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(54) CLEANING APPARATUS COMPRISING CLEANER AND DOCKING STATION

(57) A cleaning apparatus includes a cleaner including a dust container in which contaminants are collected and a dust container cover rotatably coupled to the dust container to open or close the dust container, and a docking station on which the cleaner is detachably mounted, the docking station, when the cleaner is mounted, including a collecting portion provided to collect the contaminants in the dust container and a duct portion forming a channel to guide the contaminants in the dust container to the collecting portion, wherein the docking station includes a cover opening device configured to open the dust container cover, and a cover closing device configured to close the dust container cover, and wherein the cover closing device includes a rotary lever configured to be movable between a first position forming a portion of the channel of the duct portion and a second position supporting the dust container cover in a closing direction.

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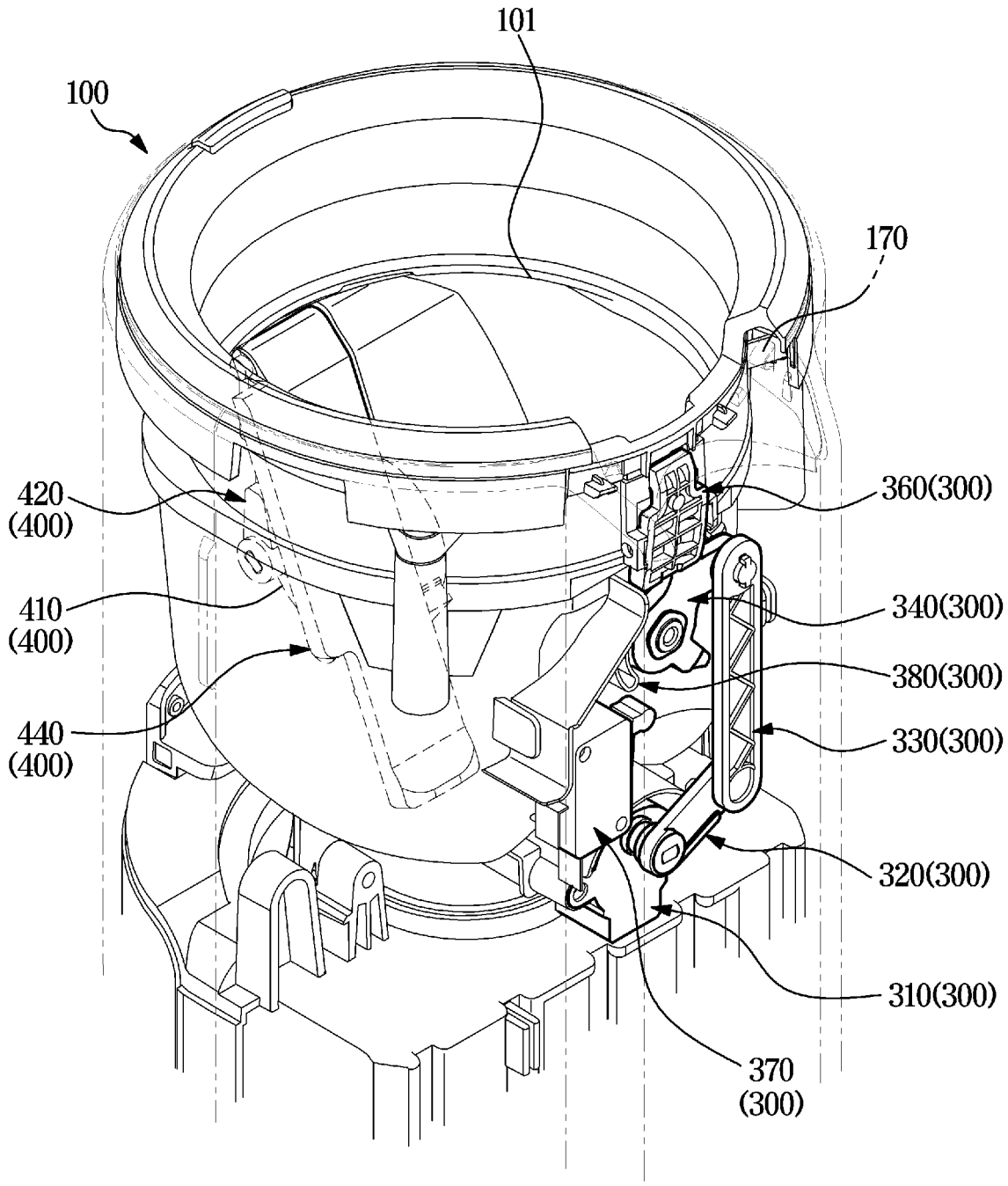
FIG. 6


101
100
170
420
(400)
360(300)
410
(400)
340(300)
380(300)
440
(400)
330(300)
320(300)
310(300)
370
(300)

Description

[Technical Field]

[0001] The disclosure relates to a cleaning apparatus, and more particularly to a cleaning apparatus including a cleaner and a docking station.

[Background Art]

[0002] In general, a vacuum cleaner is an apparatus that includes a fan motor to generate a blowing (e.g., suction) force. The vacuum cleaner draws in foreign substances, such as dust along with air through the blowing force generated by the fan motor, separates foreign substances contained in the drawn-in air from the air, and then collects the separated foreign substances, thereby performing cleaning.

[0003] Such a vacuum cleaner also includes a dust container that collects foreign substances, which causes a user to periodically separate the foreign substances collected in the dust container from the vacuum cleaner and to remove the separated foreign substances from the dust container.

[Disclosure]

[Technical Problem]

[0004] The present disclosure is directed to providing a cleaning apparatus having improved ease of use.

[0005] Further, the present disclosure is directed to providing a cleaning apparatus capable of stably closing a dust container cover.

[Technical Solution]

[0006] One aspect of the present disclosure provides a cleaning apparatus including a cleaner including a dust container in which contaminants are collected, and a dust container cover rotatably coupled to the dust container to open or close the dust container, and a docking station on which the cleaner is detachably mounted, the docking station, when the cleaner is mounted, including a collecting portion provided to collect the contaminants in the dust container and a duct portion forming a channel to guide the contaminants in the dust container to the collecting portion, wherein the docking station includes a cover opening device configured to open the dust container cover, and a cover closing device configured to close the dust container cover, and wherein the cover closing device includes a rotary lever configured to be movable between a first position forming a portion of the channel of the duct portion and a second position supporting the dust container cover in a closing direction.

[0007] The cover closing device may include a closing drive motor provided to generate power to move the rotary lever, a first closing link connected to the closing drive motor, and a second closing link connected to the first closing link and the rotary lever.

[0008] The duct portion may include a duct portion opening configured to form a space so that the first closing link or the second closing link moves, and the rotary lever may be provided to correspond to the duct portion opening.

[0009] In response to the rotary lever being in the first position, the closing drive motor, the first closing link, and the second closing link may be located outside the channel of the duct portion.

[0010] The cover opening device may include an opening drive motor having a different drive axis from the closing drive motor.

[0011] The cover opening device may include a switch configured to set an initial position of the opening drive motor.

[0012] The rotary lever may be positioned in the first position in response to the cleaner being separated from the docking station.

[0013] The docking station may include a connecting port formed to connect the dust container and the duct portion when the cleaner is mounted, and the rotary lever may be provided to correspond to the connecting port.

[0014] The rotary lever may be positioned to close the connecting port when the cleaner is separated from the docking station.

[0015] The cover closing device may be located in the duct portion.

[0016] The cleaner may be mounted on the docking station along the direction of gravity.

[0017] The cover opening device may be located outside the channel of the duct portion.

[0018] The cleaner may further include an elastic member configured to elastically support the dust container cover in the closing direction.

[0019] The cover opening device may be located on one side of the duct portion, and the cover closing device may be located on an other side opposite to one side of the duct portion.

[0020] The cleaner may further include a button configured to hold or release the dust container cover in a closed position, and the cover opening device is configured to press or release the button.

[0021] Another aspect of the present disclosure provides a cleaning apparatus including a cleaner including a dust container in which contaminants are collected, and a dust container cover rotatably coupled to the dust container to open and close the dust container, and a docking station on which the cleaner is detachably mounted, the docking station, when the cleaner is mounted, including a collecting portion provided to collect the contaminants in the dust container and a duct portion forming a channel to guide the contaminants in the dust container to the collecting portion, wherein the docking station includes a cover closing device configured to close the dust container cover, and wherein the cover closing device includes a rotary lever provided movably between a first

position forming a portion of the channel of the duct portion and a second position supporting the dust container cover in a direction of closing the dust container.

[0022] The rotary lever may be positioned in the first position in response to the cleaner being separated from the docking station.

[0023] The cover closing device may include a closing drive motor provided to generate power to move the rotary lever, a first closing link connected to the closing drive motor, and a second closing link connected to the first closing link and the rotary lever.

[0024] The duct portion may include a duct portion opening configured to form a space so that the first closing link or the second closing link moves, and the rotary lever may be provided to correspond to the duct portion opening.

[0025] The docking station may include a connecting port formed to connect the dust container and the duct portion when the cleaner is mounted, and the rotary lever may be provided to correspond to the connecting port and be positioned to close the connecting port when the cleaner is separated from the docking station.

[Advantageous Effects]

[0026] According to the spirit of the present disclosure, the cleaning apparatus may automatically open and close the dust container cover of the cleaner, thereby improving ease of use.

[0027] Further, according to the spirit of the present disclosure, the cleaning apparatus may include the cover closing device that is operated independently of the cover opening device, thereby stably closing the dust container cover of the cleaner.

[Description of Drawings]

[0028]

FIG. 1 shows a cleaning apparatus according to an embodiment of the present disclosure.

FIG. 2 shows a docking station of the cleaning apparatus shown in FIG. 1.

FIG. 3 shows a side cross-section of the cleaning apparatus shown in FIG. 1.

FIG. 4 shows an enlarged view of a portion of the cleaning apparatus shown in FIG. 1.

FIG. 5 shows an enlarged view of a portion of the docking station shown in FIG. 2.

FIG. 6 shows a portion of the interior of the docking station shown in FIG. 2.

FIG. 7 shows states of a cover opening device and a cover closing device when a dust container of the cleaning apparatus shown in FIG. 3 is closed.

FIG. 8 is a view showing the inside of a duct portion when a rotary lever is in a first position as shown in FIG. 7.

FIG. 9 shows a front view of the cover opening device shown in FIG. 7.

FIG. 10 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 7.

FIG. 11 shows a state in which the cover opening device shown in FIG. 7 opens a dust container cover.

FIG. 12 shows a front view of the cover opening device shown in FIG. 11.

FIG. 13 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 11.

FIG. 14 shows a state in which the cover closing device shown in FIG. 7 closes the dust container cover.

FIG. 15 is a view showing the inside of the duct portion when the rotary lever is in a second position as shown in FIG. 14.

FIG. 16 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 14.

FIG. 17 shows a control block diagram of the docking station shown in FIG. 1.

FIG. 18 shows a cover closing device according to another embodiment of the present disclosure.

FIG. 19 shows a state in which the cover closing device shown in FIG. 18 closes a connecting port of a station main body.

FIG. 20 shows a front view of a cover opening device according to another embodiment of the present disclosure.

FIG. 21 shows a state in which the dust container cover of the cleaning apparatus is opened by the cover opening device shown in FIG. 20.

[Modes of the Invention]

[0029] Embodiments described in the disclosure and configurations shown in the drawings are merely examples of the embodiments of the disclosure and may be modified in various different ways at the time of filing of the present application to replace the embodiments and drawings of the disclosure.

[0030] In addition, the same reference numerals or signs shown in the drawings of the disclosure indicate elements or components performing substantially the same function.

[0031] Also, the terms used herein are used to describe the embodiments and are not intended to limit and/or restrict the disclosure. The singular forms "a," "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. In this disclosure, the terms "including", "having", and the like are used to specify features, figures, steps, operations, elements, components, or combinations thereof, but do not preclude the presence or addition of one or more of the features, figures, steps, operations, elements, components, or combinations thereof.

[0032] It will be understood that, although the terms

first, second, primary, secondary, etc., may be used herein to describe various elements, but elements are not limited by these terms. These terms are only used to distinguish one element from another element. For example, without departing from the scope of the disclosure, a first element may be termed as a second element, and a second element may be termed as a first element. The term of "and/or" includes a plurality of combinations of relevant items or any one item among a plurality of relevant items.

[0033] FIG. 1 shows a cleaning apparatus according to an embodiment of the present disclosure. FIG. 2 shows a docking station of the cleaning apparatus shown in FIG. 1. FIG. 3 shows a side cross-section of the cleaning apparatus shown in FIG. 1.

[0034] Referring to FIG. 1, a cleaning apparatus 1 may include a cleaner (e.g., a vacuum cleaner) 2 and a docking station 3 on which the cleaner 2 is seated. The cleaner 2 may be coupled to the docking station 3 by being seated on the docking station 3.

[0035] The cleaner 2 may include a cleaner main body 14 and a dust container 10 that is detachably coupled to the cleaner main body 14. The dust container 10 may be provided to collect foreign substances moved into the cleaner 2.

[0036] The cleaner main body 14 may include a motor (not shown) that generates an extraction (i.e., draw-in) force necessary to draw in foreign substances on a surface to be cleaned, and the dust container 10 that accommodates foreign substances drawn-in from the surface to be cleaned.

[0037] The dust container 10 may be configured to filter and store dust, dirt, and the like from air entering through an intake nozzle 13. The dust container 10 may be provided to be detachable from the cleaner main body 14.

[0038] The cleaner main body 14 may include a filter housing. The filter housing is provided in an approximately donut shape and may accommodate a filter (not shown) therein. The disclosure does not limit the type of filter, but for example, a high efficiency particulate air (HEPA) filter may be placed within the filter housing. The filter may filter ultrafine dust or the like which is not filtered out of the dust container 10.

[0039] The cleaner main body 14 may include a handle 15 to allow a user to hold the handle and to manipulate the cleaner 2. The user may clean by holding the handle 15 and moving the cleaner 2.

[0040] The cleaner main body 14 may further include a cleaner controller. The user may turn the cleaner 2 on/off or adjust an intake strength by manipulating a power button provided on a control panel of the cleaning apparatus.

[0041] The cleaner 2 may further include an extension pipe 12 detachably coupled to the cleaner main body 14 and the intake nozzle 13 detachably coupled to the extension pipe 12.

[0042] The intake nozzle 13 may be provided to intake external foreign substances into the interior of the cleaner 2. The extension pipe 12 may be provided to connect the cleaner main body 14 and the intake nozzle 13 to form a channel through which the foreign substances move. The drawn-in foreign substances may be moved to the dust container 10 through the cleaner main body 14 and collected. In other words, the extension pipe 12 may be provided to connect the intake nozzle 13 and the dust container 10. The cleaner 2 according to an embodiment of the present disclosure may be provided in a form in which the cleaner main body 14 is mounted on a front side of the extension pipe 12. Here, the front side may be defined as in front of the user when the cleaner 2 is held by the user.

[0043] The cleaner 2 may further include a battery 16. The battery 16 may be detachably mounted on the cleaner 2.

[0044] In addition, the battery 16 may be electrically connected to a charging terminal 170 provided in a holding device for the cleaning apparatus or the docking station 3. The battery 16 may be charged by receiving power from the charging terminal 170 provided in the docking station 3.

[0045] The docking station 3 may be configured to allow the cleaner 2 to be stored or mounted.

[0046] The docking station 3 may include a station main body 100 and a supporter 200 provided to support the station main body 100.

[0047] A connecting port 101 may be formed on an upper portion of the station main body 100. The connecting port 101 may be formed in a portion of the station main body 100 where the cleaner 2 is mounted. The connecting port 101 may be provided to be connected to the dust container 10 when the cleaner 2 is mounted on the docking station 3. Contaminants from the dust container 10 may be introduced into a duct portion 120 through the connecting port 101.

[0048] The station main body 100 may include a first housing 111, a second housing 112, a third housing 113, and a fourth housing 114.

[0049] The station main body 100 may include the duct portion 120 accommodated inside the housings 111, 112, 113, and 114, a collecting portion 140, an intake portion 150, and an exhaust filter portion 160.

[0050] When the cleaner 2 is coupled to the docking station 3, the intake nozzle 13 may be accommodated in a receiving space 218 formed in the docking station 3.

[0051] The first housing 111 and the second housing 112 may form an upper exterior of the docking station 3. The first housing 111 and the second housing 112 may be combined with each other to form the upper exterior of the docking station 3. The duct portion 120 and the collecting portion 140 may be accommodated inside the first housing 111 and the second housing 112. A dust bag in which dust collected in the dust container 10 is stored may be detachably mounted on the collecting portion 140. Dust in the dust container 10 may pass through the duct portion 120 to be collected in the dust bag.

[0052] The first housing 111 and the second housing

112 may be provided to have a longitudinal axis extending in one direction. The longitudinal axes of the first housing 111 and the second housing 112 may be provided to extend in a vertical direction. The first housing 111 and the second housing 112 may be formed to have a curved surface. The first housing 111 and the second housing 112 may be combined with each other to form a substantially cylindrical shape.

[0053] The third housing 113 and the fourth housing 114 may form a lower exterior of the docking station 3. The third housing 113 and the fourth housing 114 may be combined with each other to form the lower exterior of the docking station 3. The third housing 113 may be coupled to a lower portion of the first housing 111, and the fourth housing 114 may be coupled to a lower portion of the second housing 112. The intake portion 150 and the exhaust filter portion 160 may be accommodated within the third housing 113 and the fourth housing 114.

[0054] The third housing 113 and the fourth housing 114 may be provided to have a longitudinal axis extending in one direction. The longitudinal axes of the third housing 113 and the fourth housing 114 may be provided to extend in the vertical direction. The third housing 113 may be provided to correspond to the shape of the first housing 111, and the fourth housing 114 may be provided to correspond to the shape of the second housing 112. The third housing 113 and the fourth housing 114 may be combined with each other to form a substantially cylindrical shape.

[0055] According to an embodiment of the present disclosure, the longitudinal axis of the third housing 113 may be shorter than that of the first housing 111, and the longitudinal axis of the fourth housing 114 may be shorter than that of the second housing 112. However, the disclosure is not limited thereto, and the longitudinal axes of the third and fourth housings may be equal to or longer than the longitudinal axes of the first and second housings.

[0056] According to an embodiment of the present disclosure, the docking station 3 may include recessed portions 112b and 114b. The recessed portions 112b and 114b may include the first recessed portion 112b and the second recessed portion 114b.

[0057] The first recessed portion 112b may be formed in the second housing 112. The first recessed portion 112b may be provided such that a portion of the second housing 112 is recessed inward. The first recessed portion 112b may extend along the longitudinal axis of the second housing 112. A portion of the extension pipe 12 of the cleaner 2 may be accommodated in the first recessed portion 112b.

[0058] The second recessed portion 114b may be formed in the fourth housing 114. The second recessed portion 114b may be provided such that a portion of the fourth housing 114 is recessed inward. The second recessed portion 114b may extend along the longitudinal axis of the fourth housing 14. A portion of the extension pipe 12 of the cleaner 2 may be accommodated in the second recessed portion 112b.

[0059] As the second housing 112 and the fourth housing 114 are arranged vertically, the first recessed portion 111 and the second recessed portion 112 may be connected in the vertical direction. The first depression 111 may receive an upper portion of the extension pipe 12 of the cleaner 2, and the second depression 114b may receive a lower portion of the extension pipe 12 of the cleaner 2.

[0060] The third housing 113 may include first exhaust holes 113a. The fourth housing 114 may include second exhaust holes 114a. The third housing 113 and the fourth housing 114 accommodate the intake portion 150 therein, so the drawn-in air is required to be discharged to the outside. The third housing 113 and the fourth housing 114 may include the first exhaust holes 113a and the second exhaust holes 114a, so that the air drawn-in by the intake portion 150 may pass through the exhaust filter portion 160 to be discharged to the outside of the third housing 113 and the fourth housing 114.

[0061] According to an embodiment of the present disclosure, the docking station 3 may include the supporter 200.

[0062] The supporter 200 may be coupled to the first to fourth housings 111, 112, 113, and 114 of the station main body 100. More specifically, the supporter 200 may be coupled with the third housing 113 and the fourth housing 114. The supporter 200 may be coupled to a lower portion of the station main body 100. The supporter 200 may be coupled to the station main body 100 to form the receiving space 218 in which the intake nozzle 13 of the cleaner 2 is accommodated.

[0063] The supporter 200 may be rotatable with respect to the ground. According to an embodiment of the present disclosure, the supporter 200 may include a mounting portion settled on the ground and a rotating portion rotatable with respect to the mounting portion. The rotating portion may be coupled to the housings 111, 112, 113, and 114. In response to the rotating portion rotating relative to the mounting portion, the housings 111, 112, 113, and 114 coupled with the rotating portion may rotate relative to the mounting portion. As a result, the housings 111, 112, 113, and 114 may rotate relative to the ground.

[0064] FIG. 4 shows an enlarged view of a portion of the cleaning apparatus shown in FIG. 1.

[0065] Referring to FIG. 4, the cleaner 2 may include a button 17 provided to open and close a dust container cover 11. In response to the button 17 being pressed, the dust container cover 11 may be opened by rotating downwardly. Further details thereof will be described later.

[0066] FIG. 5 shows an enlarged view of a portion of the docking station shown in FIG. 2.

[0067] Referring to FIG. 5, the station main body 100 of the docking station 3 may include a push lever 360. The push lever 360 may be provided to press the button 17 by rotating. Further details thereof will be described

later.

[0068] FIG. 6 shows a portion of the interior of the docking station shown in FIG. 2.

[0069] Referring to FIG. 6, the docking station 3 of the cleaning apparatus 1 according to an embodiment of the present disclosure may include a cover opening device 300 provided to automatically open the dust container cover 11. The cover opening device 300 may be provided in the station main body 100.

[0070] The cover opening device 300 may include an opening drive motor 310 provided to generate a driving force, a first opening link 320 provided to rotate by receiving the driving force from the opening drive motor 310, a second opening link 330 provided to move up and down by a rotation of the first opening link 320, a rotation opening guide 340 provided to rotate by an movement of the second opening link 330, a push lever 360 provided to press the button 17 by rotating through the rotation opening guide 340, a switch 370 provided to restrict a rotation range of the rotation opening guide 340 and set a reference point, and a stopper 380 provided to physically restrict the rotation range of the rotation opening guide 340. The specific structure of each component will be described later.

[0071] FIG. 7 shows states of the cover opening device and the cover closing device when the dust container of the cleaning apparatus shown in FIG. 3 is closed. FIG. 8 is a view showing the interior of the duct portion when the rotary lever is in a first position as shown in FIG. 7. FIG. 9 shows a front view of the cover opening device shown in FIG. 7. FIG. 10 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 7.

[0072] Referring to FIG. 7, the cover opening device 300 may include the opening drive motor 310 which provides the driving force and includes an opening drive shaft 311 provided to rotate by the driving force, the first opening link 320 provided to rotate together with the opening drive shaft 311, and the second opening link 330 provided to move translationally in the vertical direction by the rotation of the first opening link 320.

[0073] The first opening link 320 may have one end 321 coupled to the opening drive shaft 311 and rotating together with the opening drive shaft 311, and the other end 322 coupled to one end 332 of the second opening link 320.

[0074] The second opening link 330 may include one end 332 coupled to the other end 322 of the first opening link 320, and an opening protrusion insertion hole 331 provided to insert an opening rotation protrusion 344 of the rotation opening guide 340. The opening protrusion insertion hole 331 may be provided at the other end of the second opening link 330.

[0075] The cover opening device 300 may include the rotation opening guide 340. The rotation opening guide 340 may include a first opening pressing portion 341 and a second opening pressing portion 342 provided to press the push lever 360. The first opening pressing portion 341 and the second opening pressing portion 342 may be connected to each other, and the thickness of the second opening pressing portion 342 may be greater than that of the first opening pressing portion 341.

[0076] The rotation opening guide 340 may include an opening shaft coupling portion 343 to which an opening guide shaft 351 is coupled, the opening rotation protrusion 344 provided to be inserted into the opening protrusion insertion hole 331 of the second opening link 330, and a first opening limiting protrusion 345 and a second opening limiting protrusion 346. The opening shaft coupling portion 343 may be provided to couple the opening guide shaft 351, and may rotate together with the opening guide shaft 351. The opening rotation protrusion 344 may have a shape corresponding to the shape of the opening protrusion insertion hole 331 and thus may be inserted into the opening protrusion insertion hole 331. After being inserted into the opening protrusion insertion hole 331, the opening rotation protrusion 344 may be provided to rotate relative to the opening protrusion insertion hole 331.

[0077] The rotation opening guide 340 may include the first opening limiting protrusion 345 provided to limit the rotation range of the rotation opening guide 340 in a first direction, and the second opening limiting protrusion 346 provided to limit the rotation range of the rotation opening guide 340 in a second direction opposite to the first direction.

[0078] Referring to FIG. 7, the dust container cover 11 may rotate about a cover rotation shaft 11c. The dust container cover 11 may receive an elastic force from an elastic member 11d (see FIG. 3) in a direction in which the dust container cover 11 is closed. In other words, the dust container cover 11 may be elastically biased in the direction in which the dust container cover 11 is closed. In addition, the button 17 may rotate about a button rotation shaft 17c.

[0079] Referring to FIGS. 8 and 9, a cover closing device 400 may include a closing drive motor 410 provided to generate a driving force, a first closing link 420 provided to rotate by receiving the driving force from the closing drive motor 410, a second closing link 430 provided to move by a rotation of the first closing link 420, and a rotary lever 440 provided to rotate by an movement of the second closing link 330. The cover closing device 400 may be driven independently of the cover opening device 300.

[0080] The cover closing device 400 may include the closing drive motor 410 which provides the driving force and includes a closing drive shaft 411 provided to rotate by the driving force, the first closing link 420 provided to rotate together with the closing drive shaft 411, and the second closing link 430 provided to rotate and move by rotation of the first closing link 420.

[0081] The closing drive motor 410 may have a different drive axis from the opening drive motor 310. More particularly, the drive axis of the closing drive motor 410 may be arranged to be perpendicular to the drive axis of

the opening drive motor 310.

[0082] The first closing link 420 may have one end 421 coupled to the closing drive shaft 411 and rotating together with the closing drive shaft 411, and the other end 422 coupled to one end 432 of the second closing link 420.

[0083] The second closing link 430 may include one end 432 coupled to the other end 422 of the first closing link 420, and a closing protrusion insertion portion 431 provided to insert a closing rotation portion 444 of the rotary lever 440. The closing protrusion insertion portion 431 may be provided at the other end of the second closing link 430.

[0084] Referring to FIG. 8, the cover closing device 400 may include the rotary lever 440. The rotary lever 440 may form a portion of the duct portion 120. The rotary lever 440 may form a portion of a channel that guides contaminants (e.g., dirt) discharged from the dust container 10 to the collecting portion 140.

[0085] Accordingly, the duct portion 120 may include a duct portion opening 121 formed to correspond to the rotary lever 440. The duct portion opening 121 may be open when in response to the rotary lever 440 moving in a direction to close the dust container cover 11. As a result, the first closing link 420 and the second closing link 430 may move due to the formation of the duct portion opening 121.

[0086] The rotary lever 440 may include a main body coupling portion 443 rotatably coupled to the station main body 100, and the closing rotating portion 444 rotatably coupled to the closing protrusion insertion portion 431 of the second closing link 430. In response to the rotary lever 440 rotating about the main body coupling portion 443 as a rotation axis, the rotary lever 440 may close the dust container cover 11.

[0087] Referring to FIGS. 9 and 10, operations of the cover opening device 300 and the cover closing device 400 when the dust container cover 11 is in a closed state will be described.

[0088] Referring to FIG. 9, when the dust container cover 11 is closed, the opening drive shaft 311 may have been rotated in the first direction. According to an embodiment of the present disclosure, the first direction may refer to a clockwise direction with respect to FIG. 9.

[0089] As the opening drive shaft 311 rotates in the first direction, the first opening link 320 may rotate in the first direction. More specifically, the first opening link 320 may rotate in the first direction with one end 321 of the first opening link 320 as the center of rotation.

[0090] As the first opening link 320 rotates in the first direction together with the opening drive shaft 311, the second opening link 330 may move downward. The second opening link 330 may move downward while maintaining a state in which one end 332 and the other end at which the opening protrusion insertion hole 331 is located are vertically arranged. One end 332 of the second opening link 330 may be rotatably coupled relative to the other end 322 of the first opening link 310. Additionally, the other end of the second opening link 330 may be rotatably coupled relative to the opening rotation protrusion 344 of the rotation opening guide 340. As described above, after the opening rotation protrusion 344 is inserted into the opening protrusion insertion hole 331 provided at the other end of the second opening link 330, the rotation opening guide 340 may be rotated relative to the second opening link 330.

[0091] The rotation opening guide 340 may rotate in the first direction as the second opening link 330 moves downward. The rotation opening guide 340 may rotate in the same direction as the first opening link 320. In other words, the rotation opening guide 340 may rotate in the first direction in response to the first opening link 320 rotating in the first direction. The rotation opening guide 340 may rotate with the opening shaft coupling portion 343 as the center of rotation. When the rotation opening guide 340 rotates in the first direction, the second opening limiting protrusion 346 may press a switching protrusion 371 of the switch 370. As a result, the switch 370 may reset the opening drive motor 310 to an initial position. In addition, the second opening limiting protrusion 346 may contact the other end of the stopper 380.

[0092] According to an embodiment of the present disclosure, the rotation range of the rotation opening guide 340 in the first direction may be doubly limited. In response to the second opening limiting protrusion 346 of the rotation opening guide 340 pressing the switching protrusion 371, an operation of the opening drive motor 310 may be stopped. In addition, in response to the second opening limiting protrusion 346 pressing the switching protrusion 371, a reference position of the opening drive shaft 311 may be reset. When the rotation opening guide 340 rotates in the first direction, the second opening limiting protrusion 346 may contact the other end of the stopper 380. In response to the second opening limiting protrusion 346 contacting the other end of the stopper 380, the rotation opening guide 340 no longer rotates in the first direction due to interference between the stopper 380 and the second opening limiting protrusion 346. In other words, when the opening drive motor 310 operates despite the switching protrusion 371 being pressed, the second opening limiting protrusion 346 contacts the stopper 380, thereby stopping the rotation of the rotation opening guide 340 in the first direction.

[0093] Referring to FIG. 10, the dust container cover 11 may include a cover protrusion 11a and a cover groove 11b. The button 17 may include a button protrusion 17a and a button groove 17b. The dust container cover 11 may be closed by inserting the cover protrusion 11a of the dust container cover 11 into the button groove 17b, and inserting the button protrusion 17a of the button 17 into the cover groove 11b.

[0094] The cover closing device 400 may form a portion of a channel provided within the duct portion 120. More specifically, the rotary lever 440 of the cover closing device 400 may be provided to form a portion of an inner surface of the duct portion 120.

[0095] FIG. 11 shows a state in which the cover opening device shown in FIG. 7 opens the dust container cover. FIG. 12 shows a front view of the cover opening device shown in FIG. 11. FIG. 13 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 11.

[0096] Referring to FIG. 11, the opening drive motor 310 may open the dust container cover 11 by rotating the opening drive shaft 311 in the second direction opposite to the first direction. According to an embodiment of the present disclosure, the second direction may refer to a counterclockwise direction.

[0097] As the opening drive shaft 311 rotates in the second direction, the first opening link 320 may rotate together with the opening drive shaft 311 in the second direction. The second opening link 330 may move upward as the first opening link 320 rotates in the second direction. The rotation opening guide 340 may rotate in the second direction as the second opening link 330 moves upward. The rotation opening guide 340 may rotate in the same direction as the first opening link 320. In other words, the rotation opening guide 340 may rotate in the second direction in response to the first opening link 320 rotating in the second direction.

[0098] As the rotation opening guide 340 rotates in the second direction, the rotation opening guide 340 may press the push lever 360. The push lever 360 may rotate about a lever rotation shaft 363 by the rotation opening guide 340. As the push lever 360 rotates about the lever rotation shaft 363, a push protrusion 361 of the push lever 360 may press the button 17. The dust container cover 11 may be opened by pressing the button 17. As described above, because the dust container cover 11 is provided with an elastic force in a direction in which the dust container cover 11 is closed, the draw-in force from the intake portion 150 is required to be provided to open the dust container cover 11.

[0099] Referring to FIG. 12, in response to the opening drive shaft 311 rotating in the second direction by the driving force of the opening drive motor 310, the first opening link 320 rotates in the second direction and thus the second opening link 330 may move upward. As the second opening link 330 moves upward, the rotation opening guide 340 may rotate in the second direction.

[0100] According to an embodiment of the present disclosure, the push lever 360 may rotate about the lever rotation shaft 363 by rotating the rotation opening guide 340 in the second direction. This is because, in response to the rotation opening guide 340 rotating in the second direction, the rotation opening guide 340 may press the push lever 360 to allow the push lever 360 to rotate.

[0101] As the rotation opening guide 340 rotates in the second direction, the first opening limiting protrusion 345 of the rotation opening guide 340 may come into contact with one end of the stopper 380. As the first opening limiting protrusion 345 contacts one end of the stopper 380, the rotation of the rotation opening guide 340 in the second direction may be restricted. In other words, the rotation range of the rotation opening guide 340 in the second direction may be restricted due to physical contact between the first opening limiting protrusion 345 and the stopper 380. In contrast, the opening drive motor 310 may rotate the opening drive shaft 311 in the second direction by a predetermined angle. For example, the opening drive motor 310 may be preset to rotate the opening drive shaft 311 by approximately 60° in the second direction. In response to the opening drive shaft 311 rotating by approximately 60° in the second direction, the rotation opening guide 340 may be provided to press the push lever 360.

[0102] According to an embodiment of the present disclosure, when the rotation opening guide 340 rotates in the first direction, the second opening limiting protrusion 346 may press the switching protrusion 371 to reset the reference position of the opening drive shaft 311. Although the opening drive motor 310 is preset to rotate the opening drive shaft 311 in the second direction by the predetermined angle, the reference position may deviate from an initial setting position when the opening drive shaft 311 repeatedly rotates in the first and second directions. Because the reference position may be reset each time the opening drive shaft 311 rotates in the first direction, it is possible to prevent the reference position of the opening drive shaft 311 from deviating from the initial setting position.

[0103] Referring to FIG. 13, in response to the rotation opening guide 340 rotating in the second direction, the second opening pressing portion 342 of the rotation opening guide 340 may press a pressing surface 362 of the push lever 360. The rotation opening guide 340 may include the first opening pressing portion 341 that is relatively thin, and the second opening pressing portion 342 that is relatively thick. The first opening pressing portion 341 and the second opening pressing portion 342 may be connected to each other, and may be provided to allow the thickness to increase from the first opening pressing portion 341 to the second opening pressing portion 342. In response to the rotation opening guide 340 rotating in the second direction, the first opening pressing portion 341 may begin to come into contact with the pressing surface 362, and the second opening pressing portion 342 may press the pressing surface 362. In other words, the first opening pressing portion 341 and the second opening pressing portion 342 may be provided to gradually press the pressing surface 362.

[0104] If the opening drive shaft 311 extends in a third direction, the first opening link 320, the second opening link 330, and the rotation opening guide 340 may each rotate about a rotation axis parallel to the third direction. The push lever 360 may rotate about the lever rotation shaft 363 extending in a fourth direction intersecting the third direction.

[0105] In response to the push protrusion 361 of the push lever 360 pressing the button 17, the button 17 may rotate about the button rotation shaft 17c parallel to the fourth direction. When the button 17 rotates about the

button rotation shaft 17c, the cover protrusion 11a of the dust container cover 11 may pulled out of the button groove 17b, and the button protrusion 17a may be pulled out of the cover groove 11b. The cover protrusion 11a may be pulled out of the button groove 17b, and the button protrusion 17a may be pulled out of the cover groove 11b, so that the dust container cover 11 may be opened. The button rotation shaft 17c may be provided parallel to the lever rotation shaft 363. In other words, the button rotation shaft 17c may extend in a direction parallel to the fourth direction.

[0106] FIG. 14 shows a state in which the cover closing device shown in FIG. 7 closes the dust container cover. FIG. 15 is a view showing the inside of the duct portion when the rotary lever is in a second position as shown in FIG. 14. FIG. 16 shows a side cross-section of the cover opening device and the cover closing device shown in FIG. 14.

[0107] With reference to FIGS. 14 to 16, an operation of the cover closing device 400 to close the dust container cover 11 according to an embodiment of the present disclosure will be described.

[0108] Referring to FIGS. 14 to 16, the cover closing device 400 may automatically close the dust container cover 11. The closing drive motor 410 may close the dust container cover 11 by rotating the closing drive shaft 411 clockwise from in a state shown in FIG. 16. The following describes a direction of rotation based on FIG. 16.

[0109] When the closing drive shaft 411 rotates clockwise, the first closing link 420 may rotate clockwise together with the closing drive shaft 411. The second closing link 430 may rotate counterclockwise relative to the first closing link 420 when the first closing link 420 rotates clockwise. One end 432 of the second closing link 430 may rotate counterclockwise relative to the first closing link 420, and the other end 431 thereof may rotate counterclockwise relative to the rotary lever 440. The second closing link 430 may move in a direction of lifting the rotary lever 440.

[0110] The rotary lever 440 may rotate in a direction to close the dust container cover 11 in response to the movement of the second closing link 430. The rotary lever 440 may rotate counterclockwise around the main body coupling portion 443. The rotary lever 440 may rotate clockwise relative to the second closing link 430.

[0111] The rotary lever 440 may be rotated by the second closing link 430 and may press the dust container cover 11 in a closing direction. The dust container cover 11 may be pressed by the rotary lever 440 and may rotate about the cover rotation shaft 11c. The dust container cover 11 may be closed by the second closing link 430.

[0112] With such an arrangement, in the cleaning apparatus 1 according to an embodiment of the present disclosure, the cover closing device 400 may automatically close the dust container cover 11 after completion of discharging contaminants from the dust container 10, thereby improving ease of use. Furthermore, in the cleaning apparatus 1 according to an embodiment of the present disclosure, the cover closing device 400 may be provided separately from the cover opening device 300, thereby closing the dust container cover 11 stably.

[0113] The cover closing device 400 may be configured to return to the state shown in FIG. 10 after closing the dust container cover 11.

[0114] More specifically, referring to FIGS. 10 and 16, after the cover closing device 400 completes closing the dust container cover 11, the closing drive motor 410 may rotate the closing drive shaft 411 counterclockwise from the state as shown in FIG. 16.

[0115] When the closing drive shaft 411 rotates counterclockwise, the first closing link 420 may rotate counterclockwise together with the closing drive shaft 411. The second closing link 430 may rotate clockwise relative to the first closing link 420 when the first closing link 420 rotates counterclockwise.

[0116] One end 432 of the second closing link 430 may rotate clockwise relative to the first closing link 420, and the other end 431 thereof may rotate clockwise relative to the rotary lever 440. The second closing link 430 may move in a direction of pulling down the rotary lever 440.

[0117] The rotary lever 440 may rotate to a position shown in FIG. 10 in response to the movement of the second closing link 430. The rotary lever 440 may rotate clockwise around the main body coupling portion 443. The rotary lever 440 may rotate counterclockwise relative to the second closing link 430.

[0118] The position of the rotary lever 440 shown in FIG. 10 may be defined as a first position, and the position of the rotary lever 440 shown in FIG. 16 may be defined as a second position.

[0119] With such a configuration, the cleaning apparatus 1 according to an embodiment of the present disclosure may be configured such that the rotary lever 440 provided to close the dust container cover 11 forms a portion of the channel provided in the duct portion 120, thereby taking advantages in terms of space utilization.

[0120] FIG. 17 shows a control block diagram of the docking station shown in FIG. 1.

[0121] Referring to FIG. 17, the docking station 3 of the cleaning apparatus 1 according to an embodiment of the present disclosure may include a station operator 108 and a station controller 109.

[0122] The station operator 108 may be provided to receive input from the user. The station operator 108 may be provided to transmit input received from the user to the station controller 109.

[0123] The station controller 109 may be configured to control the opening drive motor 310 and the closing drive motor 410 based on the input received from the station operator 108.

[0124] More specifically, when mounting the cleaner 2 on the docking station 3 and desiring to empty the dust container 10, the user may make the input through the station operator 108. The station controller 109, which receives the input from the station operator 108, may open the dust container cover 11 by operating the open-

ing drive motor 310.

[0125] In response to the user wishing to close the dust container cover 11, input may be made through the station operator 108. The station controller 109, which receives the input from the station operator 108, may close the dust container cover 11 by operating the closing drive motor 410.

[0126] The cleaning apparatus 1 according to an embodiment of the present disclosure may be configured to automatically open and close the dust container cover 11 depending on the user's selection. In other words, if the user wishes to close the dust container cover 11 directly, a separate input to the station operator 108 may not be required. The user may separate the cleaner 2 from the docking station 3 and then close the open dust container cover 11 directly.

[0127] FIG. 18 shows a cover closing device according to another embodiment of the present disclosure. FIG. 19 shows a state in which the cover closing device shown in FIG. 18 closes the connecting port of the station main body.

[0128] With reference to FIGS. 18 and 19, a cover closing device 500 according to another embodiment of the present disclosure will be described in detail. However, a detailed description of the same configuration as the embodiment shown in FIGS. 7 and 14 may be omitted.

[0129] Referring to FIGS. 18 and 19, the cover closing device 500 may include a closing drive motor 510 provided to provide driving force, a first closing link 520 provided to rotate by receiving the driving force of the closing drive motor 510, a second closing link 530 provided to move by a rotation of the first closing link 520, and a rotary lever 540 provided to rotate by an movement of the second closing link 530.

[0130] The cover closing device 500 may include the closing drive motor 510 which provides the driving force and includes a closing drive shaft 511 provided to rotate by the driving force, the first closing link 520 provided to rotate together with the closing drive shaft 511, and the second closing link 530 provided to rotate and move by the rotation of the first closing link 520.

[0131] The first closing link 520 may have one end 521 coupled to the closing drive shaft 511 and rotating together with the closing drive shaft 511.

[0132] The configurations of the closing drive motor 510, the first closing link 520, and the second closing link 530 of the cover closing device 500 according to another embodiment shown in FIGS. 18 and 19 may be provided in the same manner as the closing drive motor 410, the first closing link 420, and the second closing link 430 of the cover closing device 400 as shown in FIGS. 7 and 14.

[0133] The rotary lever 540 may include a main body coupling portion 543 rotatably coupled to the station main body 100. In response to the rotary lever 540 rotating about the main body coupling portion 543 as a rotation axis, the rotary lever 540 may close the dust container cover 11.

[0134] Referring to FIGS. 18 and 19, the rotary lever 540 of the cover closing device 500 may be formed to cover the connecting port 101 formed on the upper portion of the station main body 100. The rotary lever 540 may be provided in a size and shape corresponding to the connecting port 101.

[0135] Referring to FIG. 18, while contaminants enter the duct portion 120, the rotary lever 540 may be in a position to form a channel within the duct portion 120. Accordingly, the rotary lever 540 may guide the contaminants entering from the dust container 10 of the cleaner 2 mounted on the docking station 3 to the collecting portion 140.

[0136] Referring to FIG. 19, when the cleaner 2 is separated from the docking station 3, the cover closing device 500 may move the rotary lever 540 to allow the rotary lever 540 to close the connecting port 101. In contrast to the embodiment shown in FIG. 7, after closing the dust container cover 11 of the cleaner 2, the cover closing device 500 may not move the rotary lever 540 to the inside of the duct portion 120 and may allow the rotary lever 540 to maintain the dust container cover 11 in a lifted state.

[0137] With such an arrangement, the cover closing device 500 according to another embodiment of the present disclosure may cover the connecting port 101 when the cleaner 2 is separated from the docking station 3, thereby preventing foreign substances from entering the inside of the docking station 3 and providing a nice appearance.

[0138] FIG. 20 shows a front view of the cover opening device according to another embodiment of the present disclosure.

[0139] FIG. 21 shows a state in which the dust container cover of the cleaning apparatus is opened by the cover opening device shown in FIG. 20.

[0140] With reference to FIGS. 20 and 21, a cover opening device 600 according to another embodiment of the present disclosure will be described in detail. However, a detailed description of the same configuration as the embodiment shown in FIGS. 9 and 12 may be omitted.

[0141] Referring to FIGS. 20 and 21, the cover opening device 600 may include an opening drive motor 610 provided to rotate an opening drive shaft 611, a first opening link 620, a second opening link 630, and a rotation opening guide 640. The first opening link 620 and the second opening link 630 may be provided in the same structure as the first opening link 620 and the second opening link 630 shown in FIGS. 9 and 12.

[0142] The first opening link 620 may have one end 621 coupled to the opening drive shaft 611 and rotating together with the opening drive shaft 611, and the other end 622 coupled to on end 632 of the second opening link 620.

[0143] The second opening link 630 may include one end 632 coupled to the other end 622 of the first opening link 620, and an opening protrusion insertion hole 631 provided to insert an opening rotation protrusion 644 of

the rotation opening guide 640. The opening protrusion insertion hole 631 may be provided at the other end of the second opening link 630.

[0144] The rotation opening guide 640 may rotate with an opening shaft coupling portion 643 as the center of rotation.

[0145] The cover opening device 600 may eliminate a push lever, a switch, a stopper, a first opening limiting protrusion, and a second opening limiting protrusion. In other words, productivity may be improved by simplifying the configuration of the cover opening device 600.

[0146] The cover opening device 600 may rotate the rotation opening guide 640 in the first direction or the second direction by operating the opening drive motor 610. As the rotation opening guide 640 rotates in the second direction, a pressing protrusion 641 of the rotation opening guide 640 may press the button 17. When the button 17 is pressed, the dust container cover 11 may be opened.

[0147] In contrast to the cover opening device 300 shown in FIGS. 9 and 12, in the cover opening device 600 according to another embodiment of the present disclosure, regardless of a switch, a stopper, a first opening limiting protrusion, and a second opening limiting protrusion, the dust container cover 11 may be opened and closed by the opening drive motor 610 rotating in the first or second direction within a predetermined angular range. For example, the opening drive motor 610 may be preset to rotate the opening drive shaft 611 by 60° in the first direction from the reference position. Furthermore, the opening drive motor 610 may be preset to rotate the opening drive shaft 611 by 60° in the second direction after the opening drive shaft 611 has been rotated by 60° in the first direction from the reference position. This setup may allow the cover opening device 600 according to another embodiment of the present disclosure to controllably limit the range of movement of the opening drive shaft 611 without the need for the switch, the stopper, the first opening limiting protrusion, and the second opening limiting protrusion.

[0148] While the present disclosure has been particularly described with reference to exemplary embodiments, it should be understood by those of skilled in the art that various changes in form and details may be made without departing from the spirit and scope of the present disclosure.

Claims

1. A cleaning apparatus, comprising:

a cleaner including a dust container in which contaminants are collected, and a dust container cover rotatably coupled to the dust container to open or close the dust container; and
a docking station on which the cleaner is detachably mounted, the docking station, when the cleaner is mounted, including a collecting portion configured to collect the contaminants in the dust container and a duct portion forming a channel to guide the contaminants in the dust container to the collecting portion;
wherein the docking station includes:

a cover opening device configured to open the dust container cover; and
a cover closing device configured to close the dust container cover, wherein the cover closing device includes a rotary lever configured to be movable between a first position forming a portion of the channel of the duct portion and a second position supporting the dust container cover in a closing direction.

2. The cleaning apparatus of claim 1, wherein the cover closing device includes a closing drive motor configured to generate power to move the rotary lever;

a first closing link connected to the closing drive motor; and
a second closing link connected to the first closing link and the rotary lever.

3. The cleaning apparatus of claim 2, wherein the duct portion includes a duct portion opening to form a space so that the first closing link or the second closing link moves, and
the rotary lever is provided to correspond to the duct portion opening.

4. The cleaning apparatus of claim 2, wherein in response to the rotary lever being in the first position, the closing drive motor, the first closing link, and the second closing link are located outside the channel of the duct portion.

5. The cleaning apparatus of claim 2, wherein the cover opening device includes an opening drive motor having a different drive axis from the closing drive motor.

6. The cleaning apparatus of claim 5, wherein the cover opening device includes a switch configured to set an initial position of the opening drive motor.

7. The cleaning apparatus of claim 1, wherein the rotary lever is positioned in the first position in response to the cleaner being separated from the docking station.

8. The cleaning apparatus of claim 1, wherein the docking station includes a connecting port formed to connect the dust container and the duct portion when the cleaner is mounted, and
the rotary lever is provided to correspond to the con-

necting port.

9. The cleaning apparatus of claim 8, wherein the rotary lever is positioned to close the connecting port when the cleaner is separated from the docking station.

10. The cleaning apparatus of claim 1, wherein the cover closing device is located in the duct portion.

11. The cleaning apparatus of claim 1, wherein the cleaner is mounted on the docking station along the direction of gravity.

12. The cleaning apparatus of claim 1, wherein the cover opening device is located outside the channel of the duct portion.

13. The cleaning apparatus of claim 1, wherein the cleaner further includes an elastic member configured to elastically support the dust container cover in the closing direction.

14. The cleaning apparatus of claim 1, wherein the cover opening device is located on one side of the duct portion, and
the cover closing device is located on an other side opposite to one side of the duct portion.

15. The cleaning apparatus of claim 1, wherein the cleaner further includes a button configured to hold or release the dust container cover in a closed position, and
the cover opening device is configured to press or release the button.

FIG. 1

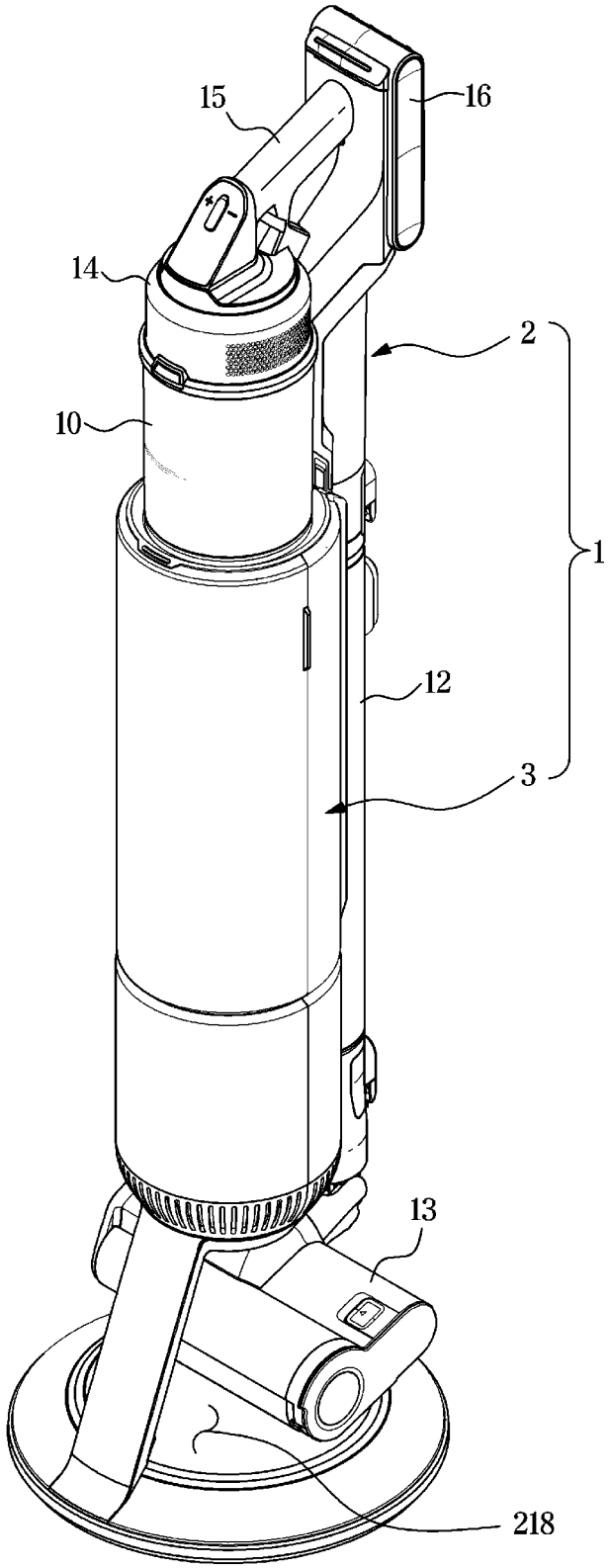


FIG. 2

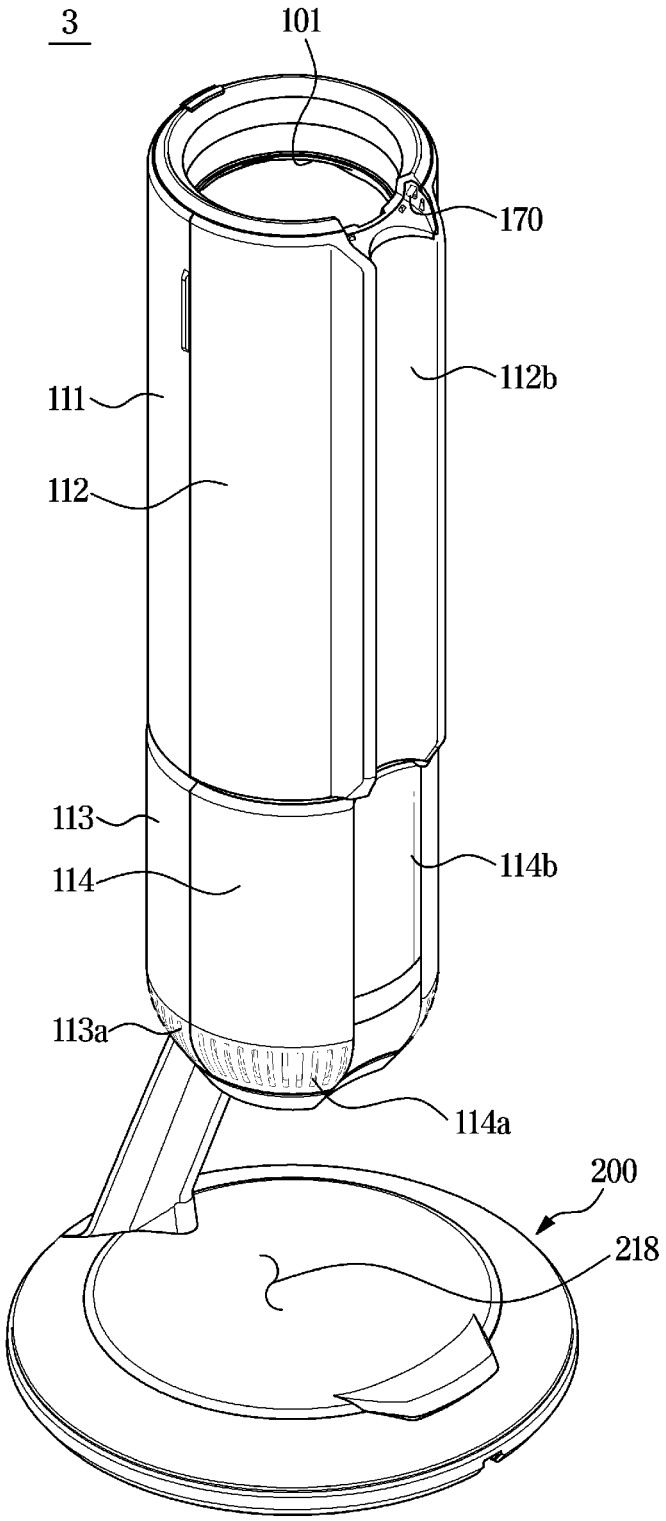
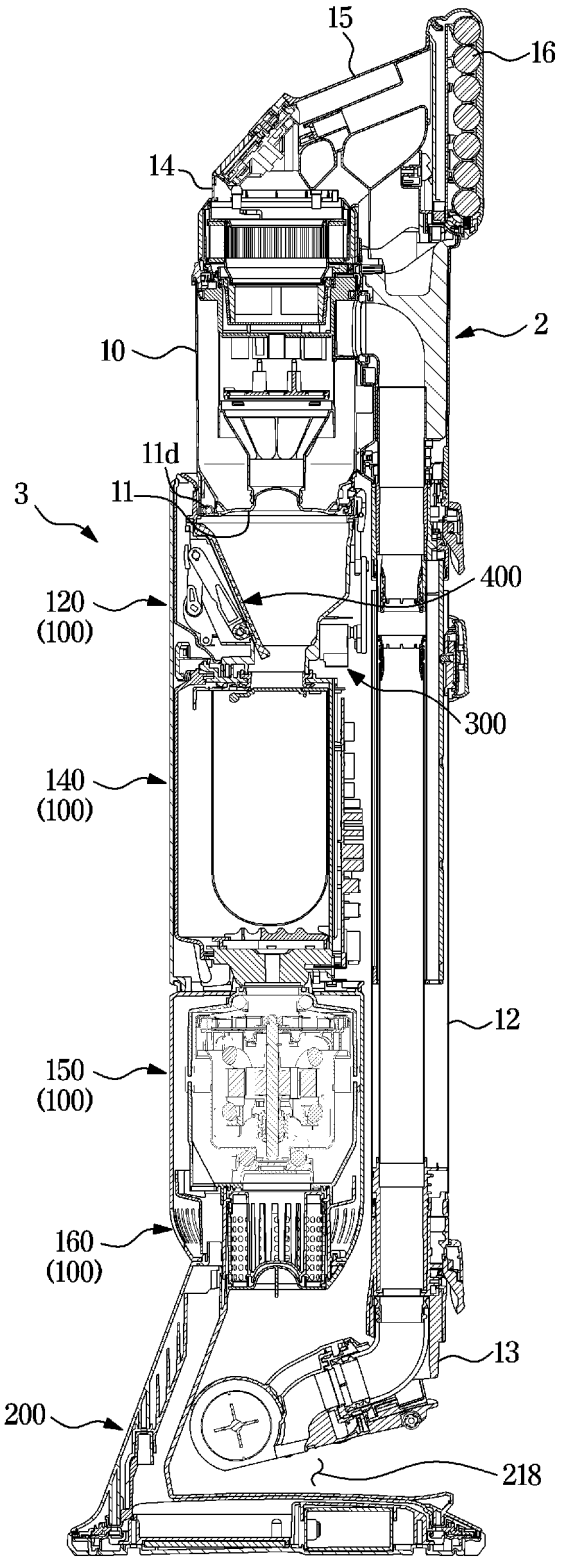


FIG. 3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10
11d
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200
218

FIG. 4

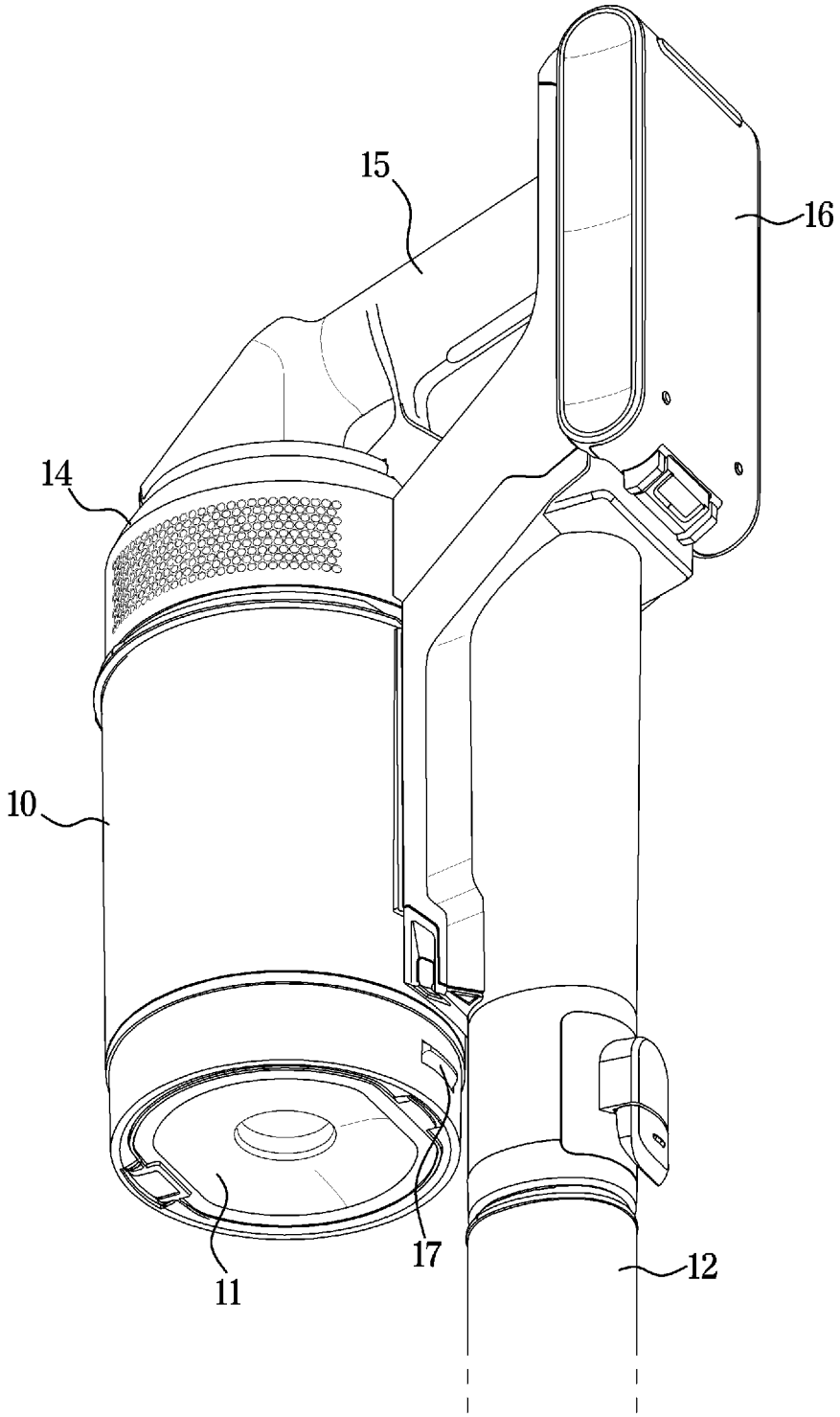


FIG. 5

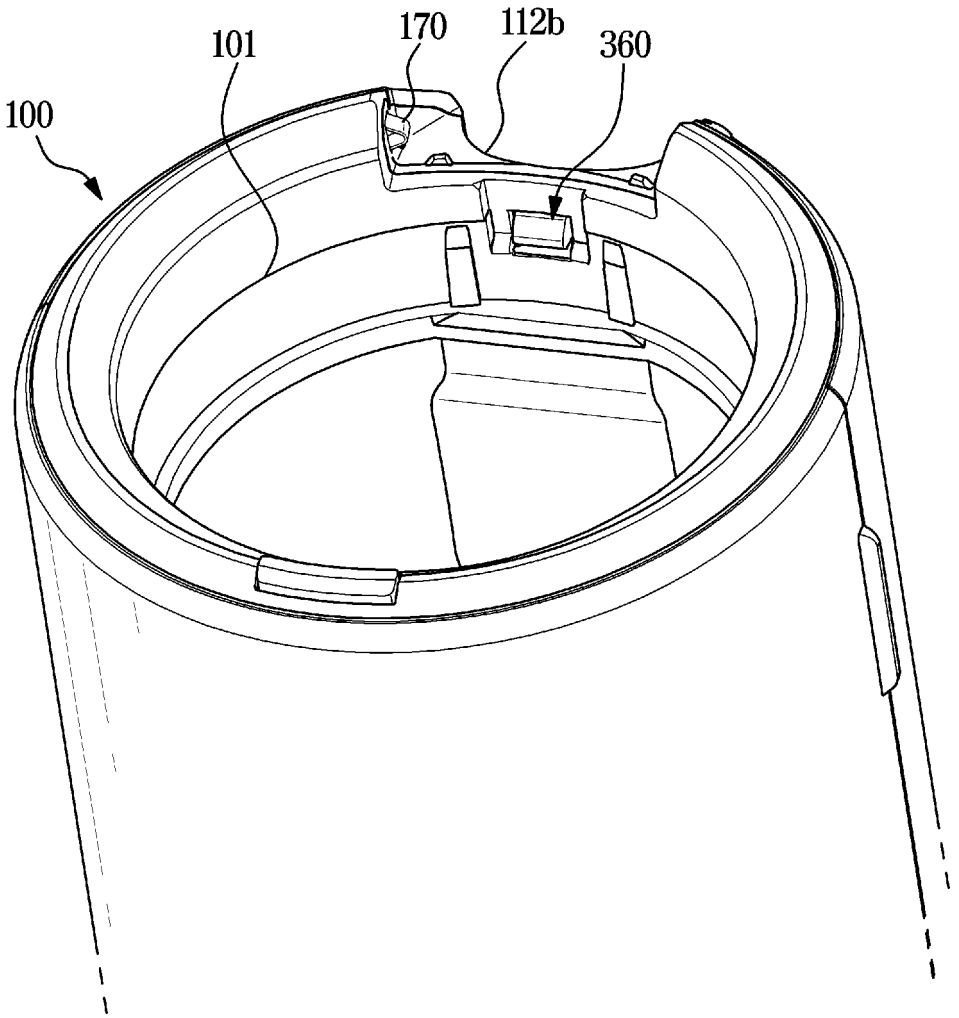
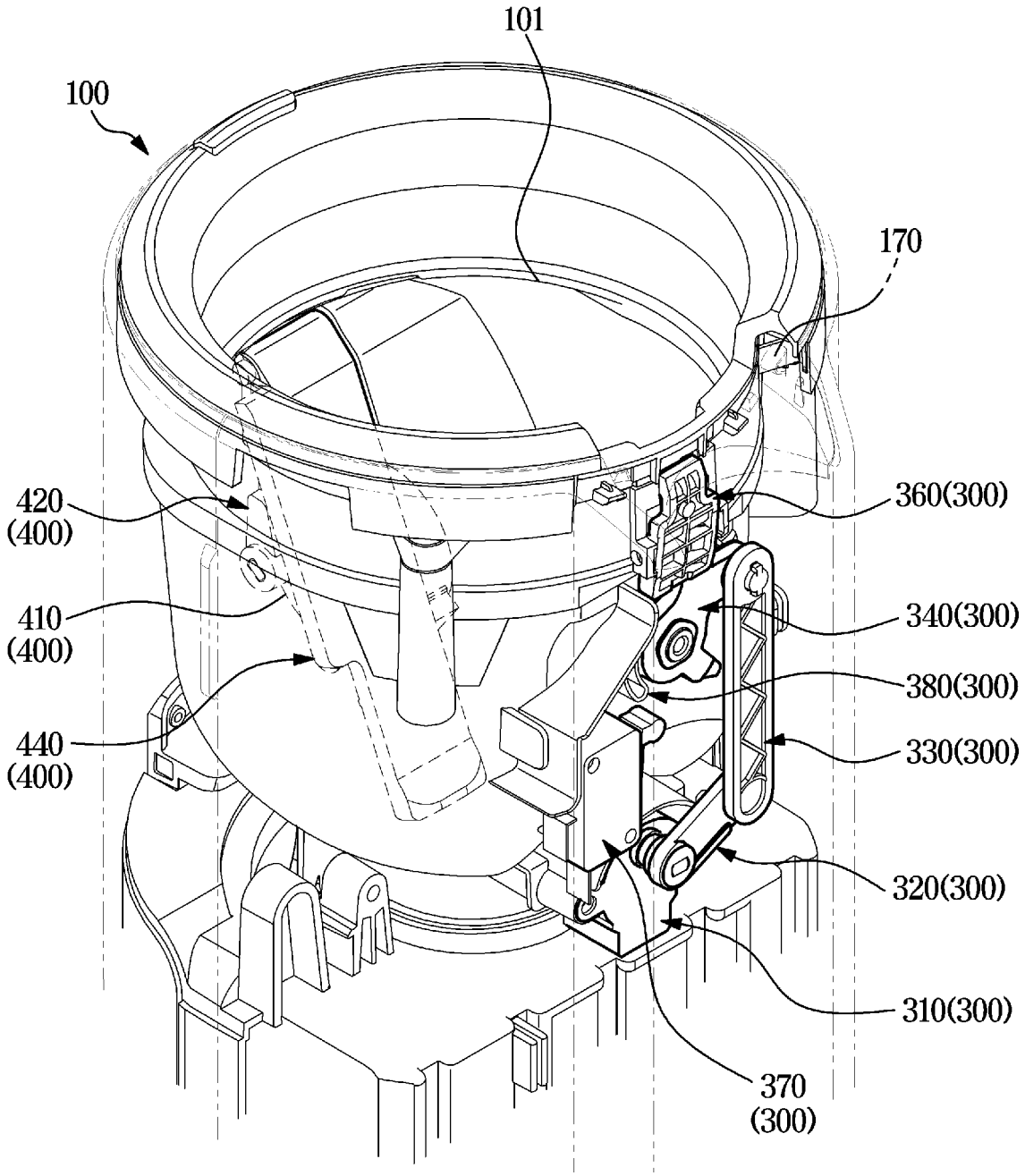


FIG. 6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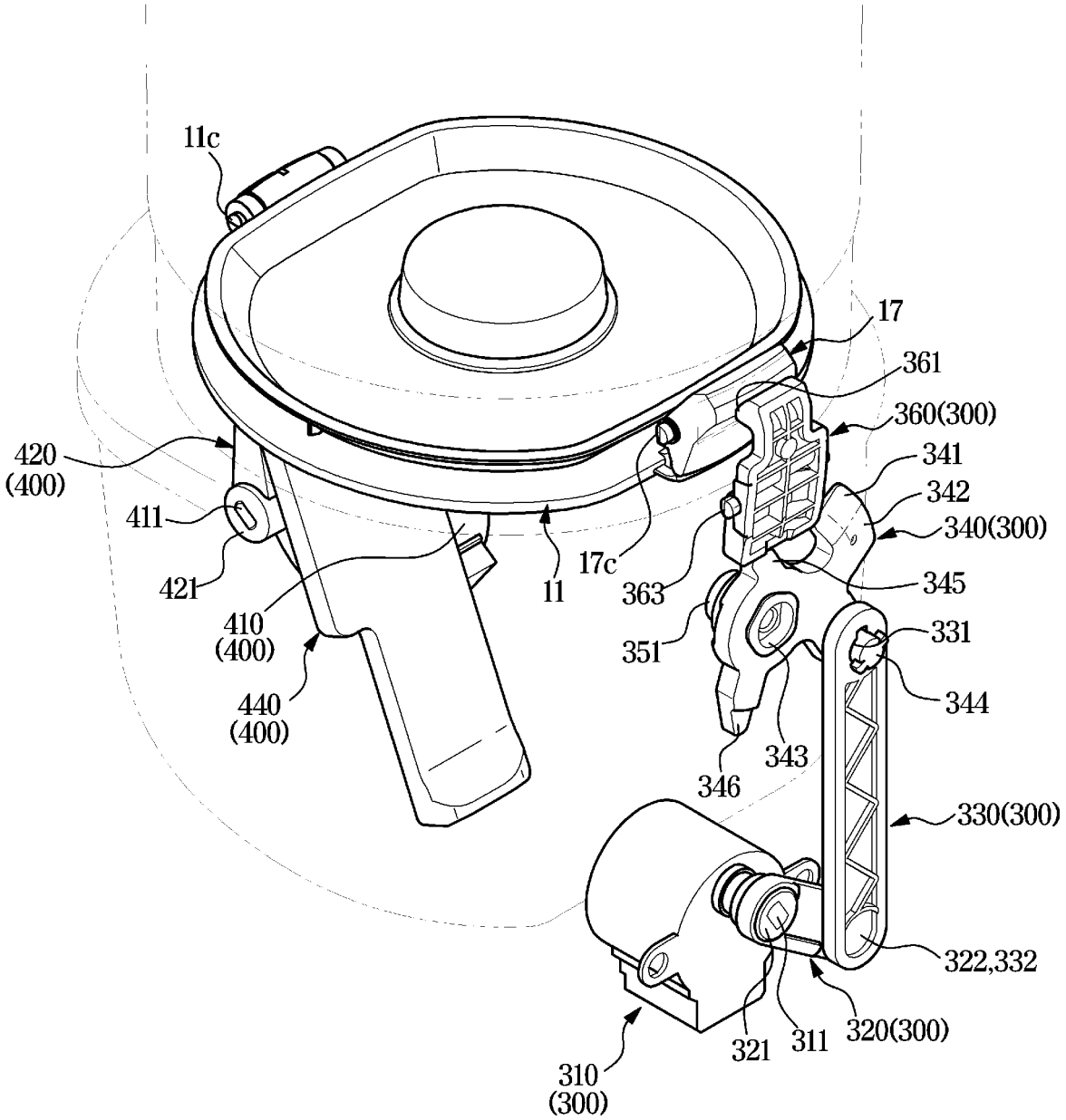
370
(300)

FIG. 7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(300)

FIG. 8

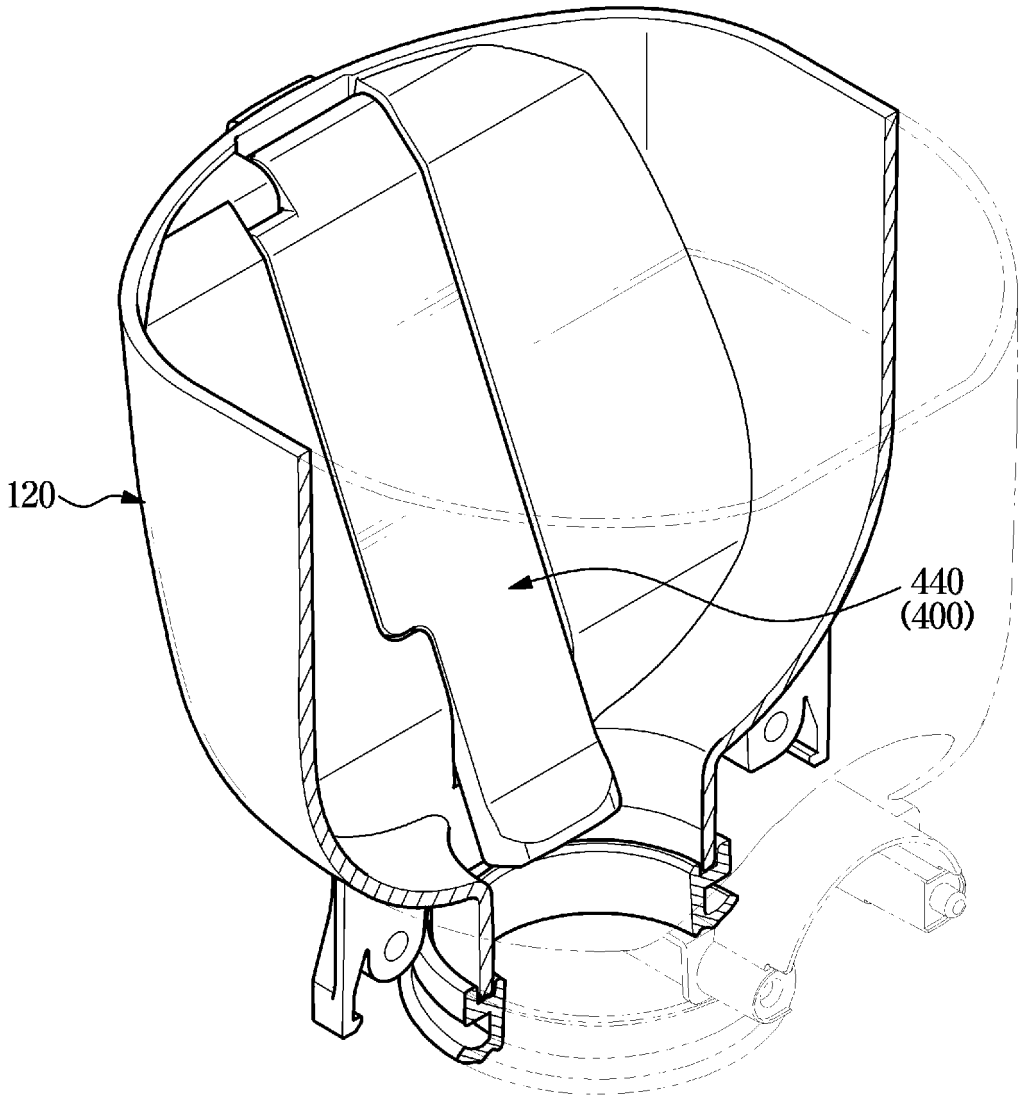

FIG. 9

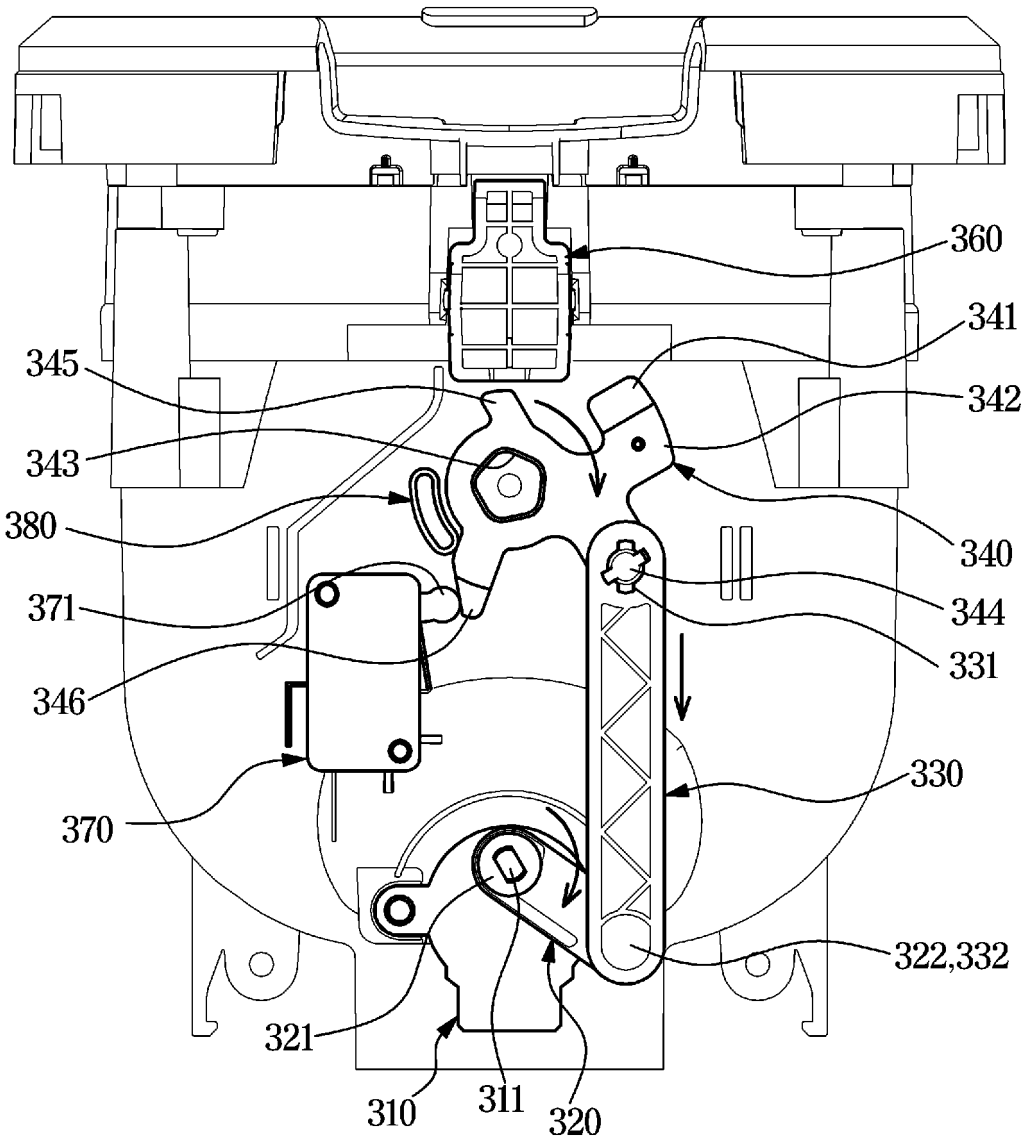
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FIG. 10

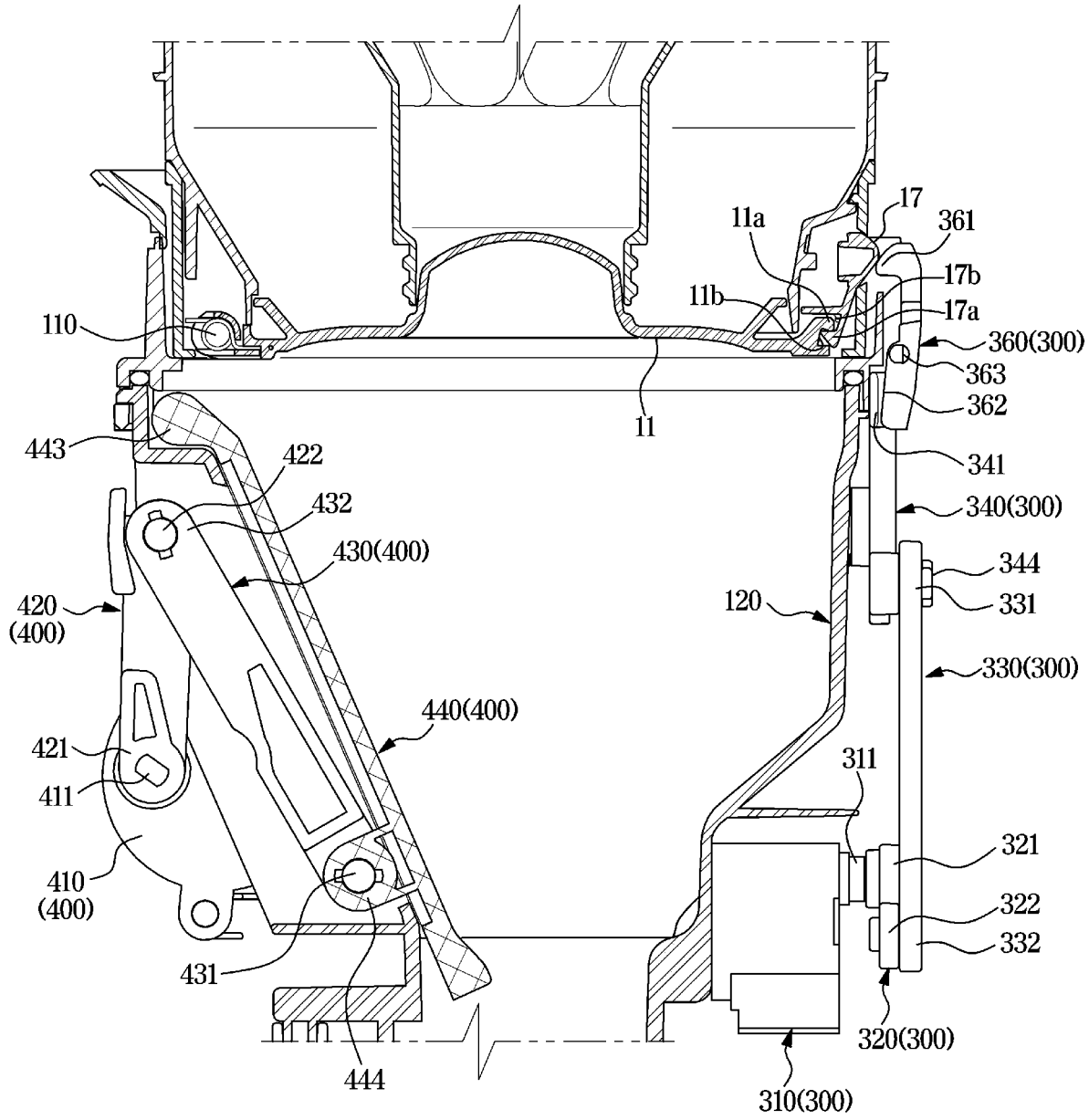
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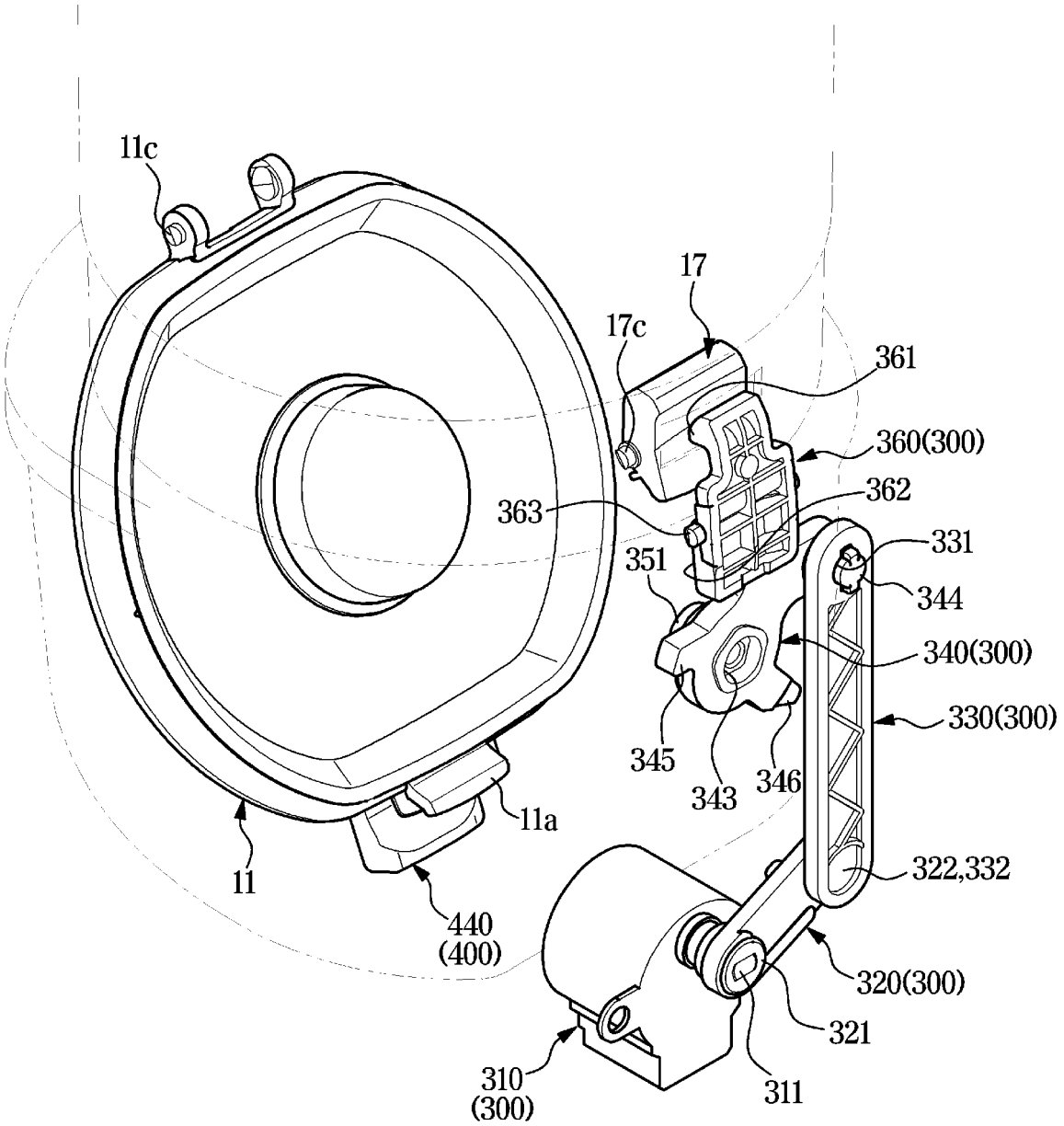
FIG. 11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(300)
311

FIG. 12

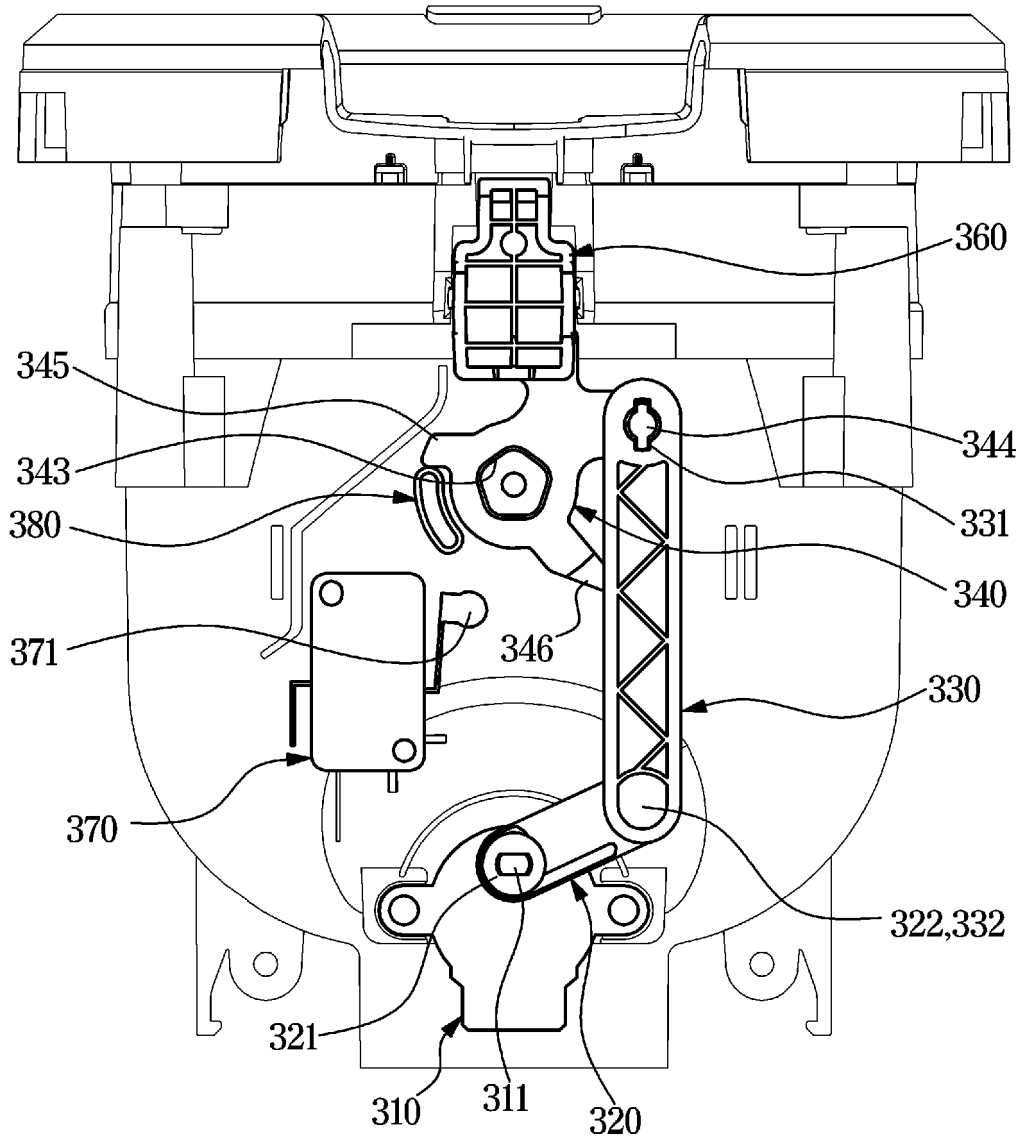
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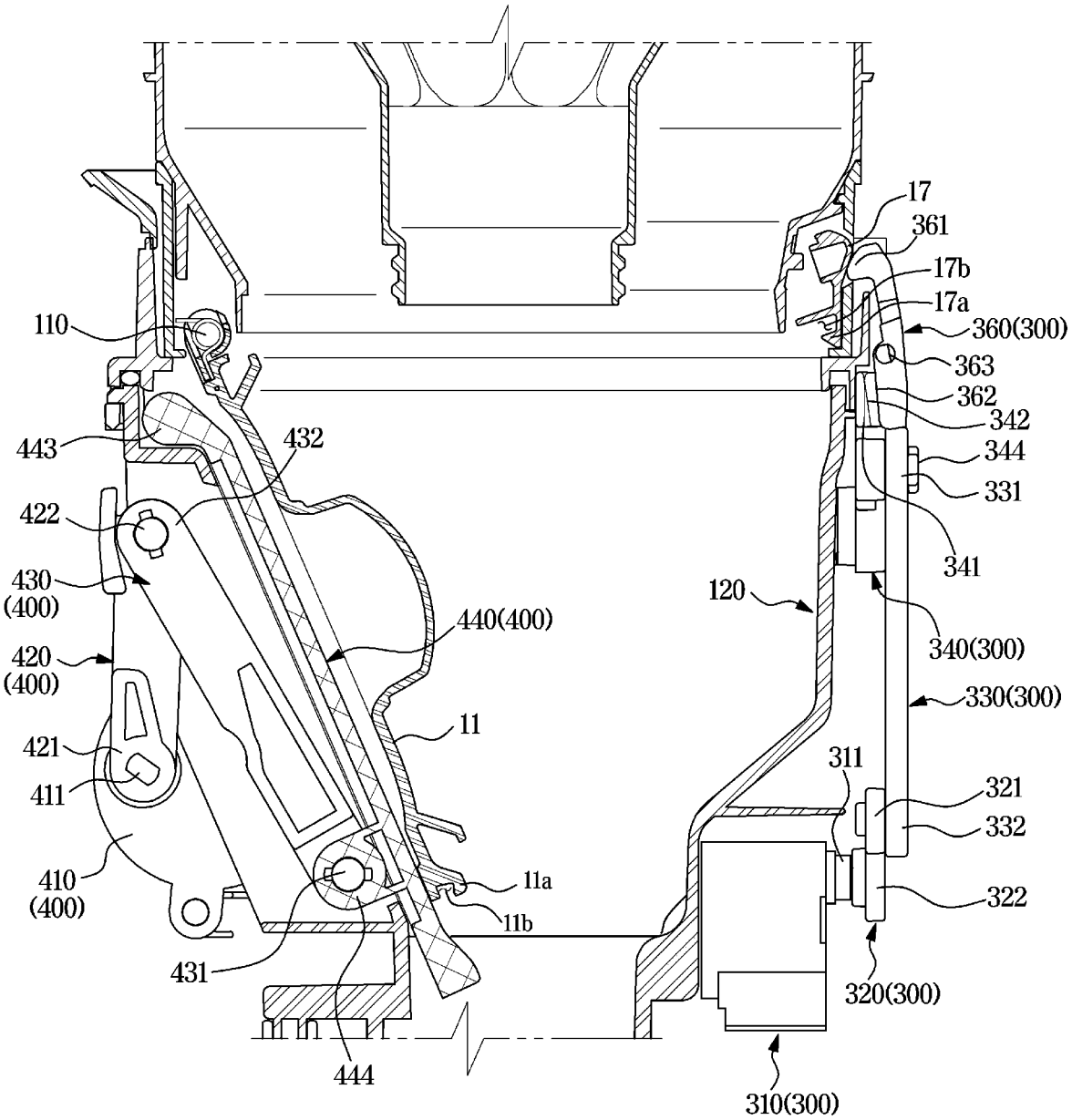
FIG. 13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110
443
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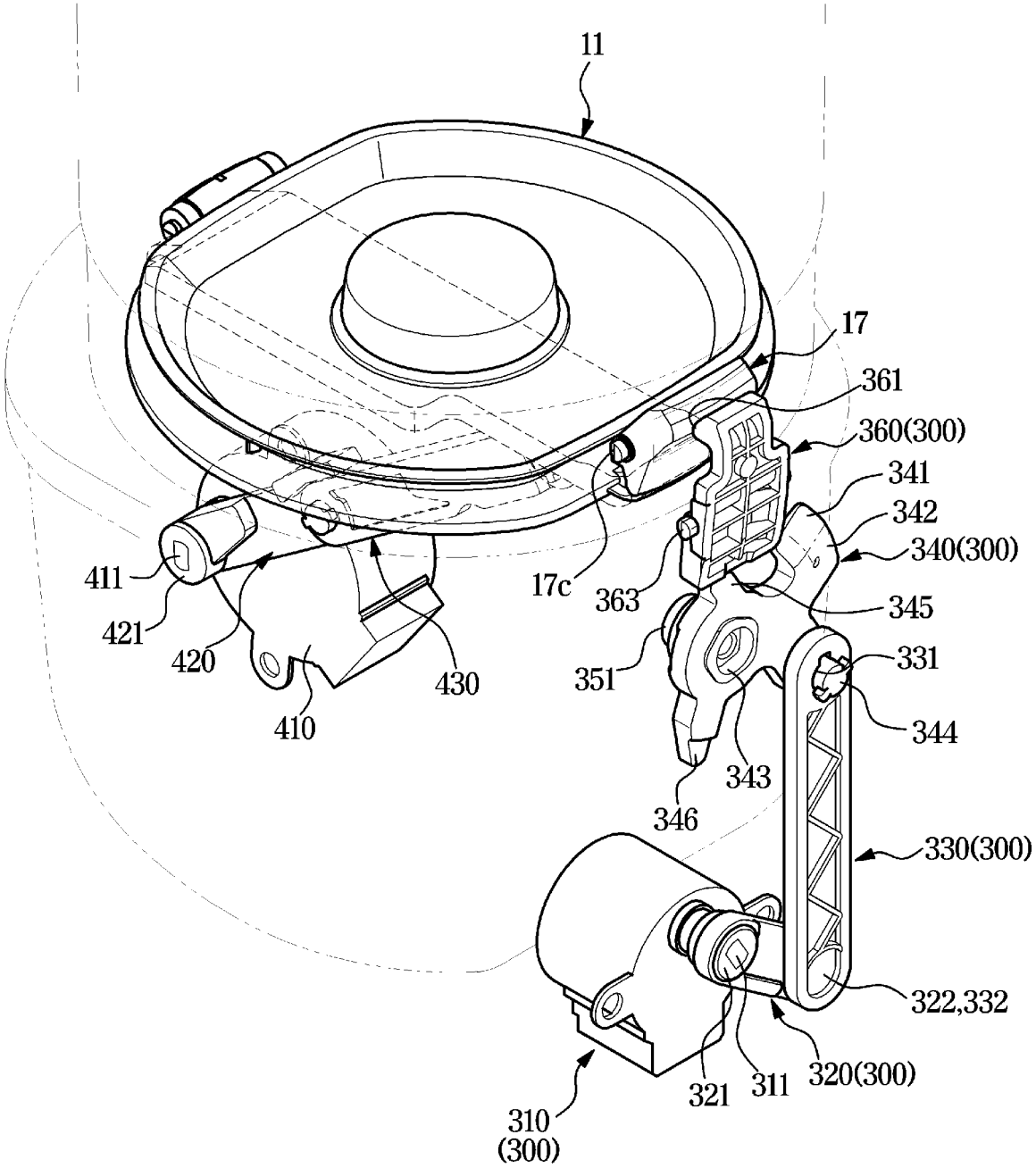
11b

FIG. 14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(300)
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363
17c
411
421
420
410
430

FIG. 15

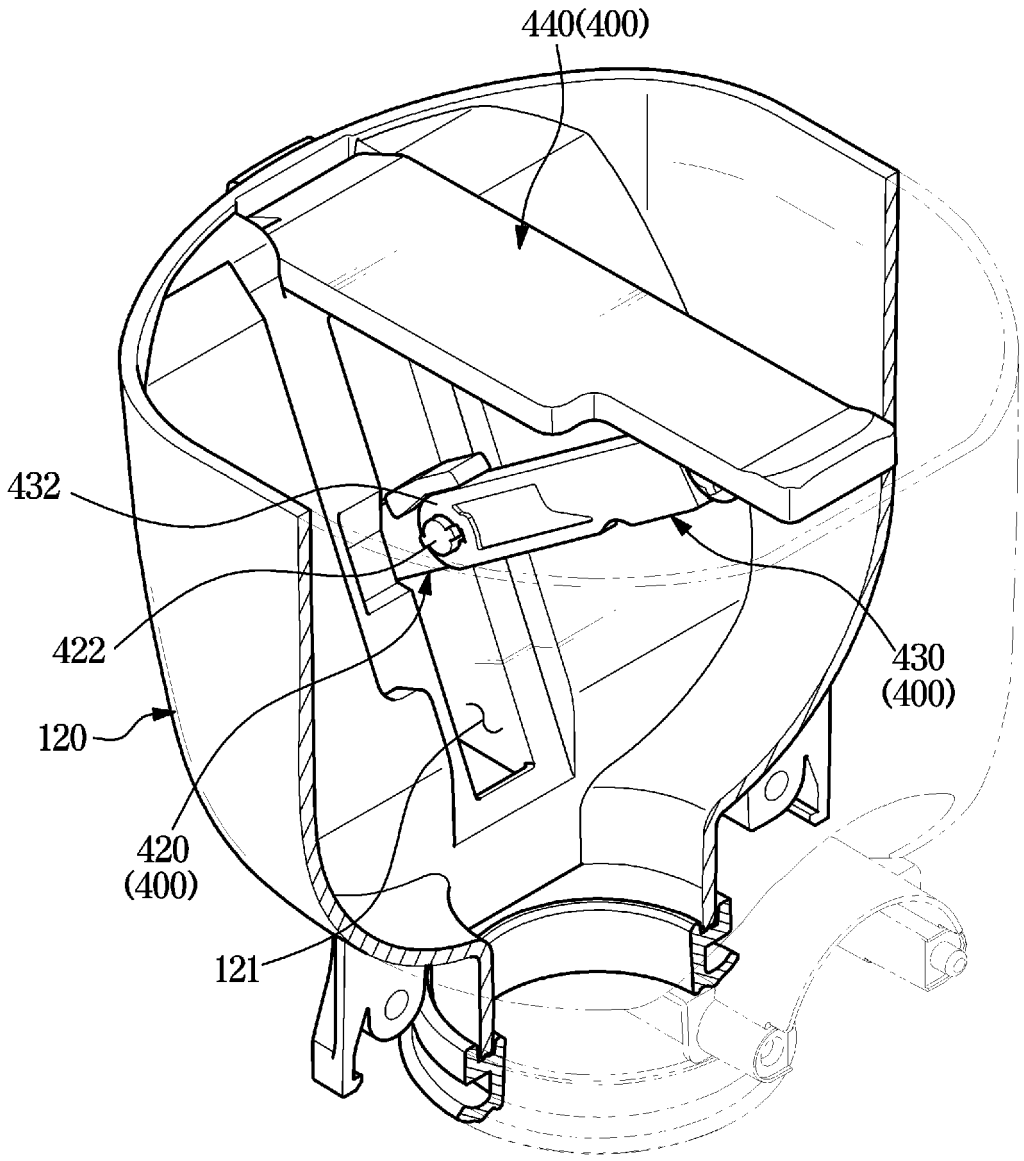
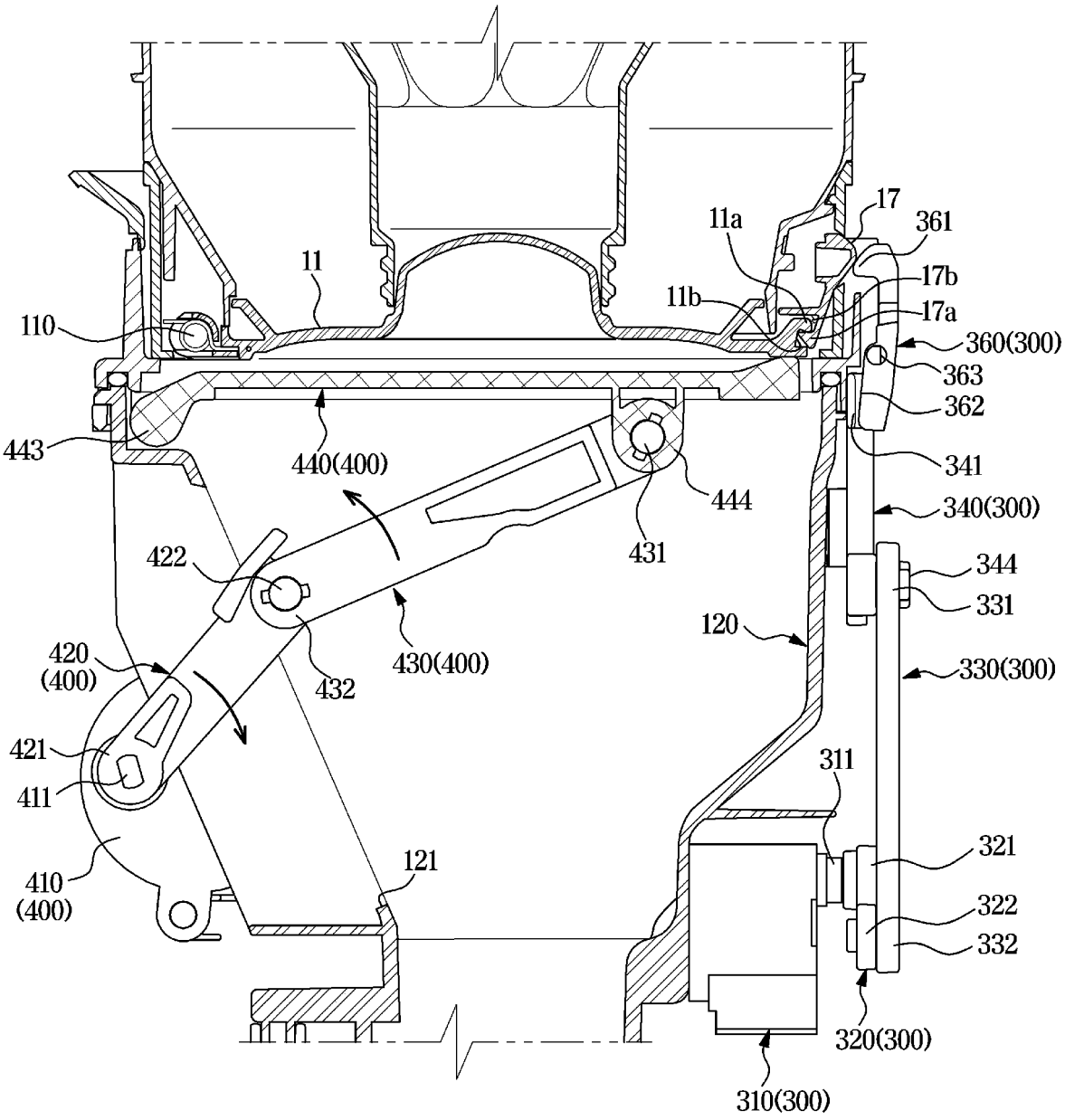


FIG. 16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330(300)
432
421
311
411
321
121
410
(400)
322
332
320(300)
310(300)

FIG. 17

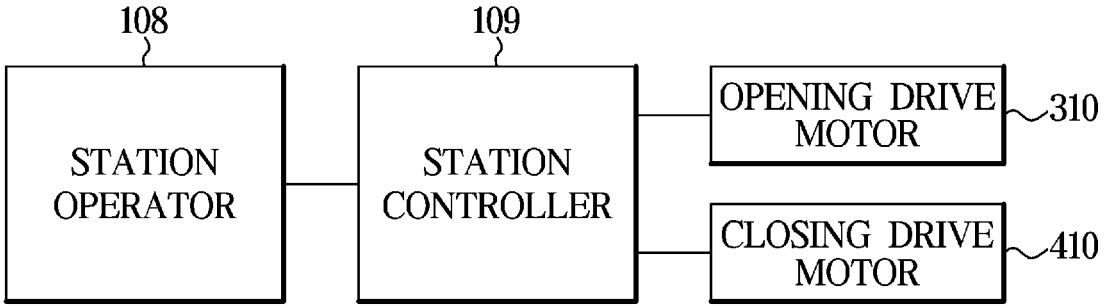

108
109
STATION OPERATOR
STATION CONTROLLER
OPENING DRIVE MOTOR
310
CLOSING DRIVE MOTOR
410

FIG. 18

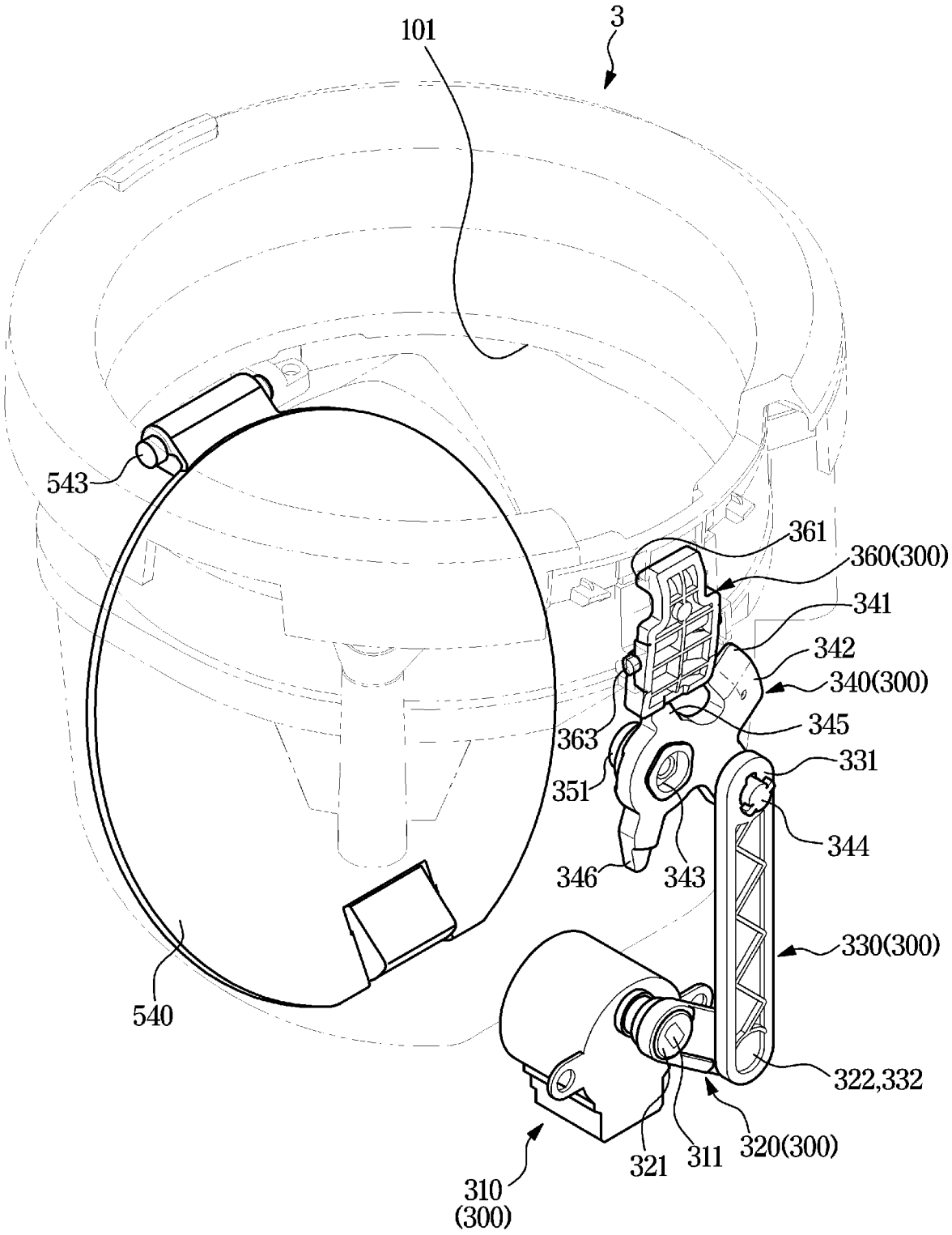

101
3
543
361
360(300)
341
342
340(300)
345
363
331
351
344
346
343
330(300)
540
322,332
320(300)
321
311
310
(300)

FIG. 19

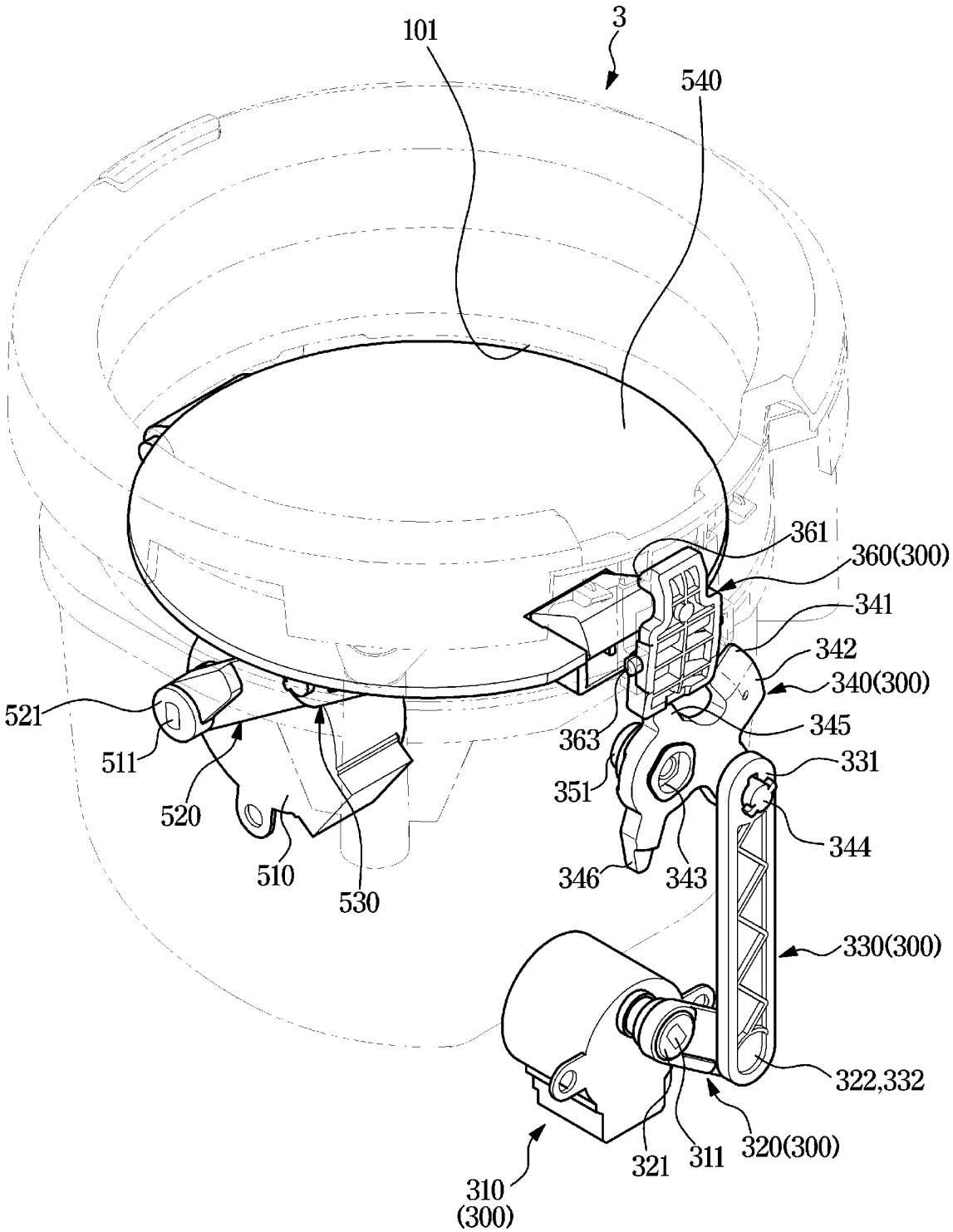

101
3
540
361
360(300)
341
342
340(300)
345
331
344
330(300)
322,332
320(300)
311
321
310
(300)
521
511
520
510
530
363
351
346
343

FIG. 20

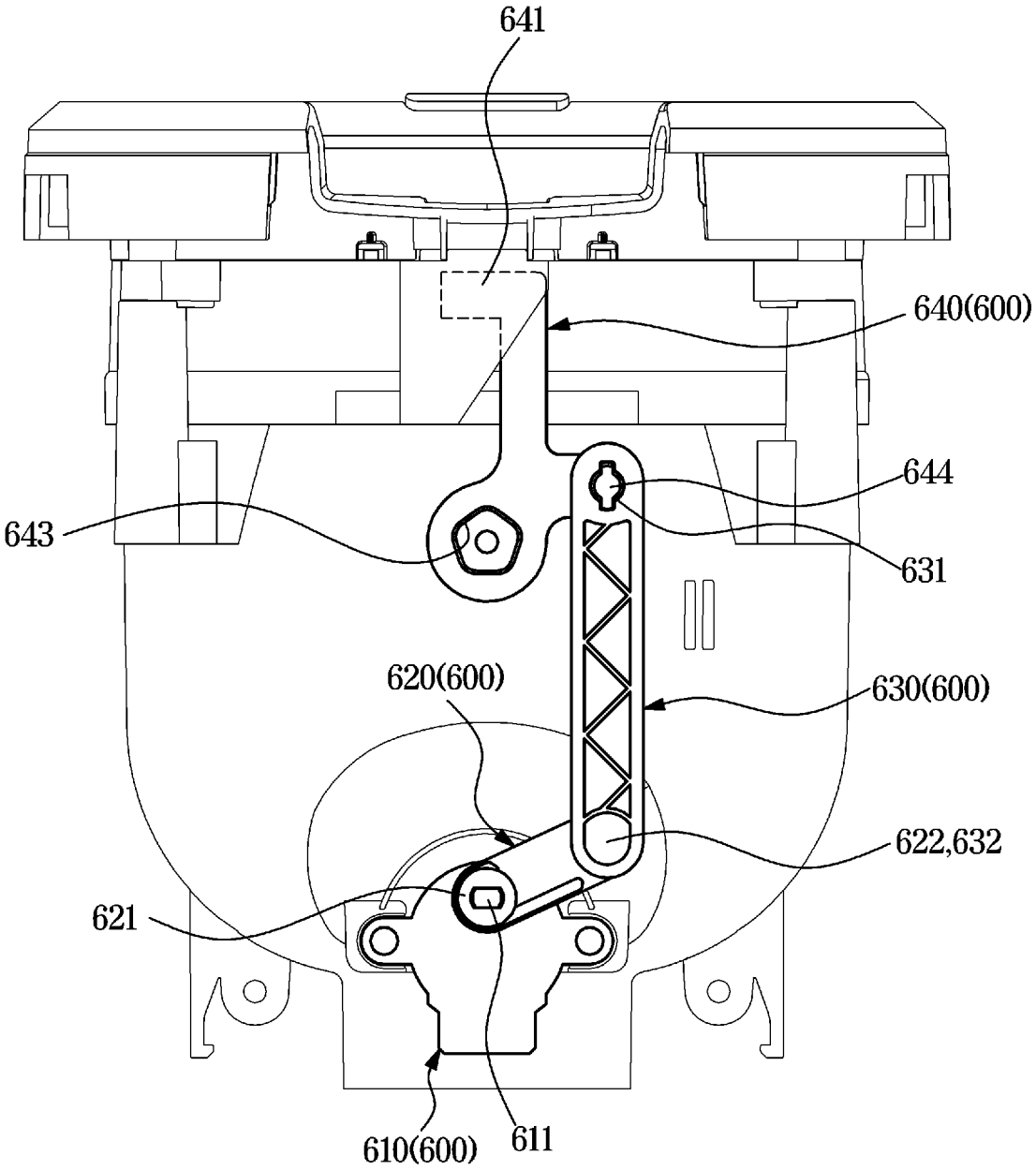
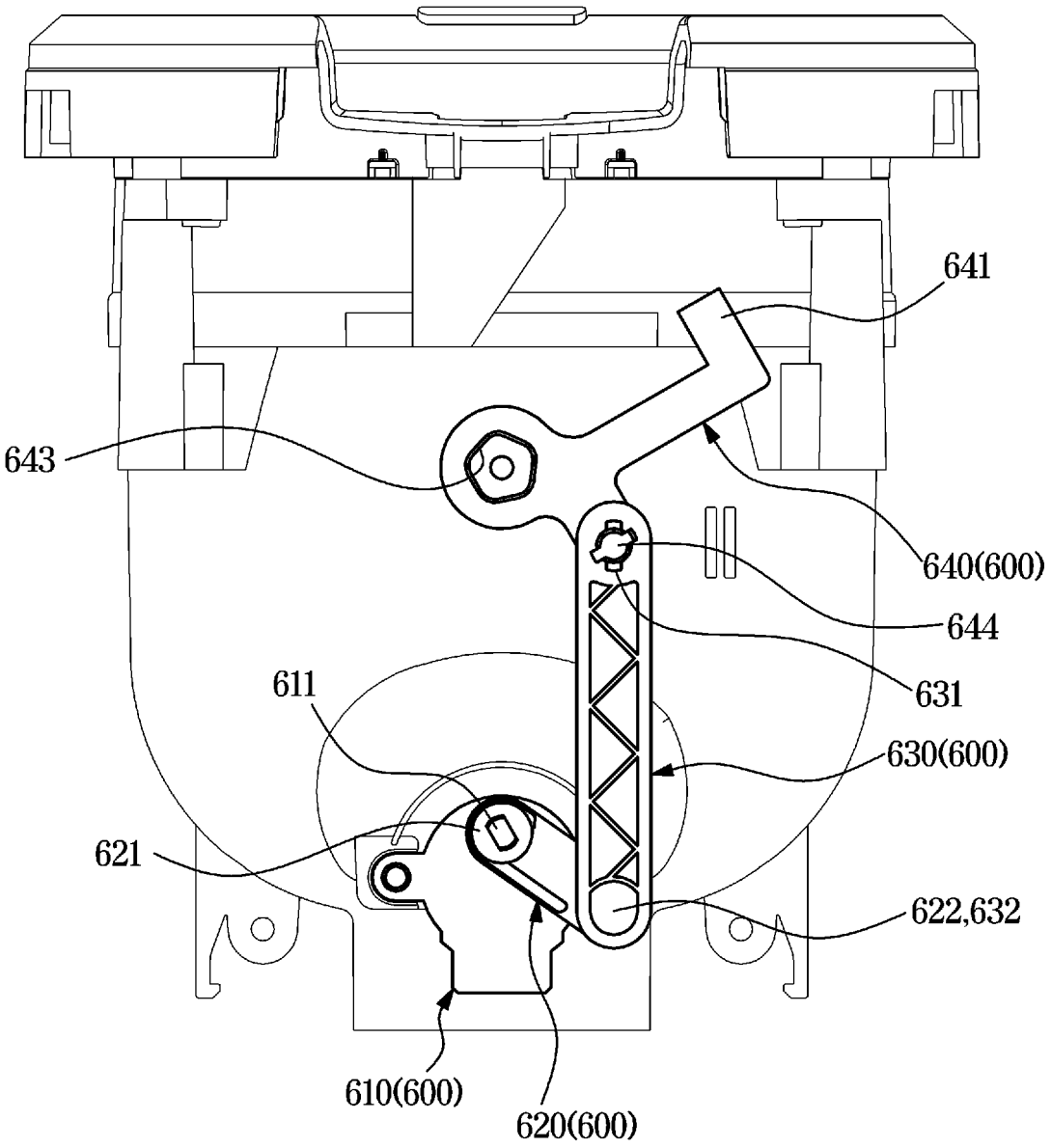


FIG. 21



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/010625

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/28(2006.01)i; **A47L 9/00**(2006.01)i; **A47L 7/00**(2006.01)i; **A47L 9/10**(2006.01)i; **A47L 5/24**(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)

A47L 9/28(2006.01); A47L 9/10(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: 청소기(vacuum cleaner), 도킹 스테이션(docking station), 도어(door), 커버(cover), 폐쇄(close), 개방(open), 레버(lever), 버튼(button), 링크(link)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 10-2021-0019940 A (LG ELECTRONICS INC.) 23 February 2021 (2021-02-23) See paragraphs [0154] and [0300]-[0397] and figures 1-6 and 10-13.	1-15
Y	KR 10-2021-0000397 A (SAMSUNG ELECTRONICS CO., LTD.) 05 January 2021 (2021-01-05) See paragraphs [0078]-[0090] and figures 8-12.	1-15
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A	JP 2016-015975 A (TOSHIBA CORP. et al.) 01 February 2016 (2016-02-01) See claims 1-6 and figures 1-7.	1-15

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"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
16 November 2022	**16 November 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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