the discharge device, and a content management system.

[Background Art]

[0002] Generally, pills, tablets, drugs in the form of capsules, health supplements, vitamins, small sweets, cosmetic products, small parts such as screws, etc. are produced as contents in the form of small solid articles (hereinafter referred to as "contents") and are accommodated in a container.

[0003] For contents such as drugs or health supplements, it is important to make sure that the contents are taken in fixed amounts to prevent overuse or addiction as well as to maximize efficacy.

[0004] Also, for tools or parts such as screws, pins, or washers, there is a need for inventory management on site through discharge of a fixed quantity and automatic detection of the discharge.

[0005] Contents are sold after being accommodated in a predetermined container, and a conventional content storage container includes a container main body in which contents are accommodated and a stopper openably and closeably coupled to the container main body. Therefore, in order to ingest or use the contents, the stopper is opened from the container main body, and then the container main body is tilted or a hand is put into the container main body to take out the contents, and here, a large quantity of the contents may pour out, or the amount of contents grabbed by hand may be different each time. As a result, it is difficult to take out the contents one at a time or only a necessary demand amount.

[0006] When drugs or vitamins are taken, there is a need to promote convenience and guide the drugs or vitamins to be taken in fixed amounts by accurately adjusting the discharge of the contents without error and preventing more than a demand amount of the contents from being discharged. In particular, when Internet of Things (IoT) technology including a sensor is applied to a device for discharging a fixed quantity and an accommodating container in order to manage stored contents, through real-time automatic datafication of the detection of discharge of a fixed quantity and ingestion or use of the contents, management and use of the data may be possible.

[0007] Even for application of the IoT technology, a content discharge device should be able to accurately discharge a desired fixed quantity of contents without error. However, there is a problem in that conventional discharge devices lack convenience in use or have an error in discharging a fixed quantity.

[Disclosure]

[Technical Problem]

[0008] The present invention is directed to providing a discharge device for discharging, without error, a fixed quantity of contents from a container accommodating the contents therein and a storage container having the discharge device.

[0009] The present invention is also directed to providing a content discharge device simultaneously having excellent convenience in use and excellent accuracy in controlling a discharge amount and a storage container having the content discharge device.

[Technical Solution]

[0010] One aspect of the present invention provides a device for discharging a fixed quantity of contents that is to be coupled to a container main body accommodating the contents, the device including: a fixed portion fixed to the container main body for the device to be coupled to the container main body; and a passing movement portion rotatably installed at the fixed portion and configured to move for the contents to pass.

[0011] The passing movement portion may include an opening member configured to open or close an opening, a rotating shaft serving as a center of rotational movement, and a blocking member connected to the rotating shaft and configured to rotate together with the opening member.

[0012] While the device is tilted at a critical angle of inclination from an upright state, a center of gravity of the passing movement portion may be configured to be positioned along the rotating shaft for a rotational force to act in a direction opposite to a direction of inclination of the device. The critical angle of inclination may be an angle of the device at the time the contents come in contact with the opening member, relative to the upright state of the device (in which the angle of inclination is 0°). That is, the critical angle of inclination may be an angle at which the contents begin to come in contact with the opening member and apply impact thereto.

[0013] Since the passing movement portion of the device is configured to not move relative to the container main body until the angle of inclination reaches the critical angle of inclination from 0°, in a state in which the angle of inclination is less than or equal to the critical angle of inclination, the angle of inclination of the device may be considered to be the same as an angle of inclination of the container main body.

[0014] In order to guide movement of the contents, the fixed portion may include a passage portion configured to form a movement path for discharging a fixed quantity of the contents and a fixing member configured to fix the passage portion to the container main body.

[0015] The fixed portion may include a duct-type passage portion configured to form a movement path for discharging a fixed quantity of the contents and a guide passage connected to the passage portion to guide the contents. The contents may move along the guide passage, enter the passage portion, and then be discharged to the outside through an opening formed at an upper end of the passage portion.

[0016] The passing movement portion may be disposed to form one sidewall of the passage portion.

[0017] The center of gravity of the passing movement portion may be configured to be positioned in a range of -90° to 0° relative to a horizontal axis having the rotating shaft as its origin. Specifically, when the rotating shaft is the z-axis, an intermediate point between both ends of the rotating shaft may be an origin, and an xy plane including the origin may be presumed. On the xy plane, a horizontal axis from the origin may be the x-axis, and a vertical axis therefrom may be the y-axis.

[0018] Another aspect of the present invention provides a discharge device to be coupled to a container main body accommodating contents, the discharge device including: a passage portion configured to form a movement path for discharging a fixed quantity of the contents; and a passing movement portion rotatably installed at the passage portion and configured to rotate for the contents to be discharged.

[0019] An opening may be formed at an upper end of the passage portion, and due to the rotation of the passing movement portion, the opening at the upper end of the passage portion may be opened, and the contents may be discharged therethrough.

[0020] The passing movement portion may include an opening member configured to open or close the opening, a rotating shaft serving as a center of the rotational movement, and a blocking member connected to the rotating shaft and configured to rotate together with the opening member, and the passing movement portion may form at least a portion of one sidewall of the passage portion.

[0021] The opening member and the blocking member may be strongly coupled via a rotating shaft portion and may rotate as free ends relative to the rotating shaft portion. The opening member, the blocking member, and the rotating shaft portion may be integrally formed, but the present invention is not limited thereto.

[0022] The discharge device according to one embodiment of the present invention may further include a detector provided at the passage portion to detect the contents discharged due to the rotation of the passing movement portion.

[0023] A duct-type passage portion may form a movement path for discharging a fixed quantity of the contents, the passage portion may have a lower portion connected to a guide portion configured to guide the contents, and the contents may move along the guide portion, enter the passage portion, and then be discharged to the outside through the opening at the upper end of the passage portion.

[0024] The detector may include a light receiver and a light emitter, light radiated from the light emitter may pass through a path along which the contents move in order to be discharged and may be detected by the light receiver, and whether the contents have been discharged may be determined based on a quantity of the detected light.

[0025] More specifically, whether the contents have been discharged may be determined based on a pattern of changes over time in the quantity of the light detected by the light receiver.

[0026] The light receiver and the light emitter may be disposed to face each other on both sidewalls formed at left and right sides of the one sidewall.

[0027] The discharge device may include a plurality of detectors each including a light emitter and a light receiver, the light emitter and the light receiver may be disposed to face each other with a passage portion disposed therebetween at both side surfaces of the passing movement portion, and light radiated from the light emitter may pass through a path along which the contents move in order to be discharged and may be detected by the light receiver. In a maximum rotation state in which the passing movement portion is rotated due to the contents applying a stroke to the opening member while the discharge device is tilted at the critical angle of inclination, at least one of the plurality of detectors may be disposed to be positioned more downstream of the passage portion than the rotated blocking member.

[0028] The detector may detect information of the detected contents and may further include: a storing portion configured to store the information of the contents detected by the detector; a measuring portion configured to calculate an accumulated discharge amount of the contents for each period based on the information stored in the storing portion; and a communication portion configured to send the information of the contents detected by the detector, the information stored in the storing portion, or information calculated by the measuring portion to an external device through wired or wireless communication.

[0029] In a medicine-taking management system including a storage container having the discharge device mounted thereon, a medicine-taking management server, and a user terminal, the user terminal which is an information processor includes: a communication portion configured to wirelessly communicate with the storage container and the medicine-taking management server; an output portion; and a controller configured to receive medicine-taking state information from the detector of the discharge device, receive medicine-taking schedule information from the medicine-taking management server, use the medicine-taking schedule information and the medicine-taking state information to generate medicine-taking management information relating to a user, and output the medicine-taking management information to the output portion.

[0030] The output portion may output the medicine-taking management information using text, images, or voice.

[0031] Also, a configuration identical to the medicine-taking management system may be configured as a content management system. In a content management system including a storage container having the above-described discharge device installed thereon, a content management server, and a user terminal, the storage container includes a control module, a communication module that is able to wirelessly communicate with an external device, a clock, and a storing portion, and the control module is able to communicate with the user terminal or external device through the communication module.

[Advantageous Effects]

[0032] According to one aspect of the present invention, it is possible to provide a discharge device that can discharge a fixed quantity of contents from a storage container per discharge without error and thus has excellent accuracy, and due to excellent accuracy, errors in sensing and data management can be reduced.

[0033] According to another aspect of the present invention, it is possible to provide a fixed-quantity discharge device that can, when a user uses a storage container in a tilted state, reduce discharge errors just by physical operations of the storage container and the discharge device without electrical energy consumption and thus has excellent performance.

[Description of Drawings]

[0034]

FIG. 1 is a perspective view of a content storage container.

FIG. 2 is an exploded perspective view of the content storage container having a discharge device according to one embodiment of the present invention.

FIG. 3 shows a perspective view of a passing movement portion of the discharge device according to one embodiment of the present invention and a longitudinal cross-sectional view of an operational process when a pill passes.

FIG. 4 is a view illustrating a tilted state of the content storage container having the discharge device according to one embodiment of the present invention and changes in the position of contents due to the tilting.

FIG. 5 is a view illustrating a case where two pieces of contents are discharged one after another in the state in which the content storage container having the discharge device of FIG. 4 is tilted.

FIG. 6 is a main view illustrating a tilted state of the content storage container having the discharge device according to an embodiment of the present invention.

FIG. 7 is a conceptual diagram relating to a gravitational action due to tilted states of the content storage container having the discharge device according to various embodiments.

FIG. 8 is a detailed conceptual diagram relating to the gravitational action due to the tilted states of the content storage container having the discharge device of the present invention.

FIG. 9 is a cross-sectional view illustrating changes in posture of the contents and the discharge device and the position of the center of gravity of the passing movement portion in a process in which the content storage container having the discharge device mounted thereon according to an embodiment of the present invention is tilted to discharge the contents.

FIG. 10 is a cut-out perspective view of the content storage container having the discharge device mounted thereon according to an embodiment of the present invention.

FIGS. 11 to 13 are views of the content storage container having the discharge device, which has a detector, mounted thereon according to an embodiment of the present invention.

FIGS. 14 to 17 are cut-out perspective views of the discharge device having a detector installed thereon and the content storage container according to another embodiment of the present invention.

FIG. 18 is a block diagram of a medicine-taking management system including the content storage container having the discharge device mounted thereon according to an embodiment of the present invention.

[Modes of the Invention]

[0035] Hereinafter, a discharge device, a storage container, and a medicine-taking management device according to one embodiment of the present invention will be described with reference to the accompanying drawings. In this process, thicknesses of lines or sizes of components illustrated in the drawings may be exaggerated for clarity and convenience of description. Also, terms mentioned below are terms defined in consideration of functions in the present invention and may be changed according to an intention or customary practice of a worker or an operator. Therefore, such terms should be defined based on the content throughout the specification.

[0036] FIG. 1 is a perspective view illustrating an exterior of a content storage container, and FIG. 2 is an exploded perspective view of the content storage container having a discharge device according to one embodiment of the present invention.

[0037] Referring to FIG. 2, a container main body 110 has an accommodating portion 117 having a cylindrical shape and configured to accommodate and store contents therein and a neck portion 116 extending upward from the accommodating portion 117. An opening is

formed at an inner portion of the neck portion 116 or an upper portion of the container main body 110, and the opening serves as a passage along which a pill is discharged to the outside. A fixed-quantity discharge device 100 is mounted to block the opening at the upper portion of the container main body 110 and allows a certain fixed quantity of the contents to be discharged each time.

[0038] Referring to FIGS. 2 to 4, the fixed-quantity discharge device 100 is configured to be mounted on the container main body and discharge a fixed quantity of the contents stored in the accommodating portion 117 when a user tilts the container main body.

[0039] The neck portion 116 having an opening 171 formed therein is formed to extend upward from the container main body 117, and screw threads for a container lid to be coupled may be formed on an outer circumferential surface of the neck portion 116.

[0040] The discharge device 100 includes a fixed portion 120 and a passing movement portion 123. The fixed portion 120 includes a fixing member 121 fixed and coupled to the neck portion 116. Alternatively, the fixed portion 120 may be coupled to the upper portion of the container main body.

[0041] The fixing member 121 may block the opening 171, and an opening 122 may be formed to pass through one region of the fixing member 121 to allow the contents to pass through the opening 122 and be discharged from the container main body to the outside.

[0042] As illustrated in FIG. 2, an edge portion may be formed on an outer circumferential surface of the fixing member 121 and may be mounted on the inner circumferential surface or outer circumferential surface of the neck portion 116, which is formed at the upper portion of the container main body 110, by being screw-coupled thereto. The discharge device 100 of the present invention may be detachably coupled to the container main body, but the present invention is not limited thereto. The discharge device 100, particularly the fixing member, may be coupled to the container main body in various ways such as adhesion, welding, fitting, and hook coupling, or the fixing member may be integrally formed with the container main body.

[0043] Meanwhile, a duct-type passage portion 172 configured to form a movement path for discharging a fixed quantity of contents 5 and a guide passage 182 connected to the passage portion 172 to guide the contents are formed at a lower portion of the opening 122 of the fixing member 121. A passage in which the opening 122, the passage portion 172, and the guide passage 182 are connected in that order in a substantially straight line is formed from an upper portion to a lower portion.

[0044] As the container main body is tilted, the contents move from the accommodating portion 117 to the passage portion 172 via the guide passage 182 and are discharged to the outside through the opening 122. One side of the guide passage 182 may be an inner wall of the container main body or may be formed by a separate guide portion 180.

[0045] The passage portion 172 is formed by a sidewall 170 extending downward to be adjacent to the opening 122 of the fixing member 121 and the passing movement portion 123 rotatably coupled to a rotating shaft holding portion formed at the fixing member.

[0046] The passing movement portion 123 disposed at the passage portion to form one portion of the passage portion is rotatably installed at the fixing member and rotates according to tilting of the container main body, to which the fixing member is fixed, to enable discharge of the contents to the outside. While the fixed portion is strongly fixed and coupled to the container main body and thus integrally moves with the container main body, the passing movement portion is able to move (rotate) relative to the fixed portion and the container main body about a rotating shaft. That is, the fixed portion is integrally tilted or integrally moves with the container main body according to tilting or movement thereof.

[0047] The passing movement portion 123 moves corresponding to movement of the contents caused by a gravitational action and opens the fixed portion 120 for the contents to pass. In the case where the fixed portion 120 is tilted or moves, the passing movement portion 123 may move due to at least one of the self-weight of the passing movement portion 123, inertia of the passing movement portion 123, and a force of the contents pressing the passing movement portion 123.

[0048] The rotational movement of the passing movement portion 123 that causes the contents to pass occurs due to gravitational motion of the contents or impact of the contents on an opening member of the passing movement portion 123, which is due to the fixed portion 120 being tilted, flipped, or shaken.

[0049] Also, the rotational movement of the passing movement portion 123 may occur due to a movement force caused by the contents pressing the passing movement portion 123 by the self-weight of the contents. The center of gravity of the passing movement portion 123 is positioned in a direction opposite to an external passing direction of the passing device 100 (an upstream side in the movement path of the contents), which is a rear of the position of a rotating shaft 125 of the passing movement portion 123.

[0050] The passing movement portion 123 includes an opening member 124 disposed in the opening 122, a rotating shaft portion connected to the opening member and having the rotating shaft 125 which is the center of the rotational movement, and a blocking member 127 connected to the rotating shaft portion to rotate together with the opening member. The rotating shaft portion is rotatably installed at the rotating shaft holding portion formed at the fixing member, and the passing movement portion 123 rotates about the rotating shaft due to gravity and external force.

[0051] In a normal state in which the storage container having the discharge device mounted therein stands upright, the opening member 124 blocks at least one portion of the opening 122 and closes the passage portion 172

from the outside of the housing 110. When, in a state in which the storage container is tilted at a predetermined angle or more, the contents move along the inclined passage portion and push the opening member, the opening member 124 rotates about the rotating shaft 125, the opening 122 is opened, and the contents are discharged to the outside after passing through the opening 122. The configuration and action of the passing movement portion 123 will be described in detail below with reference to FIG. 4.

[0052] Meanwhile, as illustrated in FIGS. 2 and 3, the passing movement portion 123 forms the passage portion 172 together with the sidewall 170 in the normal state. The sidewall forms three sidewalls of the passage portion 172, and the passing movement portion forms one sidewall of the passage portion 172.

[0053] A guide portion 190 forms the guide passage 182, and when the container main body is tilted, the contents enter the passage portion 172 via the guide passage 182 and then are discharged to the outside through the opening at the upper end of the passage portion. The guide passage 182 is formed by one portion of an inner wall of the container main body 117 and the guide portions 180 and 190 disposed adjacent thereto.

[0054] Meanwhile, as illustrated in FIGS. 2 and 3, the opening member 124 and the blocking member 127 are connected to each other with a predetermined angle formed therebetween and the rotating shaft portion disposed therebetween.

[0055] The sizes and angles of the opening member 124 and the blocking member 127 and the size of the movement path of the contents are designed to accurately control movement and discharge of a desired amount of contents. For example, in the case where one piece of contents is a fixed quantity, when one piece of contents 5 (front passing contents 5) moves in the passage portion 172, another piece of contents 5 (rear passing contents 5) is positioned behind the front passing contents 5 and sequentially moves.

[0056] The blocking member 127 is configured to be bent, and a bent portion 127b of the blocking member 127 may be deflected linearly or formed as a curved surface. The bent portion 127b at which the blocking member 127 is bent may be configured to have a steep slope close to 90° to prevent more than a demand amount of contents from entering the fixed portion 120. Of course, the bent portion 127b may be bent at various other angles.

[0057] One or more detectors configured to detect contents discharged due to rotation of the passing movement portion are provided at the passage portion or adjacent to the passage portion. The configuration and arrangement of the detectors will be described below.

[0058] Referring to FIG. 4, when a user tilts the storage container standing upright (at an angle of inclination of 0°, see FIG. 4A) 90° or more, and a state of FIG. 4B is reached, the contents on the bottom of the container main body move to the passage portion along the guide passage. Here, for the movement path of the contents to be secured, the blocking member 127 of the passing movement portion may be designed to not close the passage portion, and the opening member 124 may be designed to keep the opening closed.

[0059] In FIG. 4A, in a case where the center of gravity of the passing movement portion is at the right side about the rotating shaft, the passing movement portion receives a clockwise rotational force, but rotation of the passing movement portion is limited by a stopper 129 positioned at one side of the fixing member 121. The stopper is positioned adjacent to the opening 122 of the fixing member and comes in contact with a tip of the opening member to prevent further clockwise rotation of the opening member toward the passage portion. The position and shape of the stopper 129 may be designed in various ways for the stopper 129 to have the above function.

[0060] In FIG. 4B, a center of gravity G of the passing movement portion 123 is positioned to the right of a vertical line of the rotating shaft 125 (in the direction of gravity, indicated with a one-dot chain line). In the case where the center of gravity of the passing movement portion is at the right side about the rotating shaft, the passing movement portion receives a clockwise rotational force, and a state in which the blocking member 127 does not close the passage portion, and the opening member 124 closes the opening is maintained. In a case where a user tilts the receiving container, and thus the fixed portion 120 strongly fixed to the receiving container is tilted together, due to a difference between the position of the center of gravity G of the passing movement portion and the position of the center of rotation 125, the rotational movement of the passing movement portion 123 may be prevented or delayed. That is, due to action of torque caused by gravity that affects the center of gravity of the passing movement portion relative to the position of the rotating shaft 125 which is the center of rotational movement of the passing movement portion 123, even in the state in which the fixed portion is tilted, the blocking member of the passing movement portion keeps the passage portion open from the guide portion.

[0061] As illustrated in FIG. 4C, in the case where the storage container (and the fixed portion fixed thereto) is tilted at a larger angle compared to FIG. 4B, and the storage container (and the fixed portion fixed thereto) is tilted at a predetermined angle of inclination (critical angle of inclination) from an initial state (an angle of inclination of 0°), a piece of contents 5 that has moved through the passage portion first (preceding contents 5) moves and comes in contact with the opening member. As illustrated in FIG. 4C, the preceding contents 5 in contact with the opening member push the opening member 124 from a rear end of the opening member 124. Here, the weight of the contents and impact caused by a movement amount of the contents that are applied from the rear end of the opening member 124 overcome the clockwise torque caused by gravity that is applied to the center of gravity G of the passing movement portion 123 and make

the passing movement portion 123 rotate counterclockwise about the rotating shaft 125.

[0062] Due to the counterclockwise rotation of the opening member 124, the opening is opened, and the preceding contents are discharged to the outside of the storage container (see FIG. 4D). Here, due to the rotation of the passing movement portion 123, the blocking member 127, which is a portion of the passing movement portion 123, also rotates together with the opening member and is positioned in front of succeeding contents 5. Accordingly, the blocking member 127 blocks entry of the succeeding contents 5 that are about to enter the passage portion 172 from the guide passage 182.

[0063] As illustrated in FIG. 4D, as the preceding contents are discharged due to the rotation of the passing movement portion 123, and the blocking member 127 blocks the passage portion 172, the succeeding contents 5b are prevented from entering the passage portion 172 after moving along the guide passage. Further, as illustrated in FIG. 4D, the succeeding contents apply a stroke to the blocking member 127 after passing through the guide passage and serve as a stopper to prevent the passing movement portion from returning to its original state. That is, after the discharge of the preceding contents, when the impact of the preceding contents applied to the opening member disappears, the passing movement portion receives torque causing the passing movement portion to rotate clockwise about the rotating shaft and return to its original position, but due to the succeeding contents applying a weight to the blocking member, the passing movement portion is not able to return to its original position.

[0064] In this way, as the succeeding contents, which move along the inclined movement path, apply a stroke to the blocking member 127 positioned in front of the succeeding contents and act as a stopper to prevent the passing movement portion from returning to its original position and cause the blocking member to block the passage portion, additional contents are not discharged through the passage portion. In this way, by preventing pieces of contents from being discharged one after another, one piece of contents, which is a fixed quantity of the contents, can be discharged at a time.

[0065] Then, when the user tilts the storage container back to its original state so that the storage container stands upright as in the normal state, all of the pieces of contents that are not discharged, including the succeeding contents, fall to the container main body 117 at a lower portion and are stored therein. Such a series of operational mechanisms enables discharge of a fixed quantity of contents and storage of the remaining contents.

[0066] However, the inventors of the present invention have found some cases in which the above-described operational mechanisms do not work properly. Hereinafter, such cases will be described with reference to FIG. 5.

[0067] FIG. 5A illustrates a state in which the storage container and the fixed portion stand upright (with an angle of inclination of 0°) as illustrated in FIG. 4A.

[0068] FIG. 5B illustrates a state in which the storage container and the fixed portion are tilted slightly more than 90° as illustrated in FIG. 4B, and in this state, a pill which is preceding contents 5 is about to enter the passage portion from the guide passage. In this state, the center of gravity G of the passing movement portion is positioned at the right side of the rotating shaft (positioned on the one-dot chain line) such that the passing movement portion receives a clockwise rotational force, and accordingly, the blocking member 127 does not close the passage portion, and the opening member 124 closes the opening.

[0069] As illustrated in FIG. 5C, in the case where the storage container (and the fixed portion fixed thereto) is tilted at a larger angle, and the storage container (and the fixed portion fixed thereto) is tilted at a predetermined critical angle of inclination from an initial state (an angle of inclination of 0°), preceding contents 5 that have moved through the passage portion first come in contact with the opening member.

[0070] Then, as illustrated in FIG. 5C, the preceding contents 5 come in contact with the opening member 124 and then push the opening member 124. Impact caused by the weight of the contents 5 that is applied from the rear end side of the opening member 124 causes the passing movement portion 123 to rotate counterclockwise about the rotating shaft 125. Due to the counterclockwise rotation of the opening member 124, the opening is opened, and the preceding contents 5 are discharged to the outside of the storage container (see FIG. 5D).

[0071] However, unlike in FIG. 4C, the succeeding contents of FIG. 5C are positioned with a significant gap from the preceding contents instead of being adjacent thereto. In the case where the amount of contents is small or the critical angle of inclination is relatively small, the succeeding contents may be positioned at an entrance of the guide passage or positioned in the accommodating portion in a state in which the preceding contents are discharged. Referring to FIG. 5D, as the preceding contents are discharged due to the rotation of the passing movement portion 123, the blocking member 127, which is a portion of the passing movement portion 123, also rotates and blocks the passage portion 172. Here, since the succeeding contents are not approaching the blocking member 127 yet, in a state in which impact caused by the weight of the preceding contents is not present, the relationship between the center of gravity G of the passing movement portion 123 and the rotating shaft causes the passing movement portion to return to its original position as illustrated in FIG. 5E. Specifically, in FIG. 5E, the center of gravity G of the passing movement portion 123 that is positioned at the right side of the rotating shaft receives gravity in the vertical direction, and the passing movement portion 123 rotates clockwise about the rotating shaft.

[0072] In the case of FIG. 4, the succeeding contents

5 immediately collide with the blocking member blocking the passage portion and act as a stopper to block returning of the blocking member, and thus additional discharge is prevented. However, in the case where the succeeding contents enter while positioned with a significant gap from the preceding contents as in FIG. 5, some time is taken for the succeeding contents 5 to enter the passing portion as illustrated in FIG. 5E, and due to the passing movement portion rotating and returning during that time, the blocking member 127 does not block the passage portion, and the passage portion is open. Therefore, the succeeding contents immediately enter the passage portion and then are discharged in the same way as the preceding contents. Therefore, since the contents are additionally discharged right after one discharge of the fixed quantity of the contents, two pieces of contents are discharged one after another.

[0073] This is a malfunctioning state in the fixed-quantity discharge device that does not occur frequently but acts as a problem in terms of product reliability. In particular, such a situation may occur in a case where the critical angle of inclination is designed to be more than 90° and less than or equal to 130°.

[0074] As a result of study, the inventors of the present invention have solved the above problem using the relationship between the center of gravity of the passing movement portion and the rotating shaft.

[0075] Figs 6 to 8 are a longitudinal cross-sectional view illustrating angles of the storage container and the fixed portion and a rotational state of the passing movement portion 123 according to the angles.

[0076] FIG. 6 is a conceptual diagram relating to a gravitational action due to tilted states of the content storage container having the discharge device.

[0077] In FIG. 6, when the rotating shaft 125 is the z-axis, an intermediate point between both ends of the rotating shaft portion may be an origin, and an xy plane including the origin may be presumed. On the xy plane, the horizontal axis from the origin is the x-axis, and the vertical axis therefrom is the y-axis. The cross-section of the passing movement portion of FIG. 6 is positioned on the xy plane. The passage portion is positioned substantially along the y-axis.

[0078] In FIG. 6A in which the storage container stands upright and the angle of inclination is 0°, the center of gravity of the passing movement portion 123 including the opening member, the blocking member, and the rotating shaft portion is positioned on the xy plane and denoted with G, relative to the rotating shaft 125 of the passing movement portion. The vertical line of the rotating shaft 125 is indicated with a one-dot chain line and is the same as the y-axis here. Here, the passing movement portion receives gravity that is vertically downward, and gravity applied to the center of gravity spaced from the rotating shaft by a predetermined radius generates torque causing the passing movement portion to rotate about the rotating shaft. Here, since the center of gravity is present at the right side of the vertical line of the rotating shaft as illustrated in FIG. 6A, the passing movement portion receives a clockwise rotational force. Therefore, the opening member 124 receives the clockwise rotational force, but since the rotation is suppressed by the stopper, the state shown in FIG. 6A is maintained.

[0079] Then, when a user tilts the storage container 90° or more as in FIG. 6B, the contents move along the inclined passage and come in contact with the opening member. This angle is the critical angle of inclination, and here, is about 130°, for example. That is, until the critical angle of inclination reaches 130° from the initial state shown in FIG. 6A in which the angle of inclination is 0°, the passing movement portion receives gravity that is downward and receives a force causing the passing movement portion to rotate clockwise about the rotating shaft. Although the clockwise rotation is stopped by a separate stopper, since the clockwise rotational force acts continuously, the blocking member 127 of the passing movement portion continues to not block the passage portion. Therefore, a pill, which is the contents, enters the passage portion and reaches a rear surface of the opening member 124.

[0080] That is, in the state in which the critical angle of inclination is 130°, the passing movement portion receives gravity that is downward and receives the force causing the passing movement portion to rotate clockwise about the rotating shaft, the blocking member does not block the passage portion such that the contents pass through the passage portion and apply impact to the opening member, the opening member rotates counterclockwise due to the impact caused by the contents and opens the opening, and the contents are discharged.

[0081] FIG. 6C illustrates a longitudinal cross-section of the discharge device in the state in which the contents apply impact to the opening member, the opening is opened, and the contents are discharged. The center of gravity of the passing movement portion (that is indicated by a red point) is positioned at the left side of the vertical line of the rotating shaft. Therefore, due to gravity that the center of gravity G of the passing movement portion receives, the passing movement portion receives torque causing the passing movement portion to rotate counterclockwise about the rotating shaft. In this case, even in a state in which the preceding contents are discharged and impact applied to the opening member is not present, due to the torque of the passing movement portion, the passing movement portion maintains the state of FIG. 6C instead of immediately returning to its original state, that is, the state of FIG. 6B. Therefore, even in a case where the succeeding contents are positioned far from the preceding contents and do not act as a stopper, the blocking member may block entry of the succeeding contents. Therefore, even when the succeeding contents do not enter along the passage portion while adjacent to the preceding contents, an operational error in which two pieces of contents are discharged one after another may be prevented.

[0082] In order to provide clear description by compar-

ing a case where the operational mechanism of FIG. 6 is possible and a case where the operational mechanism of FIG. 6 is not possible, detailed description will be given below with reference to FIG. 7 focusing on the correlation between the center of gravity of the passing movement portion and the rotating shaft.

[0083] FIG. 7 is a conceptual diagram relating to a gravitational action due to tilted states of the content storage container having the discharge device. FIG. 7 schematically shows longitudinal cross-sections of the passing movement portion in which the center (origin) of concentric circles is the rotating shaft, and a green point indicates the position of the center of gravity of the passing movement portion. Hereinafter, torque actions in cases where the center of gravity G of the passing movement portion is positioned in first to fourth quadrants relative to the rotating shaft, which is the origin, will be described with reference to the table of FIG. 7. In the table of FIG. 7, concentric circles are divided into a first quadrant, a second quadrant, a third quadrant, and a fourth quadrant counterclockwise from an upper right side about the origin.

[0084] FIG. 7A shows a state in which the angle of inclination is 0°, that is, the state in which the storage container having the discharge device mounted thereon stands upright as in FIG. 6A. The positions of the rotating shaft and the center of gravity relative to each other in this state are schematically shown in FIG. 7A. FIG. 7B shows a state in which the angle of inclination is 90°, FIG. 7C shows a state in which the angle of inclination is the critical angle of inclination that causes the contents to come in contact with the opening member and apply impact thereto, and FIG. 7D shows the position of the center of gravity (indicated with a point on an inner circle) in a state in which the discharge device and the storage container are tilted at an angle of inclination of 180°.

[0085] First, in the table of FIG. 7, case 7-1(a) is a case in which, at an angle of inclination of 0°, the center of gravity (indicated with a point) is positioned in the first quadrant relative to the rotating shaft which is the origin. In case 7-1(a), while the angle of inclination is 0° and the storage container stands upright, the center of gravity of the passing movement portion 123 (that is indicated with a point) is positioned in the first quadrant, which is the upper right side, about the rotating shaft 125 as the origin. In 7-1(a), gravity acting on the center of gravity is indicated with a downward arrow. In 7-1(a), torque causing clockwise rotation acts due to gravity acting on the upper right side about the rotating shaft (origin), and as a result, the blocking member does not block the passage portion, and the passage portion is kept open.

[0086] However, in case 7-1(b) in which the discharge device is rotated 90°, the center of gravity is positioned at the upper left side about the rotating shaft (origin), torque causing counterclockwise rotation acts due to gravity, and as a result, the blocking member blocks the passage portion. The same applies to case 7-1(c) in which the angle of inclination is the critical angle of inclination. Therefore, until the angle of inclination reaches the critical angle of inclination from 90°, the passage portion is blocked by the blocking member, and the contents are unable to enter the passage portion. In the case where the center of gravity is in the first quadrant while the angle of inclination is 0° as in 7-1(a), the passing movement portion is not able to operate for passage of the contents.

[0087] In case 7-2, a counterclockwise rotational force acts while the angle of inclination is in a range of 0° to 90°, the blocking member blocks the passage portion, and then, while the angle of inclination is the critical angle of inclination, a rotational force does not act, or a rotational force in an arbitrary direction acts. It may not be easy for the contents to enter the passage portion. Therefore, the case in which the center of gravity is positioned in the second quadrant as in 7-2 is also not appropriate for passage of the contents.

[0088] In case 7-3, the center of gravity is in the third quadrant, and a counterclockwise rotational force acts and causes the blocking member to block the passage portion while the angle of inclination is 0°, but afterwards, when the angle of inclination is in a range of 90° to the critical angle of inclination, a clockwise rotational force acts, and the blocking member does not block the passage portion. Therefore, the contents are able to enter the passage portion before the angle of inclination reaches 90°, and by the contents applying impact to the opening member and causing the passing movement portion to rotate, discharge of the contents is possible. However, when, while the angle of inclination is the critical angle of inclination, the contents apply impact to the passing movement portion, and the passing movement portion further rotates counterclockwise, case 7-3(d) in which the angle of inclination is 180° or an angle close to 180° is reached, and here, since the center of gravity is positioned at the upper right side about the origin, a clockwise rotational force acts on the passing movement portion. Therefore, since only gravity acts as an external force on the passing movement portion immediately after the contents are discharged, the passing movement portion immediately rotates clockwise. Such a result is the same as in FIG. 5E, and in the case where the passage portion is opened immediately after the preceding contents are discharged, and the succeeding contents enter while positioned with a significant gap from the preceding contents, the succeeding contents are additionally discharged after the preceding contents. Therefore, 7-3 shows a mechanism in which an error may occur in one discharge of a fixed quantity.

[0089] In case 7-4, while the angle of inclination is 0°, the center of gravity is positioned in the fourth quadrant. In this case, since, until the angle of inclination reaches the critical angle of inclination from 0°, the center of gravity of the passing movement portion is positioned at the right side of the origin, and a clockwise rotational force acts, the blocking member does not block the passage portion, and the contents may enter the passage portion

and apply impact to the opening member.

[0090] When, while the angle of inclination is the critical angle of inclination, the contents apply impact to the passing movement portion, and the passing movement portion further rotates counterclockwise, case 7-4(d) in which the angle of inclination is 180° or an angle close to 180° is reached (see 7-4(d)). Here, the center of gravity of the passing movement portion is positioned in the second quadrant, and a counterclockwise rotational force acts. Therefore, even in a state in which impact is not applied to the passing movement portion due to discharge of the preceding contents, for the blocking member to block the passage portion, the counterclockwise rotational force is maintained while the succeeding contents approach the blocking member. When the succeeding contents collide with the blocking member, the succeeding contents act as a stopper, and thus discharge of a fixed quantity is possible without continuous discharge of pieces of contents.

[0091] Therefore, it can be seen that, in the case where the center of gravity of the passing movement portion is positioned in the fourth quadrant about the rotating shaft which is the origin, discharge of a fixed quantity is possible without error just by the discharge device being tilted.

[0092] Hereinafter, case 7-4 (the case where an angle relative to the right horizontal axis of the concentric circles exceeds -90° and is less than 0°) will be reviewed in more detail with reference to FIG. 8.

[0093] FIG. 8 is a view schematically illustrating rotation of the passing movement portion, focusing on the rotating shaft (origin) and the center of gravity (green point), and cases of FIG. 8 have the same mechanism as in case 7-4.

[0094] FIG. 8A illustrates a case where, while the angle of inclination is 0° and the storage container stands upright, the center of gravity of the passing movement portion 123 is positioned at angle a (°) relative to the horizontal plane (x) when the rotating shaft 125 is the origin. $-90°<a<0°$ is satisfied. That is, the center of gravity of the passing movement portion should be positioned in the fourth quadrant.

[0095] FIG. 8B schematically illustrates a state in which the angle of inclination is 90°, and FIG. 8C schematically illustrates a state in which the angle of inclination is a critical angle of inclination C (for example, 130°).

[0096] In FIG. 8B, an angle of the center of gravity relative to the horizontal plane is (90+a)°, and in FIG. 8C, an angle of the center of gravity relative to the horizontal plane is (C+a)°. C is the critical angle of inclination where the contents begin to be discharged, and indicates a degree to which the storage container is tilted when the contents begin to apply impact to the opening member, relative to the state of FIG. 8A in which the storage container stands upright. Preferably, C may be greater than 90° and less than 145°.

[0097] In FIG. 8B, for the blocking member to not block the passage portion and the contents to be able to enter the passage portion, the passing movement portion should be able to receive torque causing clockwise rotation. Therefore, since $0°<(a+90)°<90°$ should be satisfied, $-90°<a<0°$ is satisfied.

[0098] While the angle of inclination is the critical angle of inclination as in FIG. 8C, for the contents to be able to enter the passage portion, the passing movement portion should be maintained to receive torque causing clockwise rotation. Therefore, when the fixed portion is rotated by the critical angle of inclination, the center of gravity of the passing movement portion should be positioned in the first or fourth quadrant.

[0099] However, since $90°<C<180°$, $0°<(a+C)°<180°$. Since $90°<C<180°$, and $-90°<a<0°$, (a+C)° is not able to be in the fourth quadrant and is in the first quadrant.

[0100] Therefore, since $0°<(a+C)°<90°$, $-C<a<(90-C)°$ and $-90°<a<0°$ should be simultaneously satisfied. For example, when C is 130°, since $-130°<a<-40°$ and $-90°<a<0°$ should be simultaneously satisfied, $-90°<a<-40°$ should be satisfied.

[0101] To generalize, $-90°<a<(90-C)°$, and here, $90°<C<180°$.

[0102] While the angle of inclination is the critical angle of inclination, when the contents collide with the opening member and apply impact thereto, the passing movement portion further rotates counterclockwise, and the maximum angle of rotation M of the passing movement portion in this case may be in a range of 100° to 180° relative to the angle of inclination of 0° which is the reference. M is the maximum angle at which, when the contents apply impact to the opening member, the passing movement portion rotates due to the impact. The maximum angle is based on the horizontal axis in the state in which the storage container stands upright.

[0103] In FIG. 8D, preferably, $110°<M\leq180°$ may be satisfied, and the angle of rotation of the center of gravity may satisfy $20°<(a+M)°<180°$. Even in the case where the preceding contents and the succeeding contents are positioned with a large distance therebetween, in order to block continuous discharge of the pieces of contents, the passing movement portion should stay at its position without returning to its original position immediately after the preceding contents are discharged. Therefore, the center of gravity should be positioned at the left side of the origin for torque causing counterclockwise rotation to be generated. To this end, $90°<(a+M)°<180°$ should be satisfied.

[0104] To sum up, $-90°<a<(90-C)°$, and here, $90°<C<180°$.

[0105] Also, $90°<(a+M)°<180°$ should be satisfied at the same time.

[0106] Since $(90-M)°<a<(180-M)°$ should be satisfied, but $C<M$ and $100°<M\leq180°$ should also be satisfied, $(90-M)°<a<(90-C)°$. For example, when C is 120° and M is 170°, $-80°<a<-30°$.

[0107] For example, in a case where M is 130° and C is 100°, $-40°<a<-10°$. When this is shown in a general expression, $(90-M)°<a<0°$, and $C<M=<180°$.

[0108] FIG. 9 illustrates an exemplary embodiment of the present invention, and an axis that is a basis of angle calculation is the x-axis. In FIG. 7, C is 130° and M is 175°. Therefore, (90-175)<a<(90-130), and -85<a<-40, and in FIG. 9A, a is confirmed to be -75°, which is within the range that satisfies the conditions of the present invention. The resulting actions will be described in detail.

[0109] In FIG. 9A, the center of gravity is indicated with a point and is disposed at a position that is 15° relative to the vertical line of the rotating shaft 125 (one-dot chain line). Specifically, since the center of gravity is positioned to be -75° relative to the reference axis (x), a is -75°. Here, the discharge device and the passing movement portion have an angle of 0° relative to the reference axis, and the opening member 124 has an angle of 5° relative to the reference axis. The opening member is positioned at an angle of 5° relative to the x-axis, and the angle of inclination in this case is 0°.

[0110] FIG. 9B illustrates a lateral cross-section of the discharge device and the passing movement portion that are inclined at the critical angle of inclination. Here, the critical angle of inclination C is 130°.

[0111] In FIG. 9B, the critical angle of inclination is 130°, and the center of gravity is positioned at an angle of ((a+130)=(-75+130)=55°), and thus a clockwise rotational force acts on the passing movement portion, and the blocking member keeps the passage portion open.

[0112] In FIG. 9C, the contents push the opening member, the passing movement portion rotates about the rotating shaft, and the contents are discharged. In this state, due to impact applied to the opening member by the contents, the passing movement portion is further rotated counterclockwise and is rotated to have an angle of 175° relative to the reference axis. Here, the center of gravity of the passing movement portion is at an angle of ((a+175)=(-75+175)=100°) and is positioned in the second quadrant, and thus the passing movement portion receives torque causing counterclockwise rotation. Therefore, even after the contents are discharged, the passing movement portion maintains its position instead of returning to its original position immediately.

[0113] That is, even when the preceding contents are discharged, and impact caused by the contents is not being applied to the opening member, the passing movement portion does not return to its original state, and the blocking member keeps the passage portion blocked. Therefore, it is possible to block unwanted discharge of contents immediately after the discharge of the preceding contents.

[0114] FIG. 9D illustrates a state in which the succeeding contents move toward the blocking member, apply impact to the blocking member from a rear surface thereof, and act as a stopper while the passing movement portion does not return to its original state due to torque even after the preceding contents are discharged.

[0115] In this way, due to the structure illustrated in FIG. 9, continuous discharge of pieces of contents is prevented to ensure discharge of a fixed quantity.

[0116] The shapes and angles of an equilibrium portion 123b, the opening member 124, and the blocking member 127 of the passing movement portion 123 may be designed to appropriately set the position of the center of gravity.

[0117] The present invention has been described above with reference to the embodiments illustrated in the drawings, but the embodiments are only illustrative, and those of ordinary skill in the art should understand that various modifications and other equivalent embodiments are possible therefrom. Therefore, the true technical protection scope of the present invention should be defined by the claims below.

[0118] According to the present invention, the amount of contents discharged from an accommodating device is accurately detected, and based on the detection, a user is able to take a fixed quantity of medicine.

[0119] Hereinafter, the detector of the discharge device according to an embodiment of the present invention will be described in detail with reference to FIG. 6 and FIGS. 10 to 17. The detector may be installed in the discharge device or storage container of the embodiment of the present invention.

[0120] Referring to FIG. 10, the discharge device has a duct-type passage portion configured to form a movement path for discharging a fixed quantity of contents and the passage portion includes the sidewall 170 and the passing movement portion 123. The sidewall 170 disposed at both side surfaces of the passing movement portion 123 is fixed and coupled to a bottom portion of the fixing member 121 or integrally formed with the bottom portion of the fixing member.

[0121] One or more detectors may be disposed in the passage portion, and the detector may include a light receiver and a light emitter.

[0122] In FIG. 10, a single detector is installed at a support portion which is formed at the fixed portion and positioned outside the passage portion. Referring to FIG. 10, the detector includes a pair of a light emitter 410 and a light receiver 420, light radiated from the light emitter may pass through a path along which contents move in order to be discharged and may be detected by the light receiver, and whether the contents have been discharged may be determined based on a quantity of the detected light. The pair of the light emitter 410 and the light receiver 420 are disposed to face each other with the passage portion disposed therebetween at outer sides of the sidewalls disposed at both side surfaces of the passing movement portion. In the state in which the angle of inclination is 0° and the discharge device stands upright, the light emitter 410 and the light receiver 420 are disposed to allow light radiated from the light emitter 410 to pass through the passage between the opening member and the blocking member. Due to such arrangement, whether the contents have been discharged may be accurately detected.

[0123] More specifically, the light receiver 410 and the light emitter 420 are disposed to face each other on both

sidewalls formed at the left and right sides of the passing movement portion, and while the angle of inclination is 0°, the light emitter 410 and the light receiver 420 are disposed adjacent to each other under the opening member.

[0124] A case where a plurality of detectors are disposed will be described with reference to FIG. 6 and FIGS. 11 to 13.

[0125] Referring to FIG. 6, two pairs of detectors are disposed in the discharge device. The two light emitters 411 and 412 and a light receiver may be disposed to face each other with the passage portion disposed therebetween at both side surfaces of the passing movement portion, and light emitted from the light emitters may pass through a path along which contents move in order to be discharged and may be detected by the light receiver. The two detectors are disposed so that, while the angle of inclination is 0° and the discharge device stands upright, light radiated from the light emitter 410 passes through the passage portion between the opening member and the blocking member. In the state in which the angle of inclination is the critical angle of inclination, the contents apply a stroke to the opening member, and the passing movement portion is maximally rotated, at least one of the two detectors may be disposed to be positioned more downstream from the passage portion than the rotated blocking member.

[0126] A configuration in which three detectors are disposed in the passage portion will be described in detail with reference to FIGS. 11 to 13. Three light emitters 411, 412, and 413 and a light receiver disposed to face the three light emitters 411, 412, and 413 are disposed to face each other with the passage portion disposed therebetween at both sides of the passing movement portion, and light radiated from the light emitters passes through a path along which contents move in order to be discharged and is detected by the light receiver.

[0127] The three detectors including the light emitters and the light receiver are linearly disposed from an upstream side to a downstream side in a direction in which contents move through the passage portion. The arrangement is the same even when more than three detectors are present. The three detectors are disposed so that, while the angle of inclination is 0° and the discharge device stands upright, light radiated from the light emitters 411, 412, and 413 passes through the passage portion between the opening member and the blocking member. Therefore, while the angle of inclination is 0° and the discharge device stands upright, the three detectors are disposed between the opening member and the blocking member, that is, between a downstream side of the blocking member and an upstream side of the opening member. Alternatively, at least one of the plurality of detectors is disposed between the downstream side of the blocking member and the upstream side of the opening member.

[0128] In the state in which the angle of inclination is the critical angle of inclination, the contents apply a stroke to the opening member, and the passing movement portion is maximally rotated, at least one of the plurality of detectors is disposed to be positioned more downstream from the passage portion than the blocking member.

[0129] A detector according to another embodiment of the present invention will be described with reference to FIGS. 14 to 17 (in which illustration of contents stored in the container is omitted). The detector of FIGS. 14 to 17 may be applied to the discharge device of the present invention.

[0130] First, referring to FIGS. 14 and 15, a detector includes a first light emitter 411 disposed at an upstream side of the passage portion, a second light emitter 412 disposed at a downstream side of the passage portion, and a first light receiver 421 and a second light receiver 422 disposed to face the first and second light emitters, respectively. Alternatively, only one of the first light emitter and the second light emitter may be provided, and light radiated from a single light emitter may be diffused and detected by the first and second light receivers. Dotted lines in FIGS. 14 and 15 indicate a central path of light radiated to the first light receiver 411. In reality, light may be slightly diffused, spread about the dotted line, and detected by the first and second light receivers.

[0131] Referring to FIGS. 14 and 15, the first light emitter 411 disposed at the upstream side of the passage portion and the second light emitter 412 disposed at the downstream side of the passage portion are disposed between the upstream side of the opening member and the downstream side of the blocking member while the angle of inclination reaches the maximum angle of inclination from 0°. Therefore, while the contents pass, light of the light emitter is not interfered with by the passing movement portion. At least one of the first and second light emitters is disposed downstream from the blocking member and upstream from the opening member.

[0132] FIG. 14 is a view illustrating the arrangement relationship of the opening member 124, the blocking member 127, and the detector of the passing movement portion in the state in which the angle of inclination is 0° and the storage container having the discharge device according to an embodiment of the present invention installed therein stands upright. FIG. 15 is a view illustrating the arrangement relationship of the opening member 124, the blocking member 127, and the detector of the passing movement portion in the state in which the angle of inclination is the maximum and, while the storage container is tilted at the critical angle of inclination or more, the contents are discharged in a state in which the opening member 124 is open due to rotation of the passing movement portion 123.

[0133] Referring to FIG. 14, the first light receiver 421 disposed at an upstream side along the passage portion and the second light receiver 422 disposed at a downstream side have a wide light reception area. The first light receiver 421 and the second light receiver 422 are disposed downstream from the blocking member when the angle of inclination of the storage container (and the discharge device) is 0°. In other words, the first light re-

ceiver 421 and the second light receiver 422 are positioned higher than the blocking member while the angle of inclination of the storage container (and the discharge device) is 0°. While the angle of inclination is 0°, the second light receiver 422 at the downstream side is disposed at a height similar to the height of the opening member 124, but a portion of the second light receiver 422 is disposed higher than the opening member.

[0134] In the state of FIG. 15 in which the storage container is tilted, and the passing movement portion is rotated at the maximum angle of rotation due to the stroke applied by a pill, a portion of the first light receiver 421 at the upstream side is positioned at the same height as the blocking member. An upstream portion of the first light receiver 421 is blocked from the light from the light emitter by the blocking member, but a downstream portion of the first light receiver 421 is not blocked from the light from the light emitter. Meanwhile, referring to FIGS. 15 and 17, the storage container seems to be rotated 180°, but the angle is drawn as 180° only for convenience, and the critical angle may not be 180°.

[0135] In FIGS. 16 and 17, structures are mostly the same as in FIGS. 14 and 15 and are only partially different therefrom, and thus description of the same parts will be replaced with the above description of FIGS. 14 and 15, and only the differences will be additionally described.

[0136] In FIGS. 16 and 17, the size of contents is relatively smaller as compared to FIGS. 14 and 15, and thus the volume that the passing movement portion occupies in the passage portion is small. Therefore, a gap between the opening member 124 and the blocking member 127 of the passing movement portion 123 is relatively narrow. Referring to FIG. 17, in the state in which the storage container is tilted at the critical angle of inclination or more, and the passing movement portion is rotated at the maximum angle of rotation, a portion of the first light receiver 421 at the upstream side is positioned at the same height as the blocking member. A central portion of light radiated from the first light emitter 411 is blocked by the blocking member, and most of the light received by the first light receiver is blocked.

[0137] At the maximum angle of inclination, one of the plurality of detectors may be disposed to be positioned more downstream from the passage portion than the blocking member.

[0138] A medicine-taking management system including the storage container having the discharge device installed therein according to the embodiment of the present invention will be described with reference to FIG. 18.

[0139] The medicine-taking management system may include the storage container having the discharge device installed therein, a medicine-taking management server, and a user terminal. The user terminal is an information processor that includes a smartphone and is able to perform communication.

[0140] The discharge device may further include: a storing portion (memory) configured to store information of contents detected by the detector; a measuring portion configured to calculate an accumulated discharge amount of the contents for each period based on the information stored in the storing portion; and a communication portion configured to send the information of the contents detected by the detector, the information stored in the storing portion, or information calculated by a sensing controller of the detector to an external device through wired or wireless communication. Alternatively, the storing portion, the detector, and the communication portion may be mounted on the storage container coupled to the discharge device.

[0141] The communication portion may be able to perform wireless communication such as Bluetooth communication, Wi-Fi, 5G, and Zigbee.

[0142] A controller may send a signal to the user terminal through the communication portion, receive medicine-taking guide information from the user terminal, and control the medicine-taking guide information to be output through an output portion, and the output portion may be able to output text, images, or voice. The medicine-taking management server is an information processor that is able to perform communication and may be connected to the user terminal through a wireless network, generate medicine-taking guide information and send the medicine-taking guide information to the user terminal or the storage container, and may collect and process medicine-taking information of medicine accommodated in the storage container.

[Industrial Applicability]

[0143] The present invention is able to be used in the medicine storage container manufacturing industry and may also be used in medicine management and medicine-taking guide service, medicine-taking information collection and processing service industry, and the like.

Claims

1. A discharge device coupled to a storage container accommodating contents to discharge a fixed quantity of the contents, the discharge device comprising:

   a fixed portion configured to fix the discharge device to the storage container;
   a passage portion having an opening formed in a shape of a through-hole, through which the contents are discharged, at an upper end and configured to form a movement path for discharging the fixed quantity of the contents; and
   a passing movement portion rotatably installed at the fixed portion and configured to rotate for the contents to pass.
   wherein the passing movement portion includes an opening member configured to open or close the opening, a rotating shaft portion connected

to the opening member and having a rotating shaft that serves as a center of rotational movement, and a blocking member connected to the rotating shaft portion and configured to rotate together with the opening member,
while the storage container and the discharge device are tilted at a critical angle of inclination from an angle of inclination of 0° at which the storage container and the discharge device stand upright, a center of gravity of the passing movement portion is configured to be positioned relative to the rotating shaft for rotation of the passing movement portion to be suppressed, and
the critical angle of inclination is an angle of the storage container relative to the angle of inclination of 0° at which the contents come in contact with the opening member.

2. The discharge device of claim 1, wherein:

at least a portion of the passing movement portion is disposed to form one sidewall of the passage portion;
the opening member and the blocking member are formed to be bent so that, in a state in which the opening member closes the opening, the blocking member opens the passage portion;
when the storage container and the discharge device are tilted counterclockwise to have the critical angle of inclination from the angle of inclination of 0° at which the storage container and the discharge device stand upright, the contents enter the passage portion due to gravity, apply impact to the opening member, cause the passing movement portion to rotate, open the opening, and are discharged to the outside; and
in a state in which the storage container and the discharge device stand upright, the center of gravity of the passing movement portion is positioned between -90° and 0° relative to a horizontal axis having the rotating shaft as an origin.

3. The discharge device of claim 1 or 2, wherein:

in the state in which the angle of inclination is 0° and the storage container and the discharge device stand upright, the center of gravity of the passing movement portion is positioned in a fourth quadrant about the rotating shaft as the origin;
until the angle of inclination of the discharge device reaches the critical angle of inclination from 0°, the center of gravity of the passing movement portion is positioned in the fourth quadrant and a first quadrant about the origin, the rotation of the passing movement portion is suppressed, the blocking member does not block the passage portion, and the contents enter the passage portion and are able to apply impact to the opening member;
at the critical angle of inclination, the contents apply a stroke to the opening member, the passing movement portion further rotates counterclockwise, and the contents are able to be discharged in a state in which the passing movement portion is maximally rotated without further tilting of the discharge device; and
in the state in which the passing movement portion is maximally rotated, the center of gravity of the passing movement portion is positioned in a second quadrant.

4. The discharge device of any one of claims 1 to 3, wherein:

$$(90-M)<a<(90-C)$$

where a is an angle at which the center of gravity of the passing movement portion is positioned relative to a horizontal axis of a plane orthogonal to the rotating shaft in the state in which the angle of inclination is 0° and the discharge device stands upright, C is the critical angle of inclination of the passing movement portion, and M is a maximum angle at which, when the contents apply impact to the opening member, the passing movement portion rotates due to the impact; and

$$C<M.$$

5. The discharge device of any one of claims 1 to 4, further comprising a guide passage connected to the passage portion to guide the contents,

wherein, due to tilting of the storage container, the contents move along the guide passage, enter the passage portion, and then are discharged to the outside through the opening,
the fixed portion includes a fixing member fixed and coupled to a neck portion of the storage container, and
the fixing member blocks an opening of the neck portion, and the opening is formed to pass through one region of the fixing member.

6. The discharge device of any one of claims 1 to 5, further comprising one or more detectors disposed in the passage portion and including a light emitter and a light receiver,

wherein the light emitter and the light receiver are disposed to face each other with the passage portion disposed therebetween at both

sides of the passing movement portion so that light radiated from the light emitter passes through a path along which the contents move in order to be discharged and is detected by the light receiver, and
at least one of the one or more detectors is disposed at a height between a lower portion of the opening member and the blocking member while the angle of inclination is 0° or the critical angle of inclination.

7. The discharge device of any one of claims 1 to 6, wherein:

the plurality of detectors including the light emitter and the light receiver are linearly disposed from an upstream side to a downstream side in a direction in which the contents move through the passage portion; and
at the maximum angle of inclination, at least one of the plurality of detectors is disposed to be positioned more downstream from the passage portion than the blocking member.

8. The discharge device of any one of claims 1 to 7, wherein:

the detector further includes a sensing controller configured to process an optical signal detected by the light receiver, a communication module configured to perform wireless communication with an external device, a clock, and a storing portion;
the sensing controller sends the processed signal to the external device through the communication module; and
the storing portion stores the signal processed by the sensing controller.

9. A storage container including a container main body configured to accommodate contents and a neck portion, the storage container comprising the discharge device of any one of claims 1 to 8 that is configured to be coupled to the container main body or the neck portion,

wherein the contents accommodated in the container main body move along the passage portion as the storage container is tilted, and
when the angle of inclination of the storage container becomes the critical angle of inclination or more, a fixed quantity of the contents is discharged by the discharge device.

10. A content management system comprising:

a storage container having the discharge device of any one of claims 1 to 8 installed therein;
a content management server; and
a user terminal,
wherein the storage container includes a control module, a communication module configured to perform wireless communication with an external device, a clock, and a storing portion, and
the control module is able to communicate with the user terminal or the external device through the communication module.

11. A medicine-taking management device comprising:

a storage container having the discharge device of any one of claims 1 to 8 installed therein;
a medicine-taking management server; and
a user terminal,
wherein the user terminal includes a communication portion configured to perform wireless communication with the storage container and the medicine-taking management server, an output portion, and a controller configured to receive medicine-taking state information from the detector of the discharge device, receive medicine-taking schedule information from the medicine-taking management server, generate medicine-taking management information relating to a user by using the medicine-taking schedule information and the medicine-taking state information, and output the medicine-taking management information to the output portion, and
the output portion outputs the medicine-taking management information using text, images, or voice.

12. A discharge device for discharging a fixed quantity of contents that is to be coupled to a container main body accommodating the contents, the discharge device comprising:

a fixed portion configured to fix the discharge device to the container main body and guide movement of the contents; and
a passing movement portion rotatably installed at the fixed portion to move for the contents to pass,
wherein the fixed portion has a duct-type passage portion configured to form a movement path for discharging the fixed quantity of the contents, and an opening is formed at an upper end of the passage portion,
the passing movement portion includes an opening member configured to open or close the opening, a rotating shaft portion having a rotating shaft that serves as a center of rotational movement, and a blocking member connected to the rotating shaft portion to rotate together with the opening member,
in a state in which an angle of inclination is 0°

and the container main body and the discharge device stand upright, a center of gravity of the passing movement portion is positioned in a fourth quadrant, and the fourth quadrant is defined based on a horizontal axis, which has a center of the rotating shaft as an origin and belongs to a plane orthogonal to the rotating shaft and including the origin, and the origin,
by the container main body being tilted counterclockwise from the angle of inclination of 0° by a user, the contents move along the passage portion, pass through the opening, and are discharged,
until the angle of inclination reaches the critical angle of inclination from 0°, the center of gravity of the passing movement portion is positioned in the fourth quadrant and the first quadrant about the origin, a clockwise rotational force acts, the blocking member does not block the passage portion, and the contents enter the passage portion and apply impact to the opening member,
at the critical angle of inclination, the contents apply a stroke to the opening member, the passing movement portion further rotates counterclockwise, and the contents are able to be discharged in the state in which the passing movement portion is maximally rotated without further tilting of the container main body,
in the state in which the passing movement portion is maximally rotated, the center of gravity of the passing movement portion is positioned in the second quadrant, a counterclockwise rotational force acts, and even in a state in which the contents are discharged and thus impact is not applied to the passing movement portion, the counterclockwise rotational force is maintained for the blocking member to block the passage portion, and
the critical angle of inclination is an angle of the discharge device relative to the state in which the container main body and the discharge device stand upright at which the contents come in contact with the opening member.

13. The discharge device of claim 12, further comprising a guide passage connected to the passage portion to guide the contents,

wherein the contents move along the guide passage, enter the passage portion, and then are discharged to the outside through the opening, and
the passing movement portion is disposed to form one sidewall of the passage portion.

14. The discharge device of claim 12 or 13, further comprising one or more detectors including a light emitter and a light receiver,

wherein the light emitter and the light receiver are disposed to face each other with the movement path of the contents disposed therebetween at both sides of the passing movement portion, and light radiated from the light emitter passes through the movement path for discharging the contents and is detected by the light receiver, and
the one or more detectors are disposed so that, while the angle of inclination is 0°, the light radiated from the light emitter passes through the passage portion between a lower portion of the opening member and an upper portion of the blocking member.

15. A storage container including a container main body, which accommodates contents, and a neck portion, the storage container comprising the discharge device of any one of claims 12 to 14 that is configured to be coupled to the container main body or the neck portion,

wherein the contents accommodated in the container main body move along the passage portion as the storage container is tilted,
until the angle of inclination of the storage container reaches the critical angle of inclination, rotation of the passing movement portion of the discharge device is suppressed, and
when the angle of inclination of the storage container becomes the critical angle of inclination or more, the passing movement portion of the discharge device rotates, and a fixed quantity of the contents is discharged.

Fig. 1

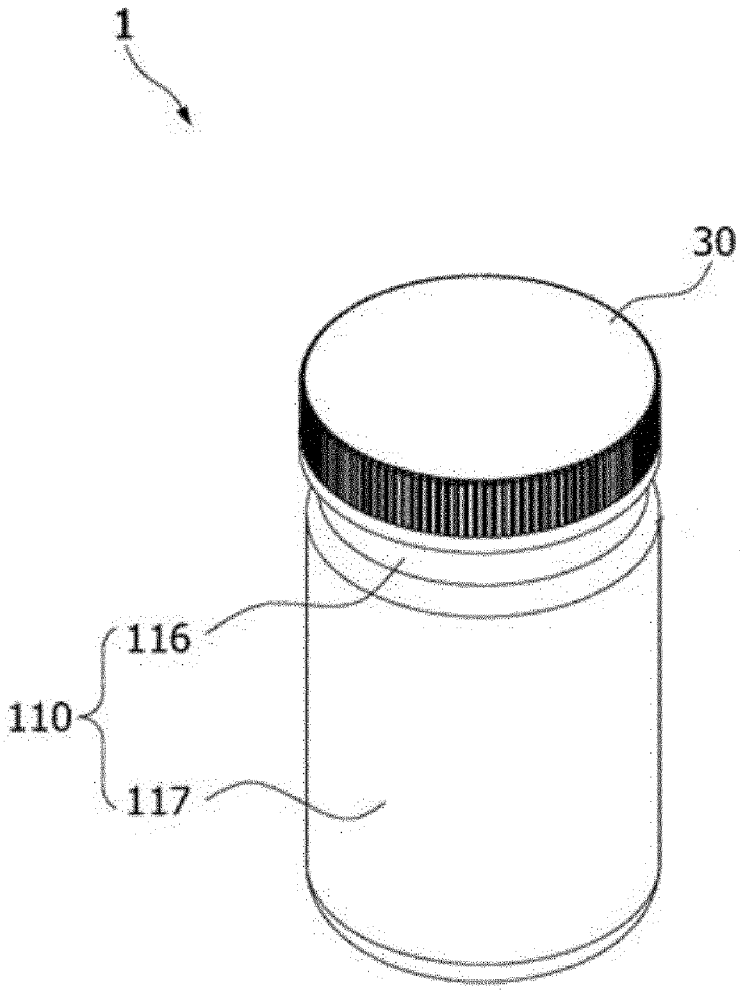
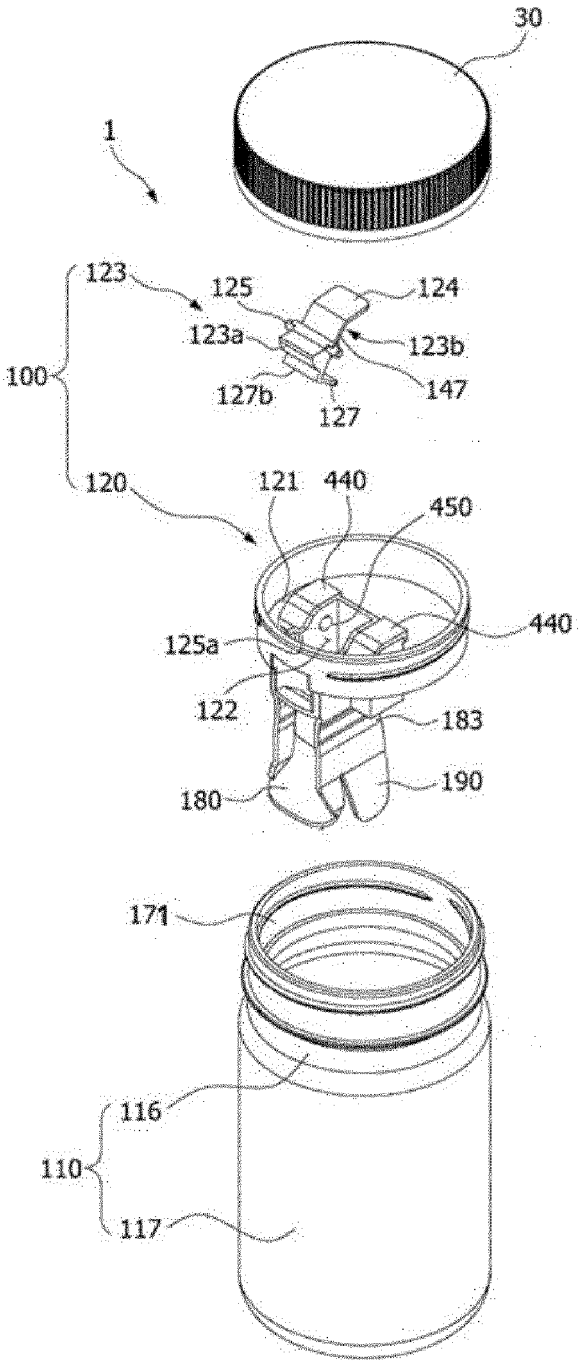


Fig. 2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123a
123b
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127b
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450
125a
440
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183
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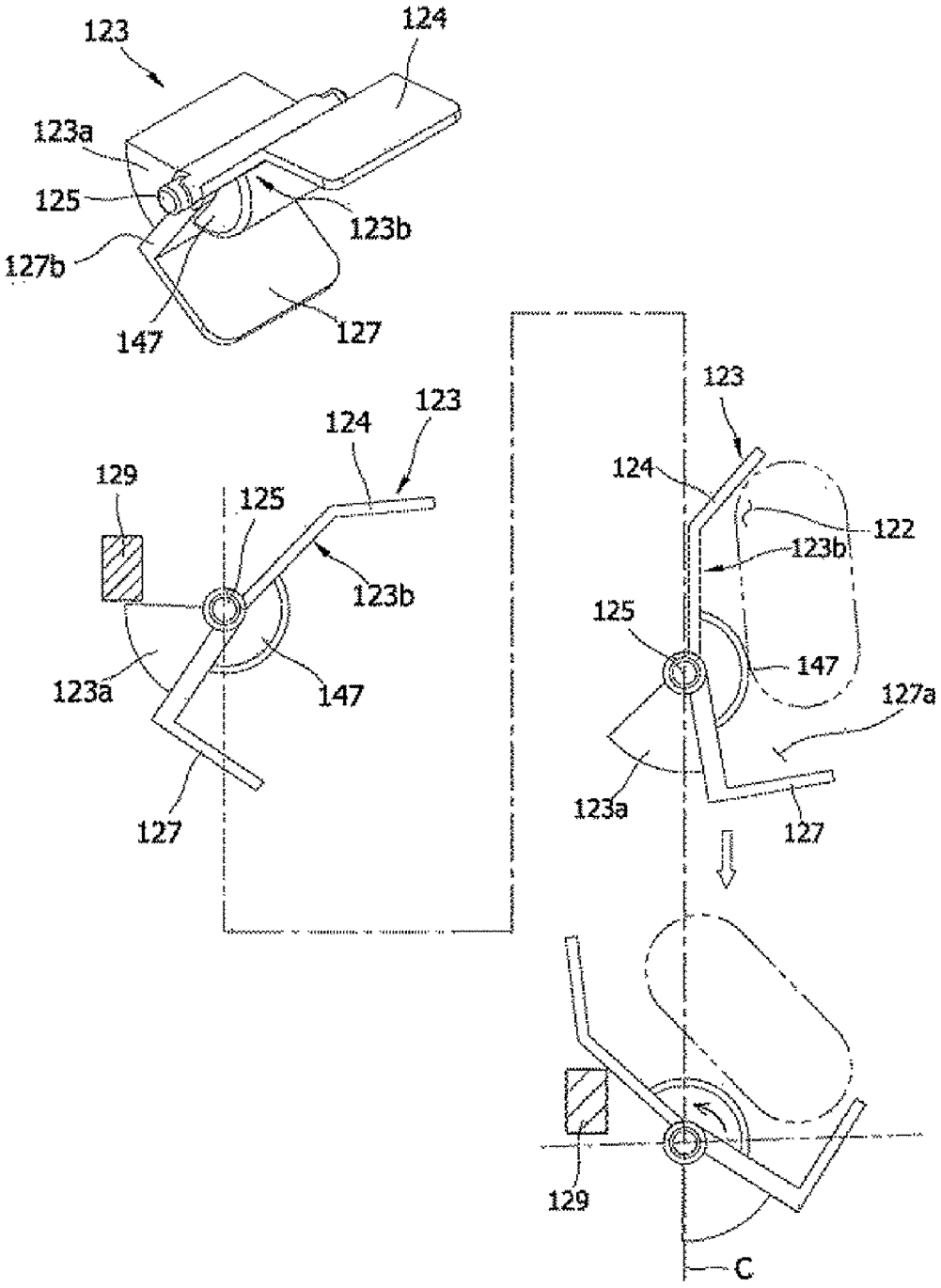
190
171
116
110
117

Fig. 3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123b
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147
127a
123a
127
129
C

Fig. 4

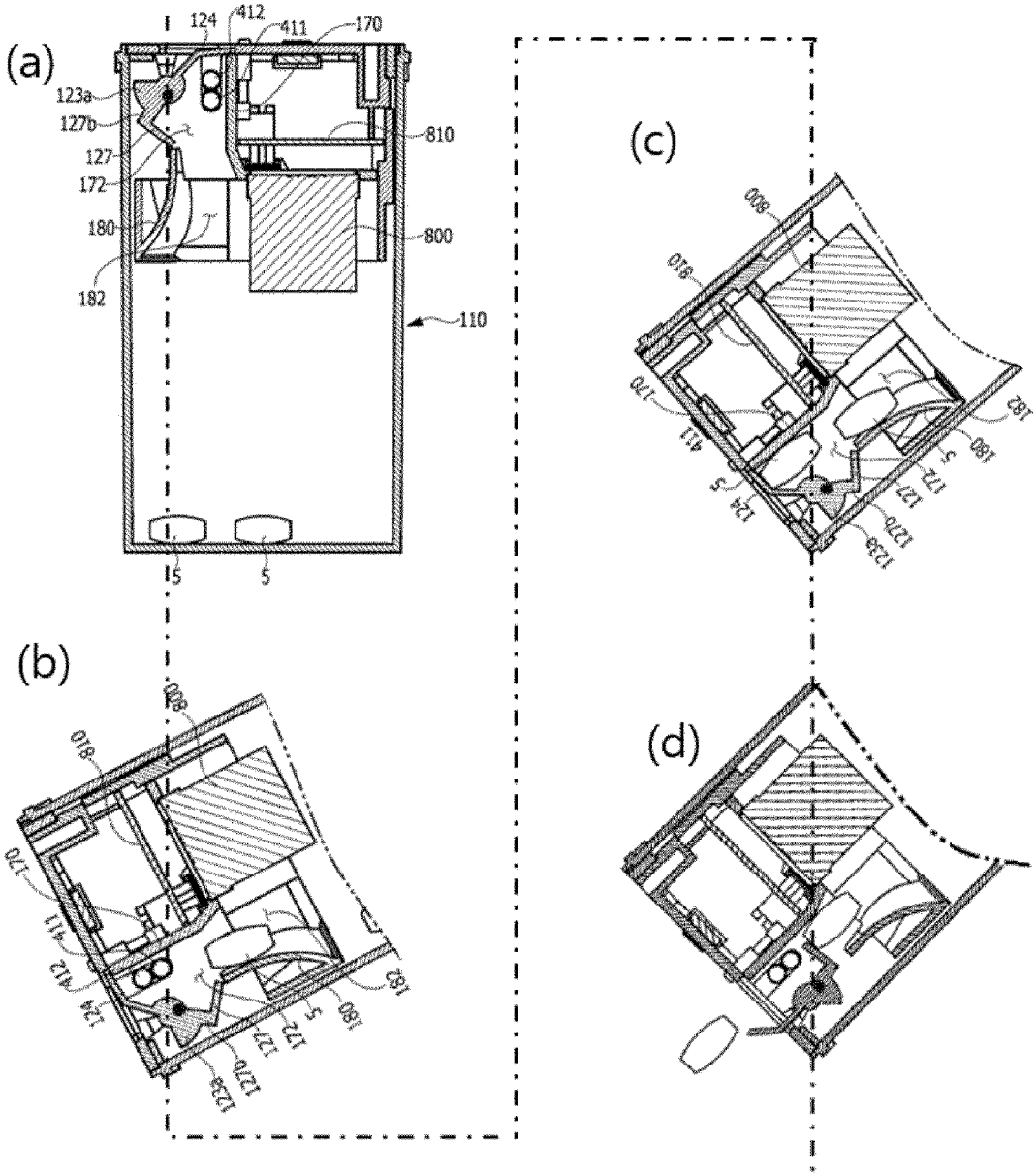


Fig. 5

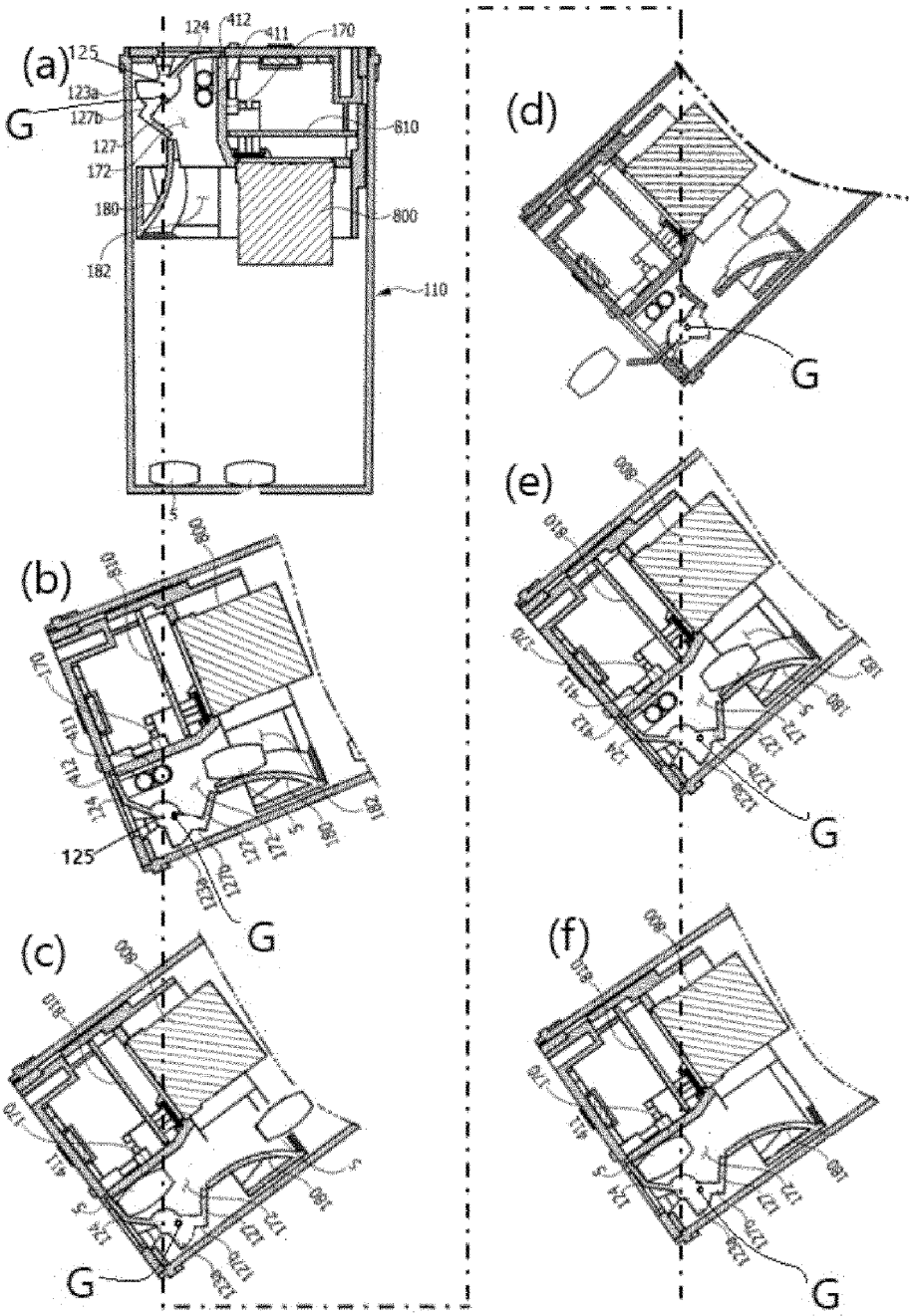
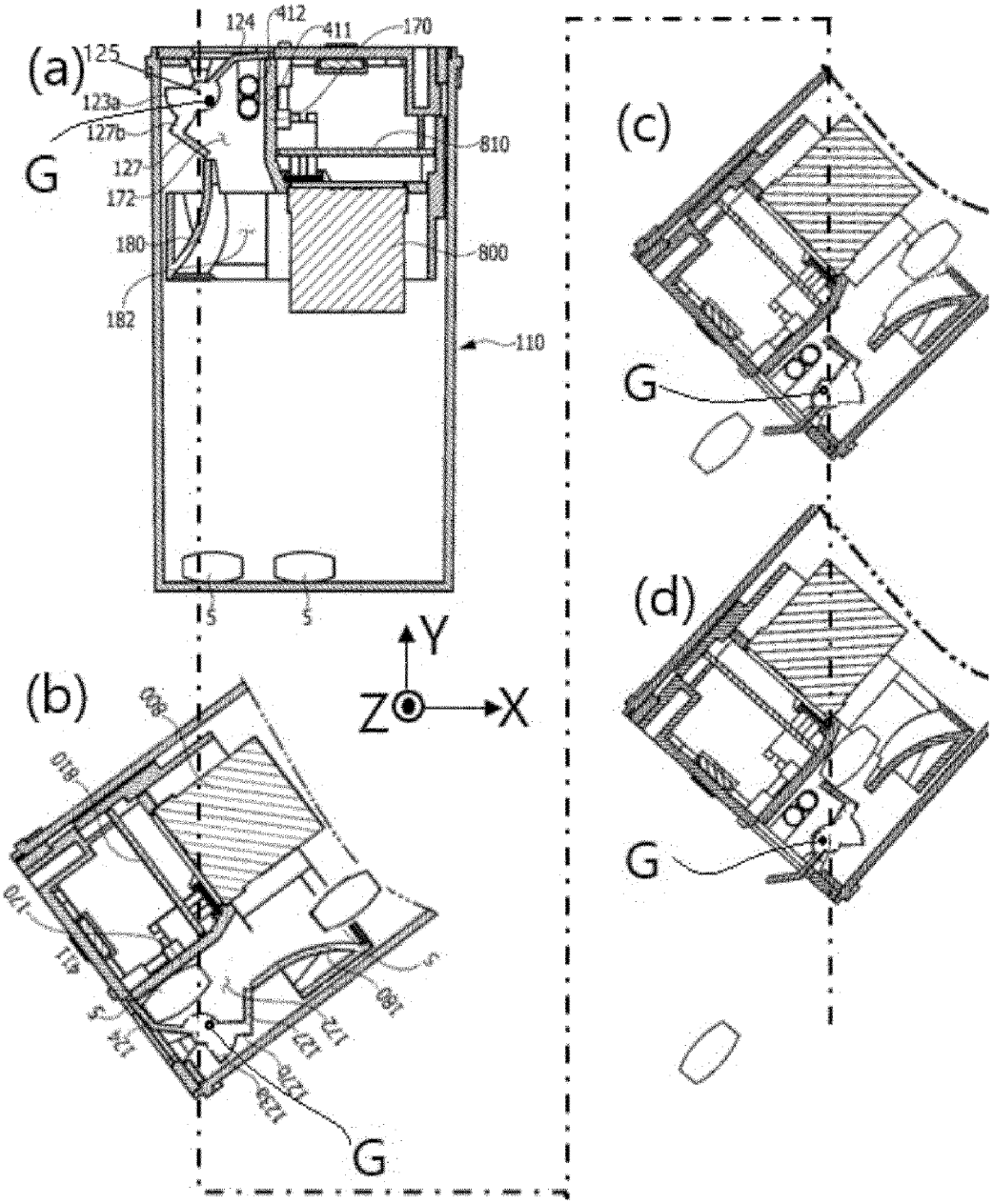

(a)
(b)
(c)
(d)
(e)
(f)
G
125
123a
127b
127
172
180
182
124
412
411
170
810
800
110

Fig. 6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X
(b)
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127b
G
(c)
G
(d)
G

Fig. 7

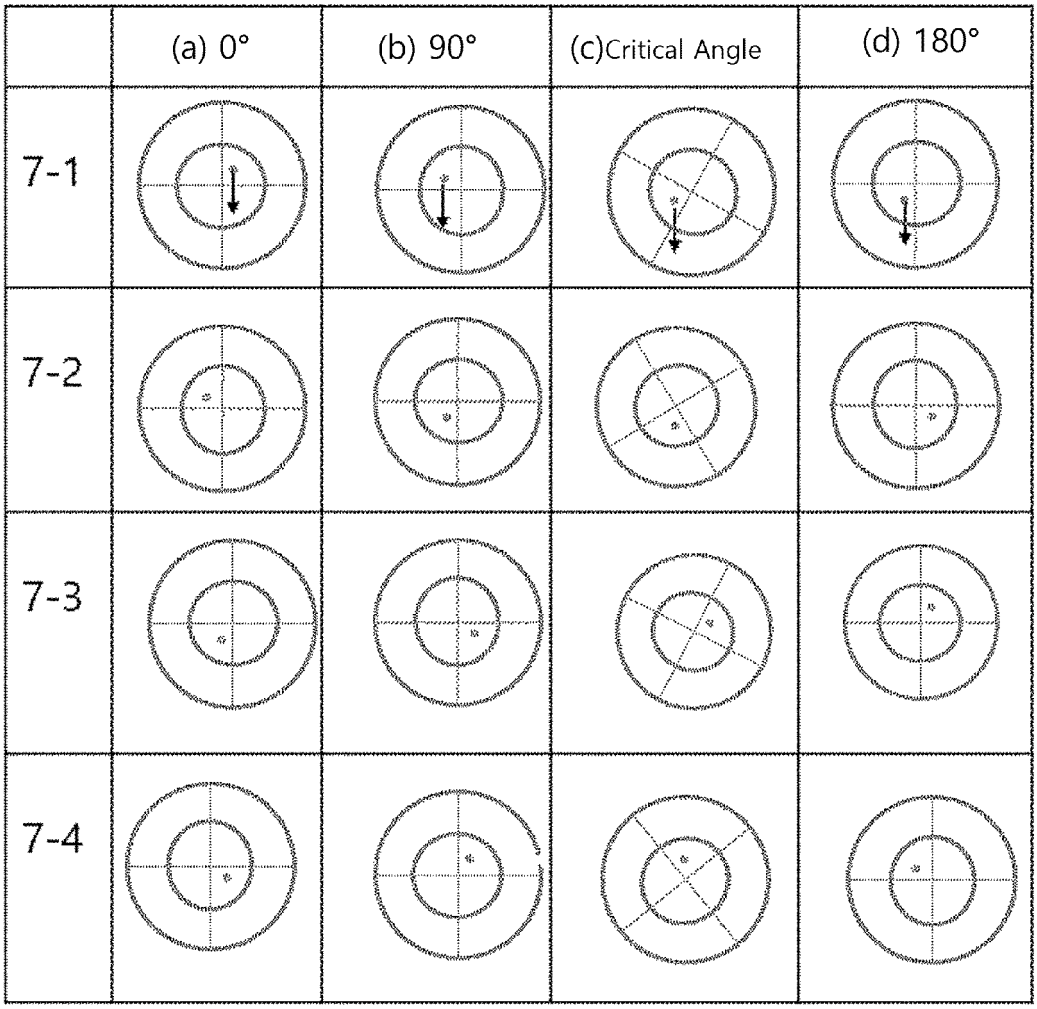


Fig. 8

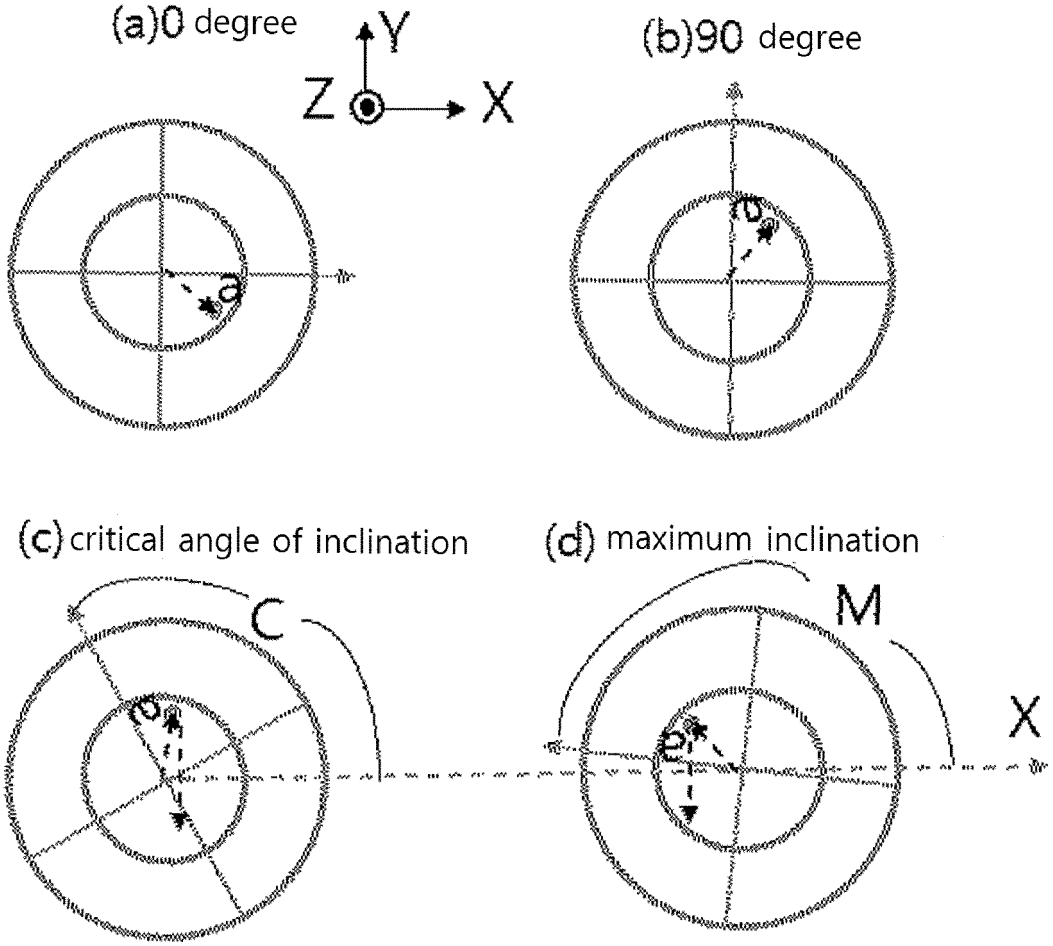

(a)0 degree
Y
Z
X
(b)90 degree
(c) critical angle of inclination
(d) maximum inclination
C
M
X

Fig. 9

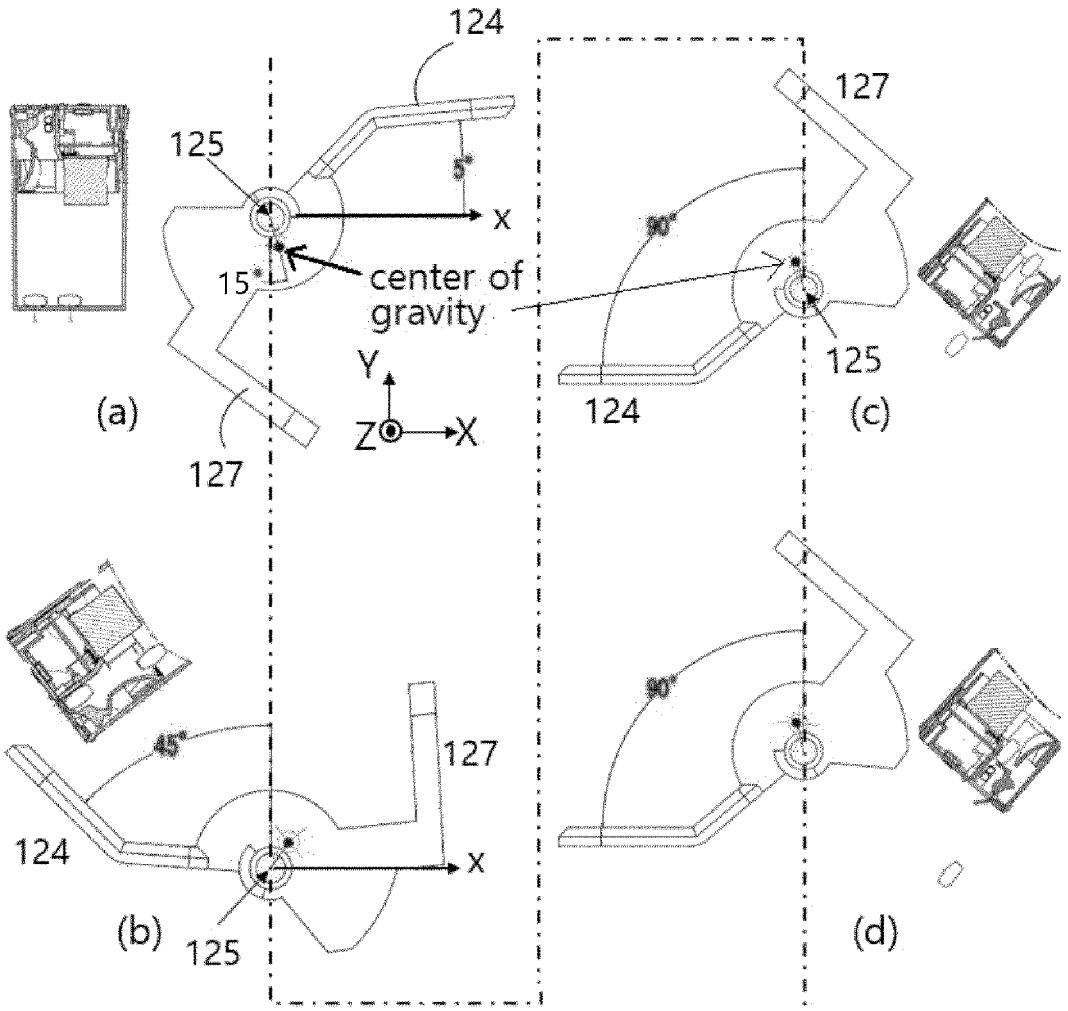

124
125
5°
x
15°
center of gravity
127
(a)
Y
Z
X
90°
125
124
(c)
45°
127
124
x
(b)
125
90°
(d)

Fig. 10

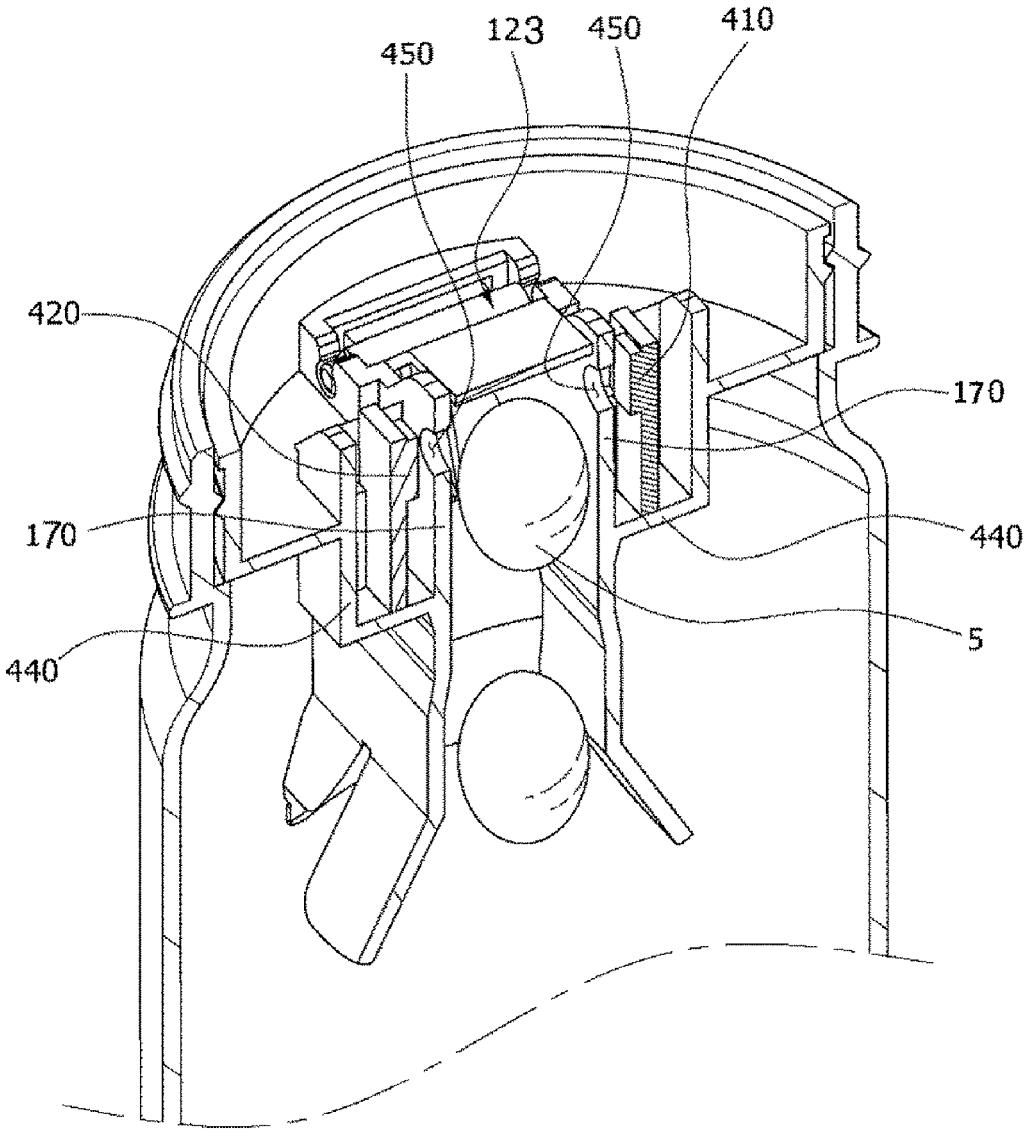


Fig. 11

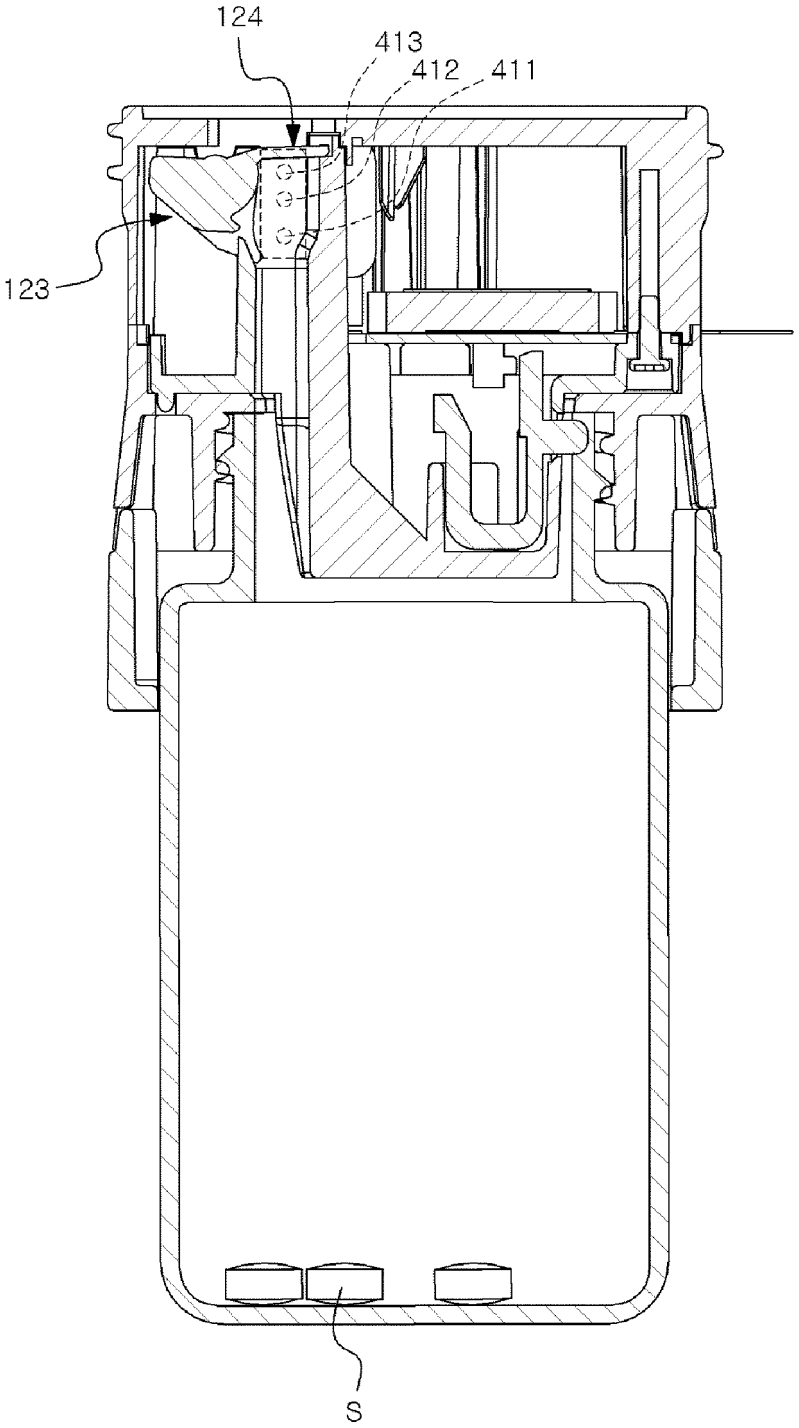


Fig. 12

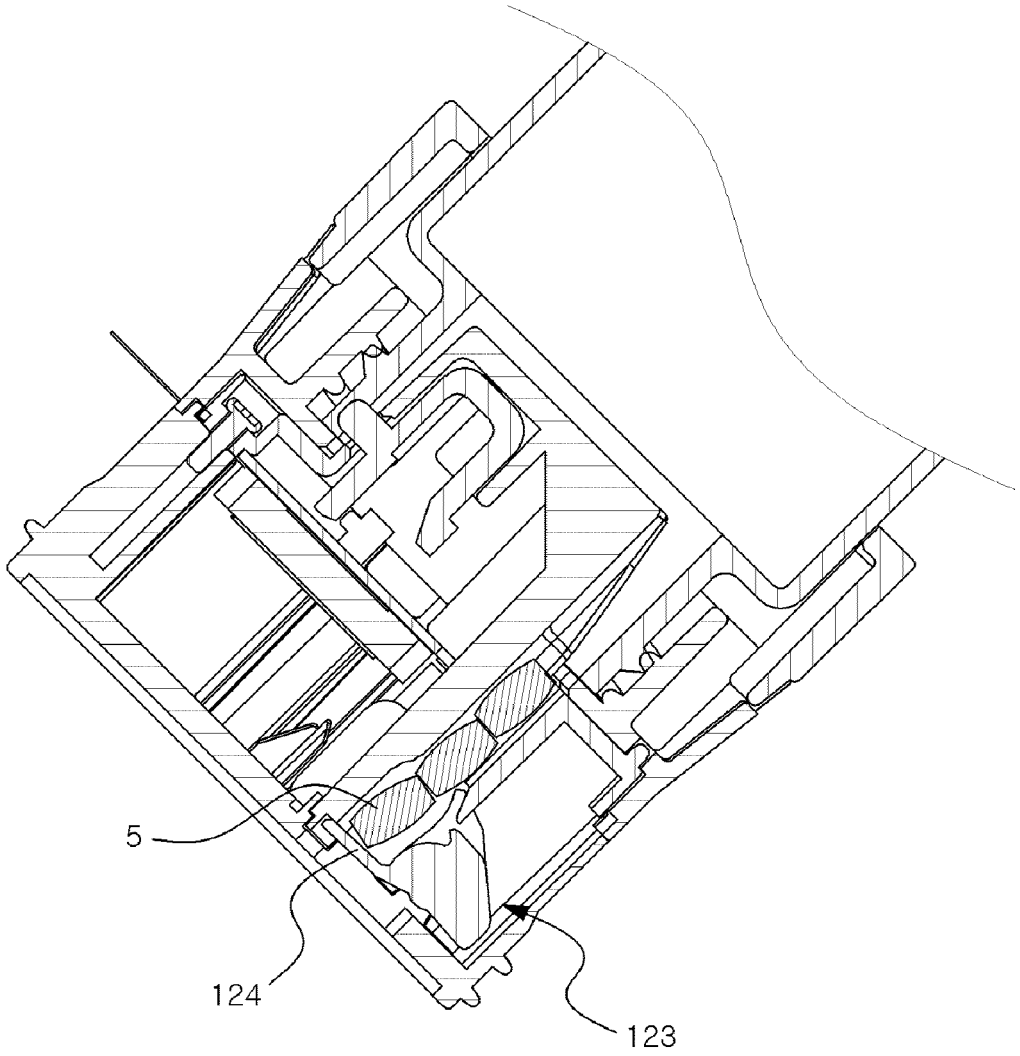


Fig. 13

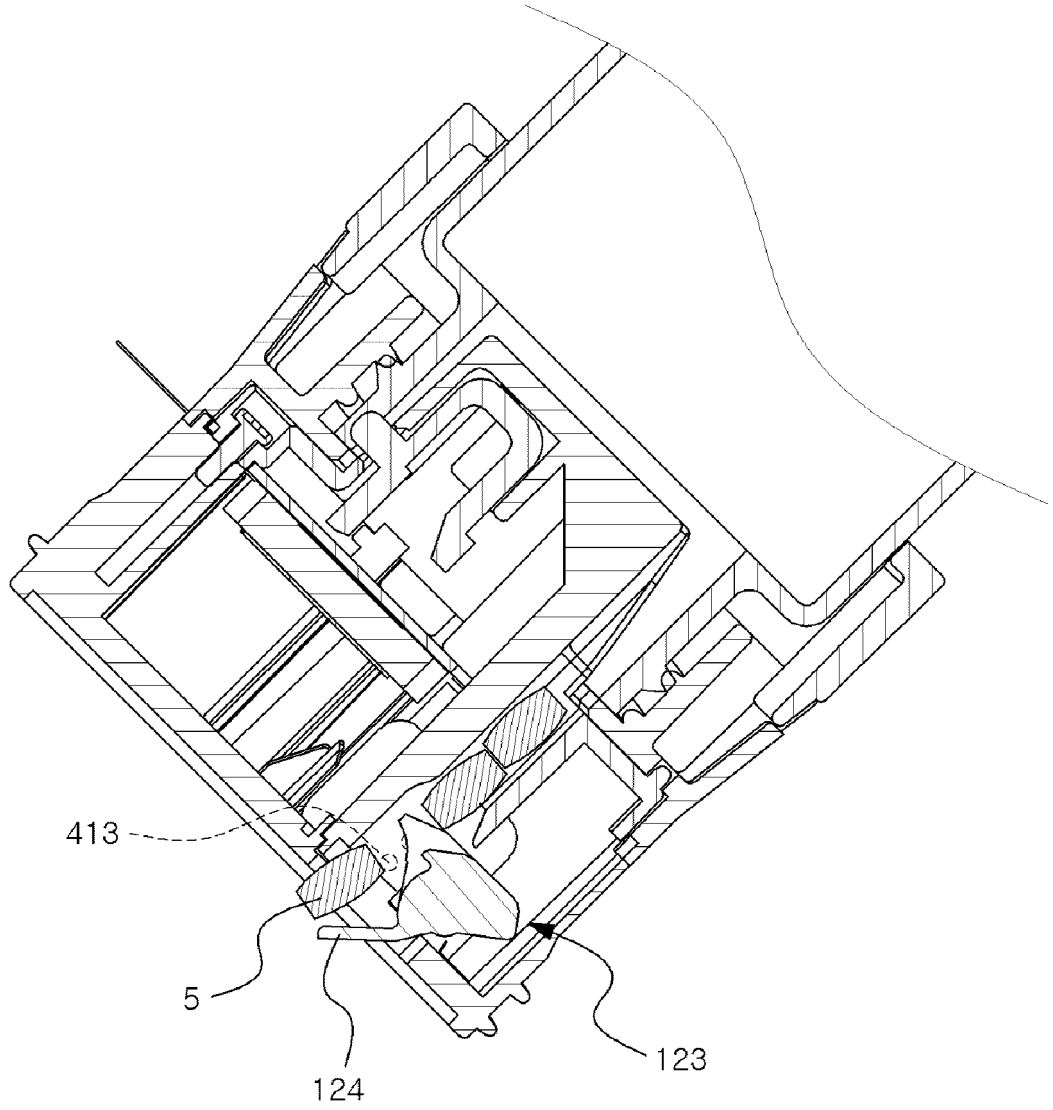


Fig. 14

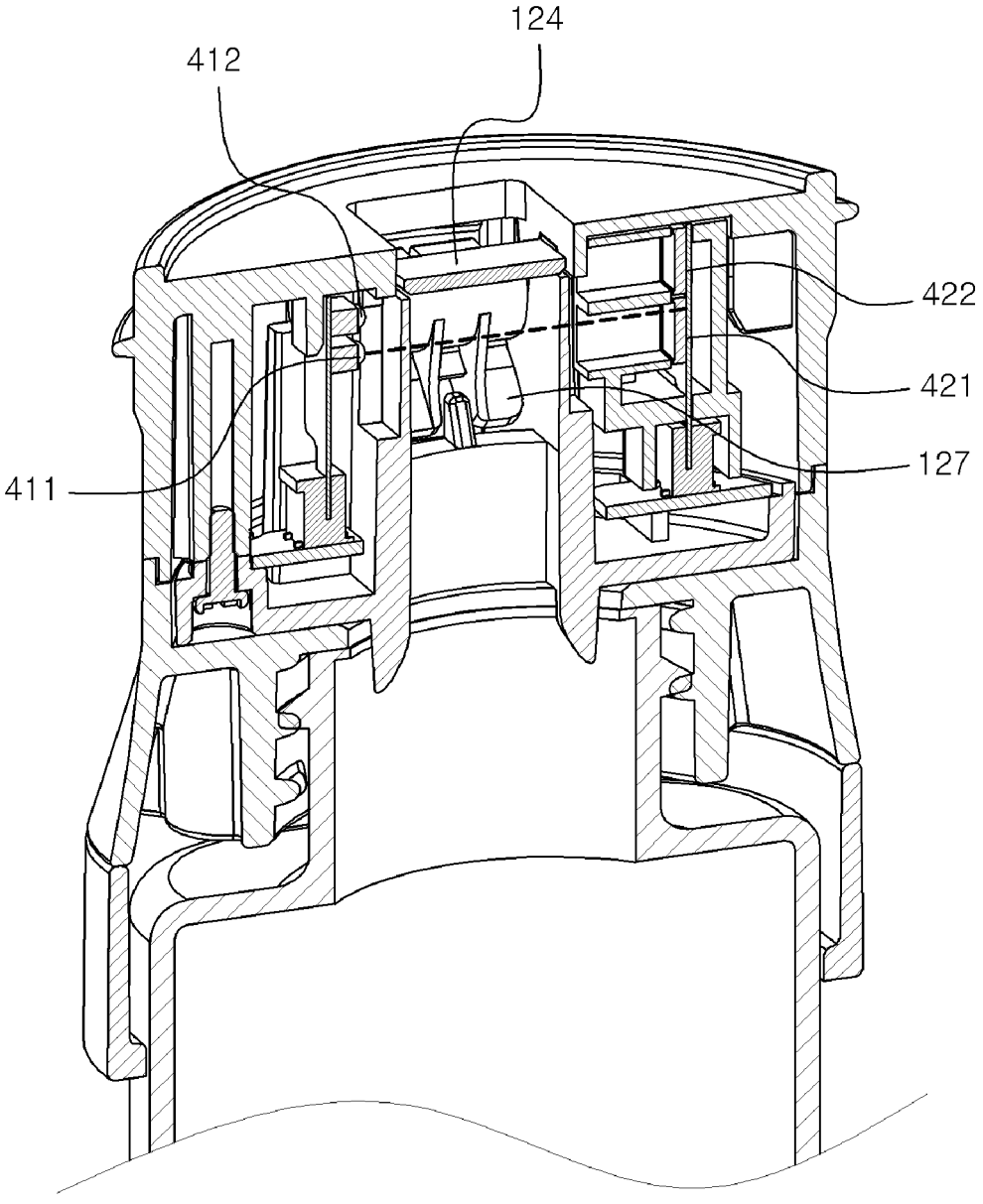


Fig. 15

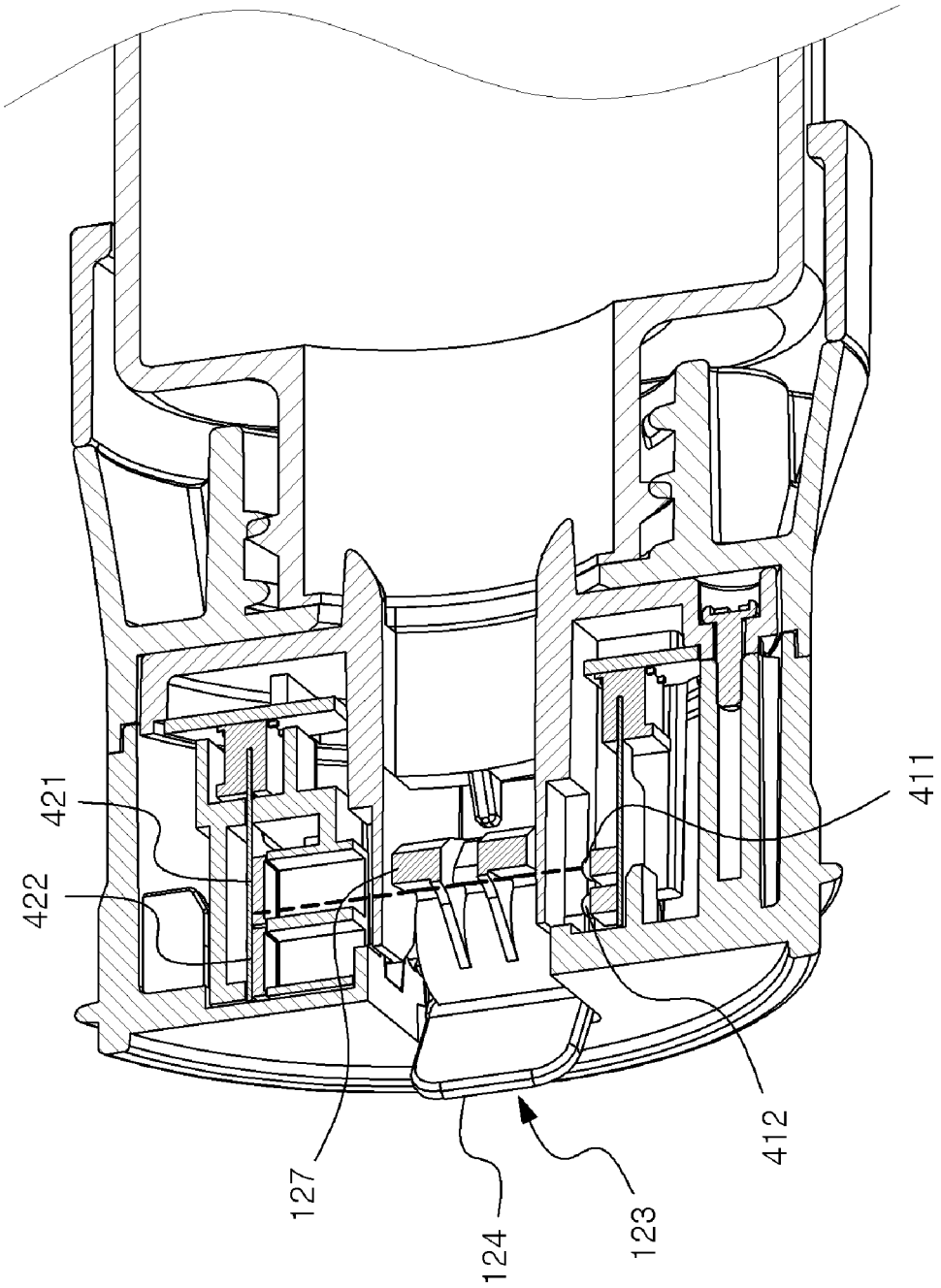


Fig. 16

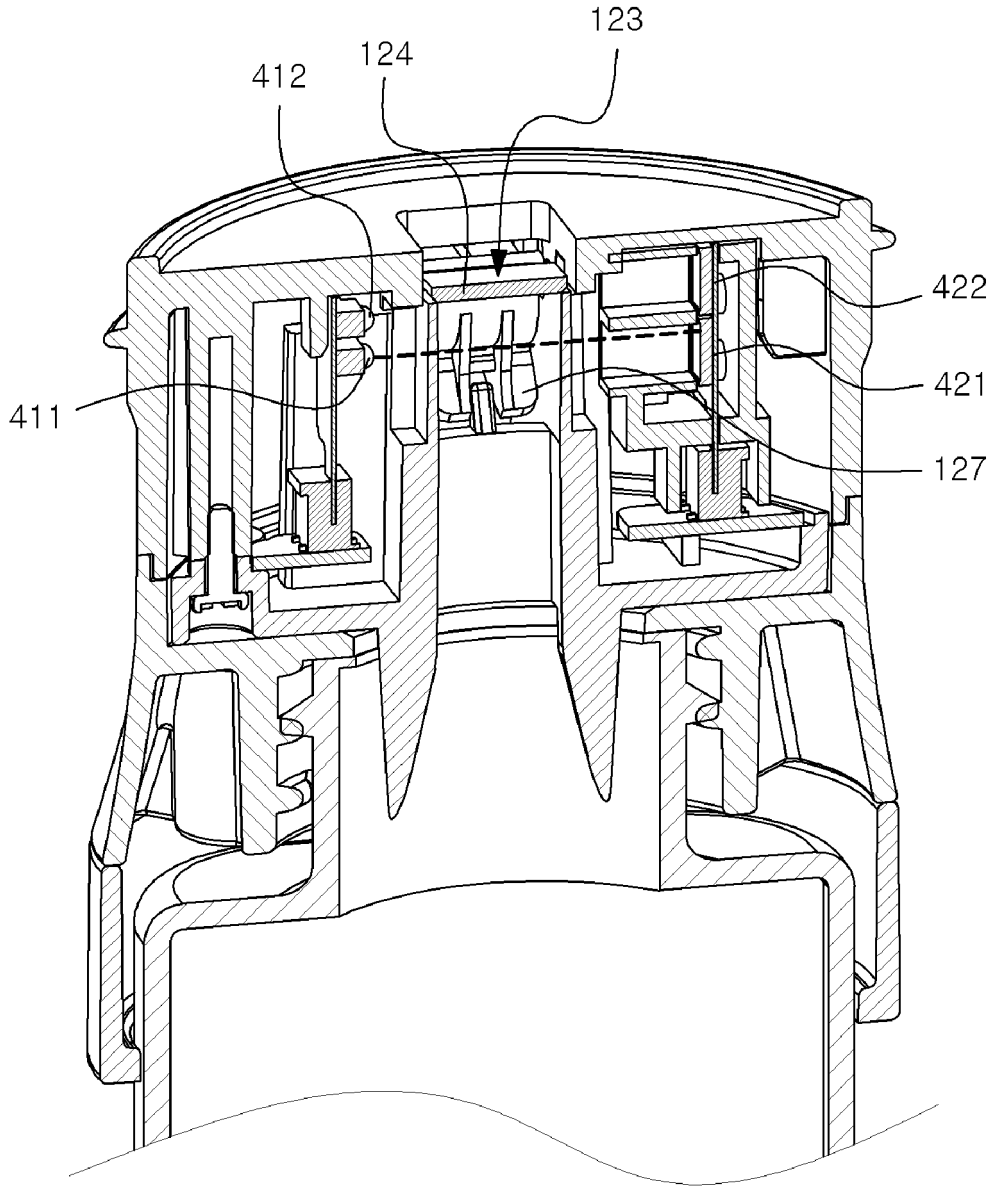


Fig. 17

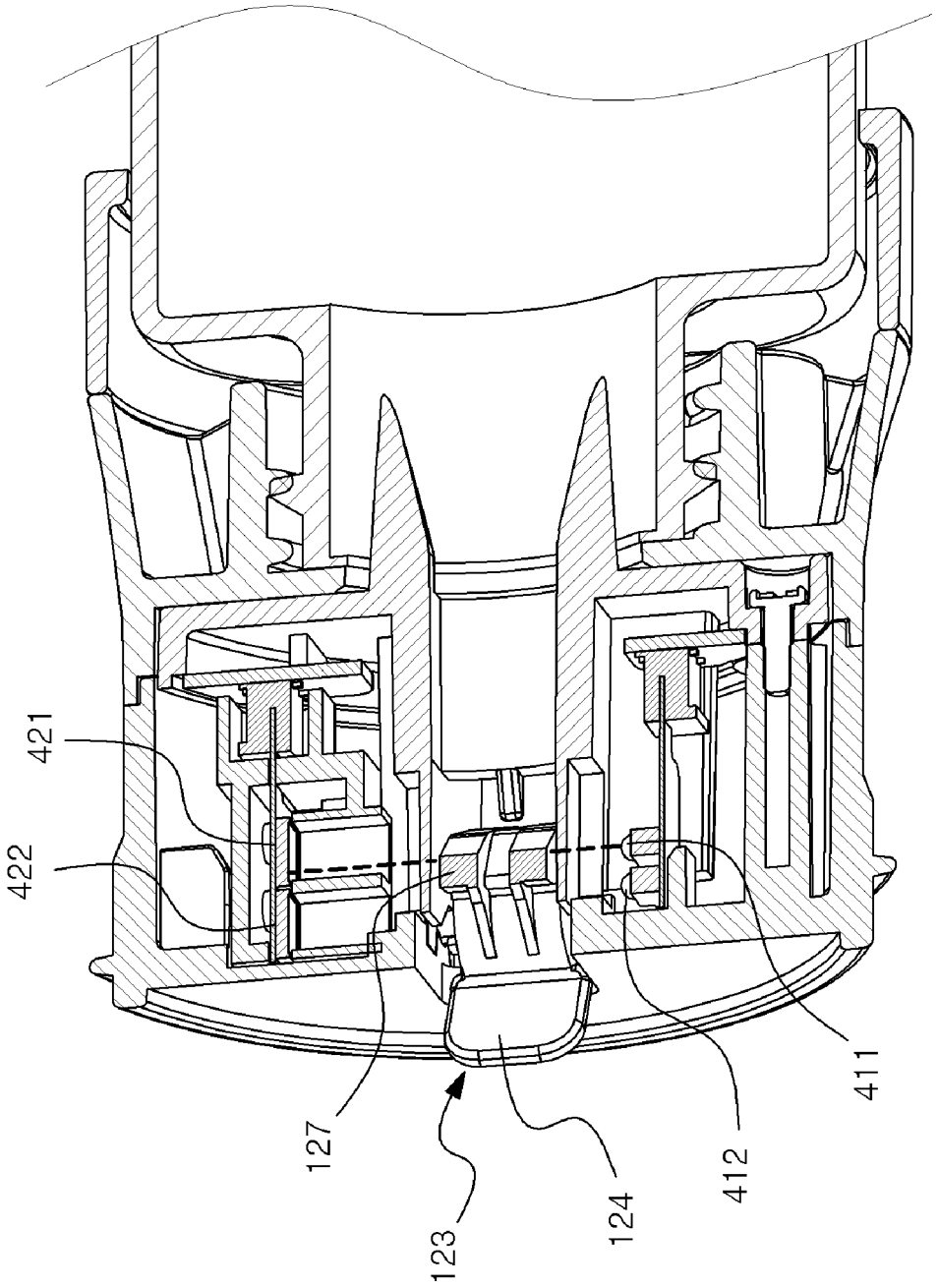
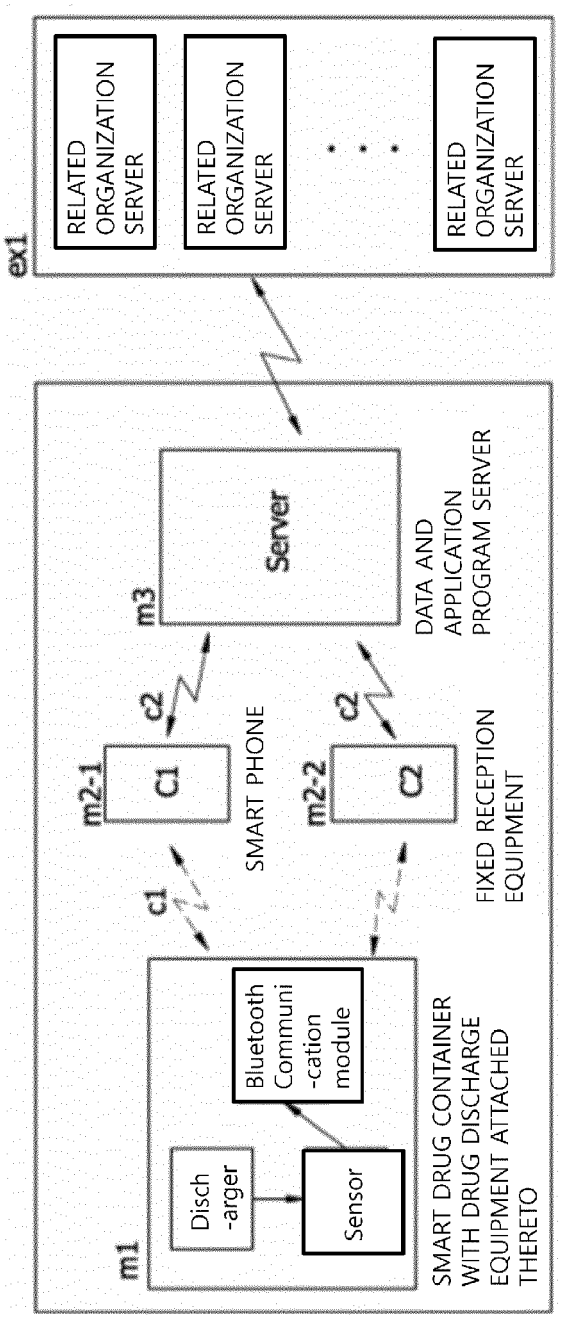


Fig. 18


ex1
RELATED ORGANIZATION SERVER
RELATED ORGANIZATION SERVER
RELATED ORGANIZATION SERVER
m3
Server
DATA AND APPLICATION PROGRAM SERVER
c2
c2
m2-1
C1
SMART PHONE
m2-2
C2
FIXED RECEPTION EQUIPMENT
c1
m1
Disch -arger
Sensor
Bluetooth Communi -cation module
SMART DRUG CONTAINER WITH DRUG DISCHARGE EQUIPMENT ATTACHED THERETO

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/006820

A. CLASSIFICATION OF SUBJECT MATTER

B65D 83/04(2006.01)i; **B65D 43/16**(2006.01)i; **B65D 51/24**(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)

B65D 83/04(2006.01); A61J 1/03(2006.01); B65D 47/06(2006.01); B65D 47/20(2006.01); B65D 55/02(2006.01)

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

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

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

eKOMPASS (KIPO internal) & keywords: 토출장치(discharging device), 정량(fixed amount), 회동(pivot), 막음부재(blocking member), 임계 경사각도(critical inclination angle)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2157445 B1 (PARK, Kyungdo) 17 September 2020 (2020-09-17) See paragraphs [0048]-[0076], [0086]-[0089], [0091]-[0094], [0103], [0164] and [0167]-[0168], claim 11 and figures 2-5, 7-8 and 21-22.	1-2,5-11
Y		3,12-15
A		4
Y	KR 10-2017-0091521 A (PARK, Suh Jun) 09 August 2017 (2017-08-09) See paragraph [0352] and figure 8.	3,12-15
A	JP 2007-319205 A (YOSHINO KOGYOSHO CO., LTD.) 13 December 2007 (2007-12-13) See paragraphs [0010]-[0022] and figures 1-7.	1-15
A	JP 2008-239204 A (SHINKO CHEMICAL CO., LTD.) 09 October 2008 (2008-10-09) See paragraphs [0015]-[0024] and figures 1-7.	1-15

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

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"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 August 2022	**04 August 2022**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/006820

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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PX	KR 10-2395334 B1 (PARK, Kyungdo) 09 May 2022 (2022-05-09) See paragraphs [0023]-[0027], claims 1-2 and 4-8 and figures 1-10. (* This document is a published earlier application that serves as a basis for claiming priority of the present international application.)	1-7,9,12-15

Form PCT/ISA/210 (second sheet) (July 2019)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2022/006820

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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