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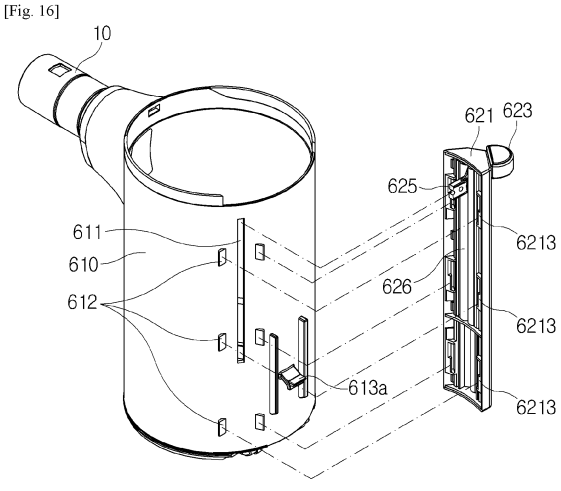
(54) CLEANING DEVICE

(57) The present disclosure relates to a cleaner which includes: a dustbin having a slit formed on one side thereof; a compression lever housing disposed on an outside of the slit and mounted to the dustbin; a compression plate disposed on an inside of the dustbin and configured to ascend in a direction in which the slit extends; and a sealer disposed in the compression lever housing, coming in close contact with the slit, and extending along the slit. Therefore, the cleaner according to the present disclosure may prevent a problem that is likely to occur during an operation of the compression lever assembly because of trapped dust, and can be maintained in a cleaner state as the user may easily separate the cleaner by assemblies to sterilize the parts.

[Fig. 16]



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Description

[0001] The present document claims the priority and benefits of Korea Patent Application No. 10-2021-0050847, filed on April 20, 2021, which is incorporated by reference in its entirety as part of the disclosure of this patent document.

Field

[0002] The present disclosure relates to a cleaner, more particularly, a cleaner that sucks in outside air by negative pressure, separates dust from the sucked air to collect it in the dustbin, and reduces a volume of the dust by compressing the collected dust.

Background

[0003] In general, a cleaner refers to an electrical appliance that draws in small garbage or dust by sucking air using electricity and fills a dustbin provided in a product with the garbage or dust. Such a cleaner is generally called a vacuum cleaner.

[0004] The cleaners may be classified into a manual cleaner which is moved directly by a user to perform a cleaning operation, and an automatic cleaner which performs a cleaning operation while autonomously traveling. Depending on the shape of the cleaner, the manual cleaners may be classified into a canister cleaner, an upright cleaner, a handy cleaner, a stick cleaner, and the like.

[0005] The canister cleaners were widely used in the past as household cleaners. However, recently, there is an increasing tendency to use the handy cleaner and the stick cleaner in which a dustbin and a cleaner main body are integrally provided to improve convenience of use.

[0006] In the case of the canister cleaner, a main body and a suction port are connected by a rubber hose or pipe, and in some instances, the canister cleaner may be used in a state in which a brush is fitted into the suction port.

[0007] The handy cleaner (hand vacuum cleaner) has maximized portability and is light in weight. However, because the handy cleaner has a short length, there may be a limitation to a cleaning region. Therefore, the handy cleaner is used to clean a local place such as a desk, a sofa, or an interior of a vehicle.

[0008] A user may use the stick cleaner while standing and thus may perform a cleaning operation without bending his/her waist. Therefore, the stick cleaner is advantageous for the user to clean a wide region while moving in the region. The handy cleaner may be used to clean a narrow space, whereas the stick cleaner may be used to clean a wide space and also used to a high place that the user's hand cannot reach. Recently, modularized stick cleaners are provided, such that types of cleaners are actively changed and used to clean various places.

[0009] A prior art provides a cleaner that can compress dust inside the dustbin by operating the cleaning apparatus, and discharge dust from the dustbin easily. Hereinafter, the prior art will be described by referring to FIGS. 1 and 2. Reference numerals of FIGS. 1 and 2 are only limitedly used to describe this prior art, and will not be used for description of the cleaner according to the present disclosure.

[0010] FIG. 1 is a perspective view of a cleaner according to the prior art, and FIG. 2 is a view illustrating an arrangement of a moving part 730, a filter part, and an air guide. Referring to FIG. 2, a means for compressing dust according to the prior art includes the operating part 710, a transmission part 720, and the moving part 730. The operating part 710 is configured to operate the cleaner by finger pressing of the user. The moving part 730 is disposed inside the dustbin, and compresses dust inside the dustbin as it ascends and descends. The transmission part 720 is configured to transmit operation instructed by the operating part 710 to the moving part 730.

[0011] When the user operates the operating part 710, the operating part 710 drops. Since the operating part 710, the transmission part 710, and the moving part 730 are fixedly coupled to the cleaner, the transmission part 720 and the moving part 730 drop as the operating part 710 drops.

[0012] According toe the prior art, from one side of the dustbin, a guide body 180 protrudes radially outward. The guide body 180 is communicated with an internal space of the dustbin. On an upper surface of the guide body 180, a hole is formed to allow the transmission part 720 to be inserted thereinto. A portion of the transmission part 720 is inserted into an inside of the guide body through the hole, or a portion thereof is withdrawn outward from the guide body 180.

[0013] According to the prior art, a stroke length to which the moving part ascends and descends corresponds to a length of the transmission part 720. That is, referring to FIG. 2, the moving part 730 descends by as much as a length of the transmission part 720 to which the transmission part 720 is inserted into the guide body 180. However, there was a problem in that, since the moving part 730 must come in close contact with an upper part of the dustbin, and the operating part 710 and the transmission part 720 protrude toward an upper part of the guide body 180 and an upper part of the dustbin, respectively, the cleaner had inconvenience in terms of the operation and appearance.

[0014] Referring to FIG. 1, the prior art attempted to solve the problem by designing a height of the main body housing 3 on the dustbin to be sufficiently high, such that the operating part 710 is located below the upper surface of the main body of the cleaner even when the operating part 710 moves as far as possible on the upper surface of the dustbin, thereby the operating part 710 or the transmission part 720 is not caught by a furniture during cleaning. However, by this design, there was a problem in that the height of the main body of the cleaner could not be lowered to a certain level or higher.

[0015] In addition, according to the prior art, since the guide body 180 is communicated with the internal space of the dustbin, the stroke distance of the moving part 730 is further reduced when a lower end of the transmission part 720 is caught by the dust as the guide body 180 is trapped with the dust, and the moving part 730 cannot descend any more.

SUMMARY

[0016] The object of the present disclosure is to solve the problem of the prior art described above, which is to provide a cleaner capable of sufficiently ascending a compression plate regardless of a height of the dustbin and a height of the main body of the cleaner.

[0017] Another object of the present disclosure is to provide a cleaner capable of preventing the compression plate from stopping to descend further due to the dust being trapped when the compression plate ascends and descends.

[0018] Still another object of the present disclosure is to provide a cleaner capable of ensuring the user to easily clean the cleaner such that the cleaner can stay clean by allowing the cleaner to be separated by assemblies.

[0019] Technical objects to be achieved by the present disclosure are not limited to the aforementioned objects, and those skilled in the art to which the present disclosure pertains may evidently understand other technical objects from the following description.

[0020] One embodiment is a cleaner, including: a dustbin having a slit formed on one side thereof; a compression lever housing disposed on an outside of the slit and mounted to the dustbin; a compression plate disposed on an inside of the dustbin and configured to ascend in a direction in which the slit extends; and a sealer disposed in the compression lever housing, coming in close contact with the slit, and extending along the slit.

[0021] The cleaner may further include: a compression rail disposed on an inside of the compression lever housing, and extending along the slit; and a compression guide having one side coupled to the compression plate and another side coupled to the compression lever, and configured to ascend along the compression rail.

[0022] The cleaner may further include: a compression guide having at least a portion thereof inserted into an inside of the dustbin through the slit, one side of the portion inserted thereinto being coupled to the compression plate, and another side not inserted thereto being inserted into the compression lever to ascend along the slit of the dustbin.

[0023] The sealer may include: a fixing part fixed to the compression lever housing; and a deformation part supported by the fixing part, configured to seal the slit, and having at least one portion thereof configured to be deformed to form a gap.

[0024] The sealer may be provided in plurality, and the plurality of sealers are arranged on left and right sides, respectively, about the slit.

[0025] The dustbin may be formed in a cylindrical shape, and the slit may be formed in a direction parallel to a center axis of the dustbin.

[0026] An angle formed between the slit of the dustbin and an imaginary line passing through a center of the dustbin and a center axis of the main body may be an acute angle.

[0027] In the compression lever housing, a slit parallel to the slit of the dustbin is formed, and the compression lever housing may further include a shield plate configured to cover at least a portion of the slit of the compression lever housing.

[0028] The cleaner may include: a mounting protrusion of the compression lever housing protruding outward from an outer circumferential surface of the dustbin, but protruding in an opposite direction to a radial direction of the dustbin; and a mounting groove of the compression lever housing formed on one side of the compression lever housing, and allowing the mounting protrusion of the compression lever housing to be inserted thereinto.

[0029] One side of the main body housing may be inserted into an opening formed on one side of the dustbin, and an opening formed on another side of the dustbin may be fixed to the main body housing.

[0030] The cleaner may include: a main body housing allowing the dustbin to be mounted thereto; a fixing protrusion of the dustbin formed in the dustbin; and a dustbin detachable lever disposed in the main body, and configured to be caught by the fixing protrusion of the dustbin to fix the dustbin and to release the fixation of a fixing hook of the dustbin when the dustbin detachable lever is operated.

[0031] When viewed from one side, an imaginary line extending in a direction in which the compression lever ascends may intersect a longitudinal axis of the handle.

[0032] When viewed from one side, an imaginary line extending in a direction in which the compression lever ascends may intersect a longitudinal axis of the suction unit.

[0033] Another embodiment is a cleaner, including: a dustbin having a slit formed on one side thereof; a compression lever housing disposed on an outside of the slit and mounted to the dustbin; a compression plate disposed on an inside of the dustbin and configured to ascend in a direction in which the slit extends; and a compression guide having at least a portion thereof inserted into an inside of the dustbin through the slit, an inside thereof coupled to the compression plate and an outside thereof coupled to the compression lever to move along the slit; and a sealer having a forward surface coming in close contact with the slit, and a side surface coming in close contact with the compression guide.

[0034] The details of other embodiments of the present disclosure are included in the written description hereof as well as the appended drawings.

[0035] The cleaner according to the present disclosure has one or more advantageous effects as below.

[0036] First, since the compression rail is disposed and

fixed on an outside of the dustbin, and the compression plate and the compression guide ascend along the slit and the compression rail of the dustbin, the compression rail which corresponds to the transmission part of the prior art does not protrude to the upper part of the dustbin. Therefore, it is advantageous that a height of the main body of the cleaner may be designed to be low.

[0037] Second, the compression rail is disposed on an outside of the dustbin, and no component corresponding to the guide body of the prior art is provided, and the present disclosure has no configuration that may disturb ascending and descending of the compression lever assembly because the dust is less likely to trapped. Accordingly, it is advantageous that ascending and descending of the compression plate may be performed without disturbance by the trapped dust.

[0038] Third, by dividing the cleaner into the cyclone part and the compression lever assembly, it is advantageous that the user may easily clean the cleaner by assemblies, and sterilize each component of the cleaner separately and keep them in a cleaner state.

[0039] The effects of the present invention are not limited to the above-described effects and other effects which are not described herein may be derived by those skilled in the art from the following description of the embodiments of the present invention.

Brief Description of The Drawings

[0040]

FIG. 1 is a perspective view of a main body of a cleaner according to a prior art document,
FIG. 2 is a perspective view of a dust compression means according to a prior art document,
FIG. 3 is a perspective view of a main body of a cleaner according to the present disclosure,
FIG. 4 is a plane view of a main body of a cleaner according to the present disclosure,
FIG. 5 is a front view of a main body of a cleaner according to the present disclosure,
FIG. 6 is a rear view of a main body of a cleaner according to the present disclosure,
FIG. 7 is a right side view of a main body of a cleaner according to the present disclosure,
FIG. 8 is a right side cross-sectional view of part B in FIG. 5,
FIG. 9 is an exploded perspective view of a main body of a cleaner according to the present disclosure,
FIGS. 10a and 10b are views illustrating an operating procedure of a dustbin detachable lever,
FIG. 11 is a view illustrating a separating procedure of a main body of a cleaner according to the present disclosure into each assembly,
FIG. 12 is a planar cross-sectional view of part C in FIG. 7,
FIG. 13 is a right side cross-sectional view of part A in FIG. 4,
FIG. 14 is a view illustrating a dustbin to which a compression plate is mounted according to the present disclosure,
FIG. 15 shows a compression lever assembly only by removing a dustbin in FIG. 14,
FIG. 16 is a perspective view illustrating remaining components of a compression lever assembly after removing a compression plate in FIG. 15,
FIG. 17 is a right side view of a compression lever assembly in FIG. 16 when viewed from a right side,
FIG. 18 is a rear side view of a compression lever assembly in FIG. 16 when viewed from a rear side,
FIG. 19 is an exploded perspective view of a compression lever assembly in FIG. 16,
FIG. 20 is a perspective view of a sealer according to the present disclosure,
FIG. 21 is a planar cross-sectional view of part D in FIG. 17.

BEST MODE

[0041] Advantages and characteristics of the present disclosure and a method of achieving the advantages and characteristics will be clear by referring to exemplary embodiments described below in detail together with the accompanying drawings. However, the present disclosure is not limited to exemplary embodiment disclosed herein but will be implemented in various forms. The exemplary embodiments are provided by way of example only so that a person of ordinary skilled in the art can fully understand the disclosures of the present disclosure and the scope of the present disclosure. Therefore, the present disclosure will be defined only by the scope of the appended claims. Like reference numerals generally denote like elements throughout the specification.

[0042] Hereinafter, a cleaner 100 according to exemplary embodiments of the present disclosure will be described in further detail with reference to the accompanying drawings.

[0043] FIG. 3 is a perspective view of a cleaner 1 according to the present disclosure, FIG. 4 is a plane view of the cleaner 1 according to the present disclosure, FIG. 5 is a front view of the cleaner 1 according to the present disclosure, FIG. 6 is a rear view of the cleaner 1 according to the present disclosure, and FIG. 7 is a right side view of the cleaner 1 according to the present disclosure.

[0044] Referring to FIGS. 3 to 7, the cleaner 100 may include a main body 2. The main body 2 may include a suction unit 10 that sucks in air containing dust.

[0045] A direction in which the suction unit 10 is disposed with respect to a longitudinal axis A1 of the suction unit 10 is defined as a forward direction, and a direction of one side in which a motor unit 20 to be described below is defined as a rearward direction. Based on the main body 2 illustrated in FIG. 1, an upper side is defined as an upward direction and a lower side is defined as a downward direction.

[0046] An outer appearance of the main body 2 is defined by a main body housing 3.

[0047] Referring to FIG. 4, the main body housing 3 may be formed to be left-right symmetric with respect to a center axis A0 of the main body.

[0048] A handle 40 is formed in the main body housing 3.

[0049] At a front of the main body housing 3, the suction unit is coupled.

[0050] In the main body housing 3, the dustbin 60 is coupled. An opening is formed in a coupling portion between the housing 3 and the dustbin 60, and the housing 3 and the dustbin 60 are communicated with each other.

[0051] A portion of a frontal lower part of the main body housing 3 is inserted into the dustbin 60. Since the frontal lower part of the main body housing 3 is inserted into the opening formed at an upper part of the dustbin 60, the dustbin 60 may be fixedly mounted to the main body housing 3.

[0052] A battery 50 is coupled to a bottom part of the main body housing 3. More particularly, the battery 50 is disposed in the bottom part at a rear of the main body housing 3.

[0053] A suction motor 20 is coupled to an upper part of the main body housing 3. The suction motor 20 may be coupled to the upper part at a rear of the main body housing 3.

[0054] The suction unit 10 has a cylindrical shape with a hollow hole formed inside, is configured to suck in air containing dust, and may provide a suction flow path through which air containing dust may flow. The air containing dust may be guided to the main body 2 through the suction unit 10.

[0055] The suction unit 10 is communicated with an inlet 311 of a cyclone unit 30. Air sucked in a nozzle passes through the suction unit 10, and is introduced into the cyclone unit 30 through the inlet 311.

[0056] The main body 2 may further include a suction motor 20, the cyclone unit 30, the handle 40, and the battery 50.

[0057] The suction unit 10 may be formed to be symmetric with respect to the longitudinal axis A1 of the suction unit. Referring to FIG. 4, the longitudinal axis A1 of the suction unit may overlap the center axis A0 of the main body when viewed from the top. Referring to FIG. 7, the longitudinal axis A1 of the suction unit may intersect a center axis A2 of a motor, an axis of a cyclonic flow A3, a longitudinal axis A4 of the handle, a center axis A5 of the dustbin, or an ascending direction A6 of the compression lever, when viewed from a side.

[0058] Here, the suction motor 20 is configured to generate an air flow (that is, an air current) through which the air containing dust can be introduced into the suction unit 10.

[0059] The suction motor 20 is disposed inside the housing 3.

[0060] The suction motor 20 is disposed at a rear of the dustbin 600. In other words, the suction motor 20 is disposed at a rear of the cyclone unit 30.

[0061] The center axis A2 of the suction motor 20 will be defined. The center axis A2 of the suction motor 20 corresponds to a rotational axis of a shaft of the suction motor 20. Since an axial fan is disposed in the suction motor 20 according to the present disclosure, the center axis A2 of the suction motor 20 is parallel to a flow direction of air that passes through the suction motor 20.

[0062] The suction motor 20 may be the BLDC (Brushless DC) motor. The BLDC motor is a type of a DC motor without a brush. Since the BLDC motor does not have a brush, which is a wearable part, the BLDC motor not only has an advantage of having little electrical and mechanical noise, but also has no problem in a high-speed rotation, and generates low rotation noise.

[0063] The cyclone unit 30 is communicated with the suction unit 10 and is a component to which a principle of a dust collector using a centrifugal force to separate dust sucked into an inside of the main body 2 through the suction unit 10 is applied.

[0064] Referring to FIG. 8, the cyclone unit is coupled to the main body housing 3 or the dustbin 60, and disposed between the suction unit and the suction motor.

[0065] The cyclone unit 30 is disposed between the suction unit 10 and the suction motor 20. The suction unit 10 is disposed upstream of the cyclone unit 30, and the suction motor 20 is disposed downstream of the cyclone unit 30. The suction unit 10 is disposed forward of the cyclone unit 30, and the suction motor 20 is disposed rearward of the cyclone unit 30.

[0066] For example, the cyclone unit 30 may include a first cyclone 310 that can separate dust by a cyclonic flow. The first cyclone 310 may be communicated with the suction unit 10. The air and dust sucked through the suction unit 10 will helically flow along an inner circumferential surface of the first cyclone 310.

[0067] The axis A3 of the cyclonic flow of the first cyclone 310 may vertically extend.

[0068] The cyclone unit 30 may further include a second cyclone 330 that secondarily separates dust from the air discharged from the first cyclone 310. At this instance, the second cyclone 330 may be disposed inside the first cyclone 310 to minimize a size of the cyclone unit 30. The second cyclone 330 may include a plurality of cyclone bodies arranged in parallel. The air discharged from the first cyclone 310 may pass through the plurality of cyclone bodies in a split manner.

[0069] At this instance, the axis A3 of the cyclonic flow of the second cyclone 330 may also extend vertically, the axis A3 of the cyclonic flow of the first cyclone 310 and the axis A3 of the cyclonic flow of the second cyclone are parallel to each other.

[0070] The axis of the cyclonic flow of the first cyclone and the axis of the cyclonic flow of the second cyclone may be collectively referred to as the axes A3 of the cyclonic flow of the cyclone unit 30.

[0071] The axis A3 of the cyclonic flow intersects the longitudinal axis A1 of the suction unit. More particularly,

the axis A3 of the cyclonic flow may be disposed to be parallel to the longitudinal axis A1 of the suction unit. Therefore, the sucked air flows rearward along the center axis A1 of the suction unit, and is vertically introduced into the cyclone unit 30 in a direction of the axis A3 of the cyclonic flow. By this arrangement, a pressure loss is not generated when the air is introduced into the cyclone unit 30 from the suction unit 10.

[0072] The main body 2 may further include a cyclone filter 350 disposed to surround the second cyclone 330. The cyclone filter 350 may be formed in a cylindrical shape, for example, and guide air separated from dust in the first cyclone 310 to the second cyclone 330. The cyclone filter 350 may filter dust while the air passes therethrough.

[0073] To this end, the cyclone filter 350 may include a mesh portion having a plurality of holes. The mesh portion may be formed of a metal material, though not limited thereto.

[0074] The air present in the first cyclone 310 flows into the second cyclone 330. At this instance, the air passes through the cyclone filter 350 from a radially outside of the cyclone filter 350 and flows radially inward of the cyclone filter 350.

[0075] Meanwhile, as another example, it is possible that the cyclone unit 30 has a single cyclone, and in such a case, the axis A3 of the cyclonic flow may also vertically extend.

[0076] Referring to FIG. 8, an inlet 311 of the cyclone unit 30 is formed in a radial direction of the dustbin 60. The inlet 311 is disposed on the center axis A1 of the suction unit. Through the inlet 311, the suction unit 10 and the cyclone unit 30 are communicated with each other.

[0077] The cyclone unit 30 has an outlet 312 formed in a longitudinal direction of the dustbin 60. In other words, the outlet 312 is formed in a direction of the axis A3 of the cyclonic flow. The air from which dust is separated while flowing inside the cyclone unit 30 flows along the direction of the axis A3 of the cyclone flow and is discharged in the longitudinal direction from the dustbin 60 to be introduced into the housing 3. The air introduced into the housing 3 passes through a filter 70 and the suction motor 20.

[0078] The handle 40 is configured to be gripped by a user to move the cleaner 1, and is disposed in the opposite direction to the suction unit 10 with respect to the cyclone unit 30. The handle 40 has a substantially cylindrical shape, and extends along the longitudinal axis A4. In addition, the handle 40 may be disposed in a way that an upper part thereof is tilted forward.

[0079] Referring to FIG. 8, an upper surface 41, a lower surface 42, a forward end 43, and a rearward end 44 of the handle will be defined.

[0080] Referring to FIG. 8, the lower surface of the handle 40 is fixed to the main body housing 3. In addition, a handle support member 45 extends from one side of a forward end of the handle to fix the handle 40 and the main body housing 3. More particularly, a rearward end of of the handle support member 45 is combined with the forward end 43 of the handle, and the handle support member 45 extends forward to be combined with the main body housing 3. Since the upper surface 41 of the handle is spaced apart from the main body housing 3, the handle 40 and the main body housing 3 may be combined with each other more strongly by the handle support member 45.

[0081] Referring to FIG. 8, a forward end of the upper surface 41 of the handle is disposed at a higher position than a rearward end thereof. More particularly, the upper surface 41 of the handle is formed as a front upward inclined surface.

[0082] The operating part 80 may be disposed on the upper surface 41 of the handle. The user may give instructions to the cleaner using the operating part 80. The instructions may include turning on and turning off, and changes to the entire operation modes including changes to the output of the suction motor.

[0083] Referring to FIG. 8, the upper surface 41 of the handle is spaced apart from the main body housing 3. By this arrangement, the vibration generated in the suction motor 20 is not transmitted to the handle 40.

[0084] The battery 50 is configured to supply power to the suction motor 20. The battery 50 is disposed such that an upper part thereof is adjacent to the handle 40, and a front part thereof is adjacent to a portion of an outer circumferential surface of the dustbin 60.

[0085] The cleaner 1 may further include the dustbin 60 for storing dust separated while passing through the cyclone unit 30.

[0086] The dustbin 60 may include a dust collecting body 610 having a cylindrical shape. As an example, it may be possible that the dust collecting body 610 serves as the first cyclone 310, without having the first cyclone 310 separately. The whole or at least a part of the second cyclone 330 may be positioned inside the dustbin 60.

[0087] Inside the dust collecting body 610, a dust storage guide 604 for guiding storage of dust separated in the second cyclone 330 may be disposed. The dust storage guide 604 may be coupled to a lower side of the second cyclone 330.

[0088] The dust storage guide 604 partitions a space inside the dust collecting body 610 into a first dust storage unit 602 in which the dust separated in the first cyclone 310 is stored and a second dust storage unit 606 in which the dust separated in the second cyclone 330 is stored. In other words, an inner space of the dust storage guide 604 is the second dust storage unit 606, and a space between the dust storage guide 604 and the dust collecting body 610 is the first dust storage unit 602.

[0089] A slit 611 is formed on one side of the dustbin 60.

[0090] Referring to FIG. 16, the slit 611 of the dustbin is formed on one side of the dust collecting body 610. More particularly, the slit 611 of the dustbin is disposed on a right side at a rear of the dust collecting body 610. However, the position of the slit is not limited thereto, and

the slit 611 of the dustbin may be disposed on a left side or at a forward position within a range that can be easily adopted by a person skilled in the art.

[0091] The slit 611 of the dustbin is disposed on an outer circumferential surface of the dustbin 60. The slit 611 of the dustbin extends in a direction of the center axis A5 of the dustbin.

[0092] The slit 611 of the dustbin is formed to penetrate the dust collecting body 610, and through the slit 611 of the dustbin, an internal space of the dustbin 60 and an external space of the dustbin 60 may be communicated with each other.

[0093] Referring to FIG. 16, the slit 611 of the dustbin is formed in a direction parallel to the center axis A5 of the dustbin. When disposing the dustbin 60 in a way that the center axis A5 of the dustbin is perpendicular to the ground, the slit 611 of the dustbin may be vertically disposed. Since a compression plate 622 ascends along the slit 611 of the dustbin, dust inside the dustbin 60 may be moved downward in the direction of the center axis A5 of the dustbin to be compressed.

[0094] A compression guide 625 is inserted into the slit 611 of the dustbin, and the compression guide 625 slidingly moves along the slit 611 of the dustbin.

[0095] Referring to FIGS. 7 and 8, the filter 70 will be described hereinafter.

[0096] The filter 70 is disposed on the air flow path and is configured to filter dust contained in the air. The filter 70 installed in the cleaner 1 according to the present disclosure has a pre-filter 71 and a HEPA filter 73.

[0097] The pre-filter 71 is configured to filter dust that has not been collected in the cyclone unit 30.

[0098] The pre-filter 71 is disposed upstream of the suction motor 20. Referring to FIG. 8, the pre-filter 71 is disposed on an upper part of the cyclone unit and at a forward position of the suction motor. Since the air is discharged upward of the cyclone unit, and introduced into the suction motor from a front of the suction motor, the pre-filter 71 is disposed upstream of the suction motor.

[0099] The pre-filter 71 removes big foreign substances contained in the air which have been introduced into the suction motor at the upstream of the suction motor. The pre-filter 71 has a plurality of hollow holes formed therein, and may perform physical filtration by filtering out foreign substances that are greater than a size of the hollow hole.

[0100] The pre-filter 71 may be a mesh filter having a cylindrical shape. For example, the pre-filter 71 may include materials such as nylon and spun-bonded nonwoven fabric. The spun-bonded nonwoven fabric is a type of nonwoven fabric made by spinning synthetic fibers such as polypropylene (PP) and then bonding them by applying heat.

[0101] In the present disclosure, it is described that the cleaner 1 includes the pre-filter 71 and the HEP A filter 73, however, the kinds and the number of the filters 71 are not limited thereto.

[0102] Referring to FIG. 8, at least one among the pre-filter 71 and the HEPA filter 73 is disposed on the extension line of the center axis on which the suction motor 20 rotates. Referring to FIG. 8, when viewed from the right side, the pre-filter 71 is disposed on an extension line from which the center axis A2 of the suction motor 20 extends forward. The HEPA filter 73 is disposed on an extension line from which the center axis A2 of the suction motor extends rearward. By this arrangement, the air discharged from the pre-filter 71 is introduced into the suction motor 20, with the flow direction thereof nearly not changed, accordingly, the pressure loss that is likely to occur due to a switchover of the air flow does not occur, thereby the efficiency of the cleaner 1 is improved.

[0103] Referring to FIG. 8, the pre-filter 71 is inserted into the main body housing 3 from a forward direction of the main body housing 3. More particularly, the pre-filter is inserted into the main body housing 3 from a forwardly upward position to a rearwardly downward position. Conversely, the pre-filter 71 may be detached by being pulled in a fowardly upward direction.

[0104] The pre-filter 71 may be formed to be long in a direction in which the pre-filter 71 is inserted into the main body housing 3, and formed to have a tubular shape with a space formed inside.

[0105] A forward end of the pre-filter 71 is formed to be grippable by the user with fingers, and is closed to prevent air leakage. A rearward end of the pre-filter 71 is opened to discharge air. A filtering member through which the air is passed and which prevents dust from passing therethrough is formed on an outer circumferential surface between the forward end and the rearward end of the pre-filter 71. By this arrangement, the air passes through the filtering member from an outer side of the pre-filter 71 to flow inward, and is discharged to the rearward end of the pre-filter 71.

[0106] A diffusion space 72 may be formed between an outer circumferential surface of the pre-filter 71 and the main body housing 3.

[0107] Referring to FIG. 8, an upper surface of the pre-filter 71 is spaced apart from the main body housing 3, and a lower surface of the pre-filter 71 is spaced apart from the cyclone unit 30. A space formed between the pre-filter 71 and the housing 3 is defined as the diffusion space 72. The diffusion space 72 is a space where the air introduced from the cyclone unit 30 is diffused before passing through the pre-filter 71. The air discharged from the cyclone unit 30 is diffused in the diffusion space 72 and may flow along the outer circumferential surface of the pre-filter 71, and the air may be uniformly passed through all sides of the outer circumferential surface.

[0108] The main body 2 may further include the HEPA filter 73 that is disposed between the pre-filter 71 and the motor unit 20. The HEPA is the abbreviation for the high efficiency particulate air filter, and is a filter having a high performance for filtering out particles.

[0109] The HEPA filter 73 serves to filter out fine dust that has not been filtered out in the pre-filter 71 once and

for all, and may be accommodated in the housing 3.

[0110] The air that has been discharged from the cyclone unit 30 and has passed through the pre-filter 71 passes through the HEPA filter 73 and is discharged to an outside.

[0111] The HEPA filter 73 is disposed at a rearward position of the suction motor 20. Referring to FIG. 8, the HEPA filter 73 is disposed rearward of the suction motor 20. The air is introduced from a forward position of the suction motor 20 and is discharged at a rear thereof, the HEPA filter 73 is disposed downstream of the suction motor 20.

[0112] The HEPA filter 73 removes fine foreign substances contained in the air being discharged to the outside at the downstream of the suction motor 20. The HEPA filter 73 may filter out the particles by attracting the particles using an electrostatic power applied to the filtered substances.

[0113] The flow direction of the air introduced into the HEPA filter 73 is parallel to the flow direction of the air discharged from the suction motor 20. Referring to FIG. 8, since the air discharged from the suction motor 20 moves rearward from the forward position, and the air introduced from the HEPA filter 73 moves rearward from the forward position, the flow direction of the air in the HEPA filter 73 and the flow direction of the air discharged from the suction motor 20 are parallel to each other.

[0114] An insertion axis of the HEPA filter is parallel to the center axis A2 of the suction motor. More particularly, the insertion axis of the HEPA filter corresponds to the center axis A2 of the suction motor. Therefore, since the air flows in the same direction in a section from the suction motor 20 to the HEPA filter without any change of the air flow direction, the pressure loss hardly occurs.

[0115] The HEPA filter 73 is detached rearward of the housing 3. When the user wants to separate the pre-filter 71, only the pre-filter 71 may be detached forward of the housing 3, and when the user wants to separate the HEPA filter 73, only the HEPA filter 73 may be detached rearward of the housing 3.

[0116] The air that has passed through the HEPA filter 73 is discharged through both sides of the HEPA filter 73. Referring to FIG. 3, the outlets are formed on both left and right sides of the HEPA filter 73. Therefore, the flow direction of the air that has passed through the HEPA filter 73 while moving rearward is switched to the left or right side, and the air is discharged through the left or right side of the cleaner 1.

[0117] Referring to FIGS. 9 to 11, the cleaner 1 accordinng to the present disclosure may be dissembled into a plurality of parts. FIG. 9 is an exploded perspective view of the main body 2 of the cleaner according to the present disclosure, FIGS. 10a and 10b are views illustrating an operating procedure of a dustbin detachable lever 613b, and FIG. 11 is a view illustrating a separating procedure of the main body 1 of the cleaner according to the present disclosure into each assembly.

[0118] Referring to FIG. 9, the cleaner 1 may be disassembled into the main body housing 3, the dustbin 60, the cyclone unit 30, and the compression lever assembly 620. The compression lever assembly 620 may be disassembled into the compression plate 622 and the remainder.

[0119] According to FIG. 10, the dustbin 60 may be separated from the main body housing 3 by the operation of the dustbin detachable lever 613b.

[0120] The dustbin 60 may be attached to or detached from the main body housing 3. One side of the main body housing 3 is inserted into an opening formed on one side of the dustbin 60 to hold the dustbin 60, and the other side of the main body housing 3 is caught by the other side of the dustbin 60 to hold the dustbin 60. More particularly, a forward upper part of the main body housing 3 holds the upper part of the dustbin 60 by being inserted into the opening formed at the upper part of the dustbin 60. The dustbin detachable lever 613b is caught by a dustbin fixing protrusion 613a formed on a rear surface of the dustbin 60 to hold a rear side of the dustbin 60. The main body housing 3 is fixedly coupled to the dustbin 60, by holding the dustbin 60 at least at two points.

[0121] Referring to FIG. 10, the dustbin fixing protrusion 613a is formed in the dustbin 60, and the dustbin detachable lever 613b is disposed in the main body housing 3. The dustbin 60 is mounted to the main body housing 3 as the dustbin fixing protrusion 613a and the dustbin detachable lever 613b are engaged with each other. When the engagement between the dustbin fixing protrusion 613a and the dustbin detachable lever 613b is released, the dustbin 60 is detached from the main body housing 3.

[0122] The dustbin fixing protrusion 613a is formed in the dustbin 60. The dustbin fixing protrusion 613a protrudes rearward from an outer circumferential surface of the dust collecting body.

[0123] The dustbin detachable lever 613b is disposed in the main body housing 3, and fixes the dustbin 60 by being caught by the dustbin fixing protrusion 613a, and releases the fixation of a dustbin fixing hook when the lever is operated. The dustbin detachable lever 613b is disposed to be ascendable in the main body housing 3.

[0124] Referring to FIG. 10a, a hook that further protrudes downward is formed at an end of the dustbin fixing protrusion 613a. A hook that further protrudes upward is formed at an end of the dustbin detachable lever 613b. The hooks of the dustbin fixing protrusion 613a and the dustbin detachable lever 613b are caught with each other, thereby the dustbin 60 is fixedly mounted to the main body housing 3.

[0125] FIG. 10b illustrates a state in which the dustbin detachable lever 613b is slided downward to separate the dustbin 60. When the dustbin detachable lever 613b descends, the catching of the hooks of the dustbin fixing protrusion 613b and the dustbin detachable lelver 613b is released. More particularly, the dustbin 60 may be detached by rotating in a clockwise direction about a forward upper part as a rotational axis.

[0126] FIG. 11 is a view illustrating a separating procedure of the main body 2 of the cleaner according to the present disclosure into each assembly.

[0127] Referring to FIG. 11a, the dustbin 60 may be detached from the main body housing 3. When the dustbin 60 is mounted to the main body housing 3, the upper part of the dustbin 60 is supported by the main body housing 3 as a portion of the upper part thereof is inserted into an opening of the dustbin 60, and a rearward part of the dustbin 60 is supported by the main body using 3 as the dustbin fixing protrusion 613a is caught by the dustbin detachable lever 613b. At this instance, by sliding the dustbin detachable lever 613b downward, the fixation of the rearward part of the dustbin 60 is released, and the dustbin 60 may be separated from the main body housing 3 by rotationg the dustbin 60 in a clockwise direaction about the forward upper part as a rotational axis.

[0128] Referring to FIG. 11b, the cyclone unit 30 may be separated from the dustbin 60. The cyclone unit 30 may be withdrawn from the dustbin 60. The cyclone unit 30 is accommodated in the dustbin 60 through the opening at an upper part of the dustbin 60. Conversely, the cyclone unit 30 may be separated by being withdrawn upward of the dustbin 60.

[0129] Referring to FIG. 11c, the compression plate 622 may be separated from the dustbin 60. The compression plate 622 is coupled to the compression guide 625, and through rotation in the clockwise direction or a counterclockwise direction about the center axis A5 of the dustbin, the compression plate 622 may be separated from the compression guide 625. The separated compression plate 622 may be withdrawn upward through the opening at the upper part of the dustbin 60 to be separated from the dustbin 60.

[0130] Referring to FIG. 11d, the compression lever assembly 620 may be separated from the dustbin 60. As a mounting protrusion 612 of the compression lever housing formed in the dustbin 60 is inserted into a mounting groove 6213 of the compression lever assembly to be fixed thereinto, the compression lever assembly 620 is mounted to the dustbin 60. Conversely, the compression lever assembly 620 may slidingly move downward along the outer circumferential surface of the dustbin 60, and move radially outward of the dustbin 60 to be separated from the dustbin 60.

[0131] As described above, according to FIGS. 11a to 11d, the main body 2 of the cleaner may be disassembled into the main body housing 3, the dustbin 60, the cyclone unit 30, the compression plate 622, and the compression lever assembly 620 except for the compression plate 622. Accordingly, it is advantageous that the user may maintain the dustbin 60, the cyclone unit 30, the compression plate 622, and the like to be cleaner through additional water cleaning and the like, and the malfunction due to water leakage in the main body housing 3 may be prevented.

[0132] Referring to FIGS. 12 and 16, the compression lever assembly 620 may be attached to and detached from the dustbin 60. FIG. 12 is a planar cross-sectional view of part C in FIG. 7, and shows a state in which the mounting protrusion 612 of the compression lever housing is caught by the compression lever housing 621 and fixed thereto. FIG. 16 is a perspective view illustrating remaining components of the compression lever assembly after removing the compression plate in FIG. 15, and shows the appearances of the mounting protrusion 612 of the compression lever housing and the matching mounting groove 6213 of the compression lever housing.

[0133] Referring to FIGS. 12 and 16, the dustbin 60 includes the mounting protrusion 612 of the compression lever housing, and the mounting protrusion 612 of the compression lever housing protrudes outward from the outer circumferential surface of the dustbin 60 in a direction opposite to a radial direction of the dustbin 60. The mounting protrusion 612 of the compression lever housing is provided in plurality along the slit of the dustbin 60. The mounting protrusions of the compression lever housing may be disposed to be left-right symmetric with respect to the slit of the dustbin 60.

[0134] Referring to FIG. 12, the mounting protrusion 612 of the compression lever protrudes in a direction opposite to the radial direction of the dustbin 60. In other words, the mounting protrusion 612 of the compression lever housing may not protrude vertically from the outer circumferential surface of the dustbin 60, but may protrude in an outward inclined direction therefrom. By this arrangement, the mounting protrusion 612 of the compression lever housing may be strongly fixed to the mounting groove 6213 of the compression lever housing.

[0135] Referring to FIG. 16, the compression lever housing 621 is provided with the mounting groove 6213. The mounting protrusion 612 of the compression lever housing is inserted into the mounting groove 6213 of the compression lever housing, and the compression lever housing 621 is mounted to the dustbin 60. The mounting grooves 6213 of the compression lever housing is formed on one side of the compression lever housing 621, and the mounting protrusion 612 of the compression lever housing is inserted thereinto. A plurality of mounting grooves 6213 of the compression lever housing are disposed along a sealer 626. The mounting groove 6213 of the compression lever housing may be left-right symmetric about the sealer 626. The mounting grooves 6213 of the compression lever housing and the mounting protrusion 612 of the compression lever housing match each other.

[0136] The mounting grooves 6213 of the compression lever housing may be formed in a way that a width of an upper portion thereof is wider than a width of a lower portion thereof. Therefore, the mounting protrusion 612 of the compression lever housing may enter an upper portion of the mounting groove 6213 of the compression lever housing, slidingly move downward thereof, and position at a lower portion of the mounting groove 6213 of the compression lever housing to be fixed therein.

[0137] Referring to FIGS. 3 and 13, the cleaner accord-

ing to the present disclosure includes the compression lever assembly 620. The compression lever assembly 620 is configured to reduce a volume of dust by compressing dust collected inside the dustbin 60.

[0138] Referring to FIG. 13a, the compression lever 623 and the compression plate 622 come in close contact with an upper end of the dustbin 60. During an operation of the cleaner 1, dust is separated from the air while helically moving in an internal space of the dustbin 60, and is collected in the internal space of the dustbin 60.

[0139] Referring to FIG. 13b, after stopping the cleaner 1, by descending the compression lever 623 and the compression 622, the dust collected in the internal space of the dustbin 60 is compressed and a volume of the dust is reduced. Referring to FIG.13b, the compression lever 623 and the compression plate 622 may descend to an intermediate height of the dustbin 60 due to a length limitation by the slit 6212 of the compression lever housing. However, the descending height is not limited thereto, and the configuration of the present disclosure has difference compared to that of the prior art document in that the compression plate 622 may descend to the bottom of the dustbin 60 only by designing a length of the slit 6212 of the compression lever housing to be longer.

[0140] Referring to FIGS. 14 and 15, the cleaner 1 according to the present disclosure includes the compression lever housing 621. The compression lever housing 621 forms an appearance of the compression lever assembly 620, and forms a space inside the assembly 620 to accommodate components constituing the compression lever assembly 620 therein.

[0141] The compression lever housing 621 is disposed on an outside of the slit 611 of the dustbin, and is mounted to the dustbin 60. The compression lever housing 621 covers the slit 611 of the dustbin.

[0142] The compression lever housing 621 is opened on its inside. The inside of the compression lever housing 621 faces the outer circumferential surface of the dustbin 60.

[0143] The inside of the compression lever housing 621 forms a curved surface. Therefore, the inside of the compression lever housing 621 comes into close contact with the outer circumferential surface of the dustbin 60, and does not form a gap therebetween.

[0144] The compression lever housing 621 is formed to be long along the slit 611 of the dustbin.

[0145] The compression lever housing 621 includes the slit 6212 that is parallel to the slit 611 of the dustbin. The slit 6212 of the compression lever housing is formed to be long along the slit 611 of the dustbin. A longitudinal direction of the compression lever housing is parallel to a longitudinal direction of the slit 611 of the dustbin. Therefore, the compression guide 625 is supported at two points along the slit 6212 of the compression lever housing and the slit 611 of the dustbin, and thus, may slidingly ascend and descend in a stable manner.

[0146] Referring to FIG. 15, the cleaner 1 according to the present disclosure includes the compression plate 622. The compression plate 622 is located inside the dustbin 60, and is configured to compress the dust collected inside the dustbin 60 to reduce a volume of the dust.

[0147] The compression plate 622 is disposed in the internal space of the dustbin 60, and ascends in a direction in which the slit 611 of the dustbin extends.

[0148] The compression plate 622 is formed in a shape similar to a donut.

[0149] An inner circumferential surface of the compression plate 622 comes into close contact with an inner circumferential surface of the first cyclone 320.

[0150] In other words, the inner circumferential surface of the compression plate 622 comes into close contact with the cyclone filter 350. Accordingly, when the compression plate 622 ascends and descends, the dust attached to the cyclone filter 350 may be swept by the compression plate 622.

[0151] Referring to FIG. 15, the cleaner 1 according to the present disclosure includes the compression lever 623. The compression lever 623 is configured to move the compression plate 622 by receiving a force from the user and transmitting the received force to the compression plate 622.

[0152] The compression lever 623 is disposed in the compression lever housing 621, and is coupled to the compression plate 622 through the slit 611 of the dustbin.

[0153] The compression lever 623 is disposed on an outer circumferential surface of the compression lever housing 621. The compression lever 623 asends along the slit 6232 of the compression lever housing.

[0154] Referring to FIGS. 16, 19, and 21, the cleaner 1 according to the present disclosure includes a compression rail 624 and the compression guide 625. The compression rail 624 and the compression guide 625 are configured to connect the compression plate 622 and the compression lever 623 to each other, and guide the compression plate 622 and the compression lever 623 when ascending.

[0155] The compression rail 624 is configured to assist ascending of the compression lever 623 and the compression plate 622 along the slit 611 of the dustbin. The compression rail 624 is disposed on an inside of the compression lever housing 621, and extends along the slit 611. More particularly, the compression rail 624 may extend along the slit 6212 of the compression lever housing, or along the slit 611 of the dustbin.

[0156] The compression rail 624 is fixed on the inside of the compression lever housing 621. More particularly, an upper end or a lower end of the compression rail 624 is fixed on the inside of the compression lever housing 621. Accordingly, the compression rail 624 does not ascend.

[0157] The compression rail 624 is disposed on an outside of the sealer 626. Since the compression rail 624 is disposed on the outside of the sealer, the compression rail 624 is separated from the dust collected inside the dustbin 60.

[0158] The compression rail 624 extends along the slit 611 of the dustbin, and guides the compression guide 625. More particularly, the compression rail 624 is parallel to a longitudinal direction of the slit 611 of the dustbin and a longitudinal direction of the slit 6212 of the compression lever.

[0159] Along with the compression rail 624, the compression guide 625 is configured to assist the compression lever 623 and the compression plate 622 to precisely ascend along the slit 611 of the dustbin. The compression guide 625 has one side coupled to the compression plate 622, and the other side coupled to the compression lever 623, and ascends along the compression rail 624.

[0160] The compression guide 625 has at least a portion inserted into the inside of the dustbin 60 through the slit, the one side inserted thereinto is coupled to the compression plate 622, and the other side not inserted thereinto is coupled to the compression lever 623 so as to ascend along the slit 611 of the dustbin.

[0161] The compression guide 625 has a hollow hole that vertically extends, and the compression rail 624 is inserted into the compression rail 624. The compression guide 625 slidingly moves along the compression rail 624.

[0162] The compression guide 625 includes a compression plate connecting portion 6251, and the compression plate connecting portion 6251 protdues radially inward of the dustbin 60 from the hollow hole of the compression guide 625.

[0163] The compression plate connecting portion 6251 penetrates the sealer 626. More particularly, the compression plate connecting portion 6251 is inserted between a left sealer 626a and a right sealer 626b. A left side surface of the compression plate connecting portion 6251 comes into close contact with the left sealer 626a and a right side surface of the compression plate connecting portion 6251 comes into close contact with the right sealer 626b.

[0164] The compression plate connecting portion 6251 penetrates the slit 611 of the dustbin. More particularly, the compression plate connecting portion 6251 is inserted into the inside of the dustbin 60 through the slit 611 of the dustbin. Since both sides of the compression plate connecting portion 6251 are adj acent to the sealer 626 of the dustbin, the compression plate connecting portion 6251 may ascend and descend along the sealer 626 of the dustbin.

[0165] The compression plate 622 is coupled to an end of the compression plate connecting portion 6251. Referring to FIG. 19, a hole is formed at the end of the compression plate connecting portion 6251, and though not illustrated, a fixing protrusion configured to be inserted into the hole is formed in the compression plate 622. As the compression plate 622 rotates in the clockwise direction or the counterclockwise direction, the fixing protrusion is inserted into the hole of the compression plate connecting portion 6251, and thus, the compression plate 622 may be fixedly coupled to the compression plate connecting portion 6251.

[0166] In a connecting portion where the compression plate connecting portion 6251 is connected to the compression rail 624, a sealer groove may be formed. The sealer 626 is fixed in position as at least a portion of the sealer 626 is inserted into the sealer groove. The sealer groove is formed by being further recessed inward from the compression plate connecting portion 6251. That is, a thickness of a portion in which the sealer groove is formed in the compression plate connecting portion 6251 is thinner than a thickness of the remaining portion in which the sealer groove is not formed.

[0167] The compression guide 625 includes a compression lever connecting portion 6252, and the compression lever connecting portion 6252 protrudes toward the slit 6212 of the compression lever housing from the hollow hole of the compression guide 625.

[0168] Since both sides of the compression lever connecting portion 6252 are adjacent to the sealer 626 of the compression lever housing, the compression lever connecting portion 6252 may ascend and descend along the sealer 626 of the compression lever housing.

[0169] The compression lever 623 is coupled to an end of the compression lever.

[0170] An angle formed between a direction in which the compression plate connecting portion 6251 extends and a direction in which the compression lever connecting portion 6252 extends may be an obtuse angle.

[0171] Referring to FIG. 20, the cleaner 1 according to the present disclosure includes the sealer 626. The sealer is configured to cover the slit 611 of the dustbin, and seal the inside of the dustbin 60.

[0172] The sealer 626 is disposed in the compression lever housing 621, comes into close contact with the slit 611 of the dustbin, and extends along the slit 611 of the dustbin. The slit may extend in a direction of the center axis A5 of the dustbin, and the sealer 626 may extend in the direction of the center axis A5 of the dustbin.

[0173] A forward surface of the sealer 626 closely contacts the slit 611 of the dustbin, and a side surface thereof closely contacts the compression guide 625.

[0174] Referring to FIGS. 20 and 21, the sealer 626 includes a fixing part and a deformation part 6262.

[0175] The deformation part 6262 is supported by the fixing part 6261, and seals the slit, but at least a portion thereof is deformed to form a gap.

[0176] The deformation part 6262 is formed to have a cylindrical shape with a hollow hole formed inside. The deformation part 6262 extends in the direction of the center axis A5 of the dustbin. An upper surface and a lower surface of the deformation part 6262 may be opened.

[0177] At least a portion of the deformation part 6262 may be deformed to strongly seal the gap. Referring to FIG. 21, a forward end of the deformation part 6262 may protrude forward of the compression lever housing 621. Therefore, when the compression lever housing 621 is mounted to the dustbin 60, the forward end of the deformation part 6262 is slightly recessed rearward while

closely contacting the dustbin 60, thereby strongly sealing the slit 611 of the dustbin from the outside.

[0178] Referring to FIG. 21, one side of the deformation part 6262 comes into close contact with the compression guide 625. At this instance, the one side of the deformation part 6262 is slightly pushed inward to closely contact the compression guide 625, thereby the gap between the deformation part 6262 and the compression guide 625 is removed. Particularly, when the compression guide 625 descends, the deformation part 6262 is deformed to form a gap through which the compression guide 625 can move, and as the deformation part 6262 is restored to its original form at an upper end of the compression guide 625, the gap therebetween then the gap is removed, thereby a sealed state between the sealer 626 and the compression guide 625 can be maintained.

[0179] The fixing part 6261 is fixed to the compression lever housing 621. The fixing part 6261 protrudes outward from an outer circumferential surface of the deformation part 6262. The fixing part 6261 extends along the center axis A5 of the dustbin. The fixing part 6162 may be formed in a plate shape.

[0180] An end of the fixing part 6261 may be fitted with the compression lever housing 621 to be coupled thereto. A long groove may be formed in the compression lever housing 621, and as the fixing part 6261 is inserted into the groove to be fitted therewith, the sealer 626 may be installed in the compression lever housing 621.

[0181] The fixing part may be composed of a first extension portion 6261a and a second extension portion 6261b.

[0182] The first extension portion 6261a extends along an outer circumferential surface of the dustbin 60 from the deformation part. The first extension portion 6261a may extend along the center axis A5 of the dustbin. That is, the first extension portion 6261a may extend in a direction of the outer circumferential surface of the dustbin 60, and may be formed in a plate shape that extends along the center axis A5 of the dustbin.

[0183] The first extension portion 6261a may form a curved surface along the outer circumferential surface of the dustbin 60. Alternatively, the first extension portion 6261a may form a flat surface.

[0184] The second extension portion 6261b extends in a direction of the compression lever housing 621 from an end of the first extension portion 6261a, and at least a portion thereof is inserted into the groove formed in the compression lever housing 621. The second extension portion 6261b may extend rearward from the end of the first extension portion 6261a. As the second extension portion 6261b is inserted into the groove formed in the compression lever housing 621 to be fitted therewith, the sealer 626 is fixed to the compression lever housing 621. The second extension portion 6261b may be formed to be vertically long along the center axis A5 of the dustbin.

[0185] Referring to FIGS. 12 and 21, the sealer is provided in plurality. The plurality of sealers 626 are disposed on left and right sides, respectively, about the slit 611 of the dustbin. The left sealer 626a is disposed on a left side of the slit 611 of the dustbin, and the right sealer 626b is disposed on the right side of the slit 611 of the dustbin.

[0186] Referring to FIGS. 12 and 21, the left sealer 626a comes into close contact with a left side end of the compression guide 625. In addition, the right sealer 626b comes into close contact with a right side end of the compression guide 625.

[0187] As a forward end of the left sealer 626a comes into close contact with the outer circumferential surface of the dustbin 60, a left side end of the left sealer 626b and a left side end of the right sealer 626b come into close contact with each other, the sealer 626 may block the internal space of the dustbin 60 from the outside by sealing the slit 611 of the dustbin 60.

[0188] Referring to FIG. 12, an angle formed between the slit 611 of the dustbin and an imaginary line passing through a center of the dustbin and the center axis A0 of the main body (angle 1) is an acute angle. The compression lever 623 is disposed in a radial direction of the dustbin 60 from the slit 611 of the dustbin. Therefore, the user may grip the handle 50 with a right hand, and press the compression lever 623 with a left hand to slidingly move the compression lever 623 along the slit 611 of the dustbin. Alternatively, the user may grip the handle 40 with four fingers of the right hand, and press the compression lever 623 with a thumb to slidingly move the compression lever 623 along the slit 611 of the dustbin.

[0189] Referring to FIGS. 17 to 19, the cleaner 1 according to the present disclosure includes a shield plate 627. The shield plate 627 is configured to cover the slit 6212 of the compression lever housing, and shield an internal space of the compression lever housing 621.

[0190] The shield plate 627 covers at least a portion of the slit 6212 of the compression lever housing. The slit 6212 of the compression lever housing is formed to be vertically long. Since the shield plate 627 is formed in a vertically long plate shape, the shield plate 627 covers the slit 6212 of the compression lever housing so as to separate the internal space of the compression lever housing from the outside.

[0191] Referring to FIGS. 17 and 18, the shield plate 627 may be divided into an upper shield plate 627a and a lower shield plate 627b.

[0192] The upper shield plate 627a ascends along with the compression lever 623, as an upper end of the upper shield plate 627a is connected to the compression lever 623 or the compression guide 625. The lower shield plate 627b is disposed below the upper shield plate 627a, and the lower shield plate 627b is disposed such that at least one portion of the lower shield plate 627a overlaps the upper shield plate 627a vertically and in the forward and rearward directions.

[0193] The upper shield plate 627a may be disposed on an inner side than the lower shield plate 627b. By this arrangement, when the upper shield plate fully descends to a threshold descending position during descending of

the compression lever 623, the compression lever 623 contacts an upper end of the lower shield plate so that the lower shield plate can descend along with the upper shield plate.

[0194] When the cleaner is viewed from one side, an imaginary line A6 extending in a direction in which the compression lever 623 ascends intersects the longitudinal axis A4 of the handle.

[0195] Referring to FIG. 7, the imaginary line A6 extending in the direction in which the compression lever 623 ascends is vertically disposed, and the longitudinal axis A4 of the handle is disposed in a forwardly upward direction. Therefore, the imaginary line A6 extending from a top of the cleaner 1 in the direction in which the compression lever 623 ascends may intersect the longitudinal axis A4 of the handle. By this arrangement, the longitudinal axis A4 of the handle may be located horizontally on the ground during a cleaning operation, and at this instance, the imaginary line A6 extending in the direction in which the compression lever 623 ascends may be disposed in a rearwardly downward direction, the user may operate the compression lever 623 easily by pulling the compression lever toward the body of the user.

[0196] When the cleaner is viewed from one side, the imaginary line A6 extending in the direction in which the compression lever 623 ascends intersects the longitudinal axis A1 of the suction unit.

[0197] Referring to FIG. 7, the imaginary line A6 extending in the direction in which the compression lever 623 ascends is disposed vertically, and the longitudinal axis A1 of the suction unit is disposed in a forwardly upward direction. Therefore, the imaginary axis A6 extending in the direction in which the compression lever 623 ascends may intersect the longitudinal axis A4 of the handle. By this arrangement, the longitudinal axis A4 of the suction motor may be located inclinedly toward the ground during a cleaning operation, and at this instance, the imaginary line A6 extending in the direction in which the compression lever 623 ascends may be disposed in a rearwardly downward direction, therefore, the user may operate the compression lever 623 easily by pulling the compression lever toward the body of the user.

[0198] Functions and effects of the cleaner 1 according to the present disclosure will be described hereinafter.

[0199] Referring to FIGS. 9 and 10, the cleaner 1 according to the present disclosure may be disassembled into a plurality of assemblies. The cleaner 1 may be disassembled into the main body housing 3, the dustbin 60, the cyclone unit 30, and the compression lever assembly 620, and the compression lever assembly 620 may be disassembled into the compression plate 622 and the remainder.

[0200] Among the disassembled parts, there used to be a problem in that the dustbin 60, the cyclone unit 30, and the compression plate 622 are exposed to dust all the time, and thus, were dirty, but cleaning them was difficult. However, since the dustbin 60 and the cyclone unit 30 can be cleaned with water, except for the main housing 3 which is likely to malfunction when it is soaked with water, it is advantageous that the dustbin 60 can be maintained in a cleaner state by disassembling the dustbin 60 and the cyclone unit 30 to wash the dustbin 60 with water, or to sterilize the dustbin 60. Likewise, the compression plate 622 can be washed with water, thus, the compression plate 622 can be maintained in a cleaner state after sterilization.

[0201] In particular, referring to FIG. 10, by operating the dustbin detachable lever 613b to release catching at a rear of the dustbin 60 and by rotating the dustbin 60 in the clockwise direction to release catching at a front of the dustbin 60, the dustbin 60 may be easily detached from the main body housing 3, and may be easily mounted to and strongly fixed to the main body housing 3.

[0202] The compression lever assembly 620 according to the present disclosure includes the compression plate 622 disposed inside the dustbin 60, the compression lever 623 that can be operated by the user, the compression guide 625 that combines the compression plate 622 and the compression lever 623 with each other, and the compression rail 624 that penetrates the compression guide 625 and guides sliding movement of the compression guide 625. Referring to FIG. 13, since the assembly in which the compression plate 622, the compression guide 625, and the compression lever 623 are combined with one another has a lower height compared to that of the prior art, the assembly provides a dramatically improved stroke distance, and the stroke distance is not limited by a height of the cleaner 1.

[0203] Referring to FIGS. 12 and 16, the compression lever assembly 620 may be attached to or detached from the dustbin 60. More particularly, by inserting the mounting protrusion 612 of the compression lever housing into the mounting groove 6213 of the compression lever housing formed in the compression lever housing 621, and slidingly moving the compression lever housing 621 in the longitudinal direction of the slit 611 of the dustbin, the compression lever assembly 620 may be easily mounted to the dustbin 60.

[0204] Referring to FIGS. 20 and 21, the the compression lever assembly 620 includes the sealer 626 that seals a gap. The sealer 626 is disposed outside the slit 611 of the dustbin and is configured to separate the internal space of the dustbin 60 from the outside. The sealer 626 includes the cylindrical deformation part 6262, and at least a portion of the deformation part 6262 is recessed to come into close contact with the outer circumferential surface of the dustbin 60 more strongly to seal. The deformation parts 6262 are disposed on the left side surface and the right side surface of the compression guide 625, and may form a gap by deforming only a portion during the sliding movement of the compression guide 625, and may fill the gap by being restored to its original form after the compression guide 625 moves. The sealer 626 includes the fixing part 6261 which protrudes from the deformation part 6262 and is inserted into the housing to be fixed thereto, and accordingly, the sealer may be eas-

ily and more strongly inserted into and fixed to the compression lever housing 621.

[0205] Although some embodiments have been illustrated and described above, this specification is not limited to the aforementioned specific embodiments, and a person having ordinary skill in the art to which this specification pertains may modify the present invention in various ways without departing from the gist of the claims. Such modified embodiments should not be individually interpreted from the technical spirit or prospect of this specification.

Claims

1. A cleaner, comprising:

a dustbin having a slit formed on one side thereof;
a compression lever housing disposed on an outside of the slit and mounted to the dustbin;
a compression plate disposed on an inside of the dustbin and configured to ascend in a direction in which the slit extends; and
a sealer disposed in the compression lever housing, coming in close contact with the slit, and extending along the slit.

2. The cleaner of claim 1, further comprising:

a compression rail disposed on an inside of the compression lever housing, and extending along the slit; and
a compression guide having one side coupled to the compression plate and another side coupled to the compression lever, and configured to ascend along the compression rail.

3. The cleaner of claim 1, further comprising:
a compression guide having at least a portion thereof inserted into an inside of the dustbin through the slit, one side of the portion inserted thereinto being coupled to the compression plate, and another side not inserted thereto being inserted into the compression lever to ascend along the slit of the dustbin.

4. The cleaner of claim 1,
wherein the sealer comprises:

a fixing part fixed to the compression lever housing; and
a deformation part supported by the fixing part, configured to seal the slit, and having at least one portion thereof configured to be deformed to form a gap.

5. The cleaner of claim 4,
wherein the fixing part comprises:

a first extension portion extending along an outer circumferential surface of the dustbin from the deformation part; and
a second extension portion extending in a direction of the compression lever housing from an end of the first extension portion, and having at least a portion thereof inserted into a groove formed in the compression lever housing.

6. The cleaner of claim 4, wherein the deformation part is formed in a cylindrical shape with a hollow hole inside.

7. The cleaner of claim 1, wherein the sealer is provided in plurality, and the plurality of sealers are arranged on left and right sides, respectively, about the slit.

8. The cleaner of claim 1,

wherein the dustbin is formed in a cylindrical shape, and
wherein the slit is formed in a direction parallel to a center axis of the dustbin.

9. The cleaner of claim 1, wherein, when viewed from a top, an angle formed between the slit of the dustbin and an imaginary line passing through a center of the dustbin and a center axis of the main body is an acute angle.

10. The cleaner of claim 1,

wherein, in the compression lever housing, a slit parallel to the slit of the dustbin is formed, and
wherein the compression lever housing further comprises a shield plate configured to cover at least a portion of the slit of the compression lever housing.

11. The cleaner of claim 10,
wherein the shield plate comprises:

an upper shield plate having an upper end connected to the compression lever to ascend along with the compression lever; and
a lower shield plate disposed below the upper shield plate, and having at least a portion thereof configured to overlap the upper shield plate in forward and rearward directions.

12. The cleaner of claim 1, comprising:

a mounting protrusion of the compression lever housing protruding outward from an outer circumferential surface of the dustbin, but protruding in an opposite direction to a radial direction of the dustbin; and
a mounting groove of the compression lever

housing formed on one side of the compression lever housing, and allowing the mounting protrusion of the compression lever housing to be inserted thereinto.

13. The cleaner of claim 1, further comprising:

a main body housing allowing the dustbin to be mounted thereto,
wherein one side of the main body housing is inserted into an opening formed on one side of the dustbin to hold the dustbin, and
wherein another side of the main body housing is caught by another side of the dustbin to hold the dustbin.

14. The cleaner of claim 1, comprising:

a main body housing allowing the dustbin to be mounted thereto;
a fixing protrusion of the dustbin formed in the dustbin; and
a dustbin detachable lever disposed in the main body, and configured to be caught by the fixing protrusion of the dustbin to fix the dustbin and to release the fixation of a fixing hook of the dustbin when the dustbin detachable lever is operated.

15. The cleaner of claim 1, comprising:

a main body housing allowing the dustbin to be mounted thereto; and
a handle disposed in the main body housing,
wherein, when viewed from one side, an imaginary line extending in a direction in which the compression lever ascends intersects a longitudinal axis of the handle.

16. The cleaner of claim 1, comprising:

a suction unit disposed in the dustbin, and configured to guide air to the dustbin, and
wherein, when viewed from one side, an imaginary line extending in a direction in which the compression lever ascends intersects a longitudinal axis of the suction unit.

17. A cleaner, comprising:

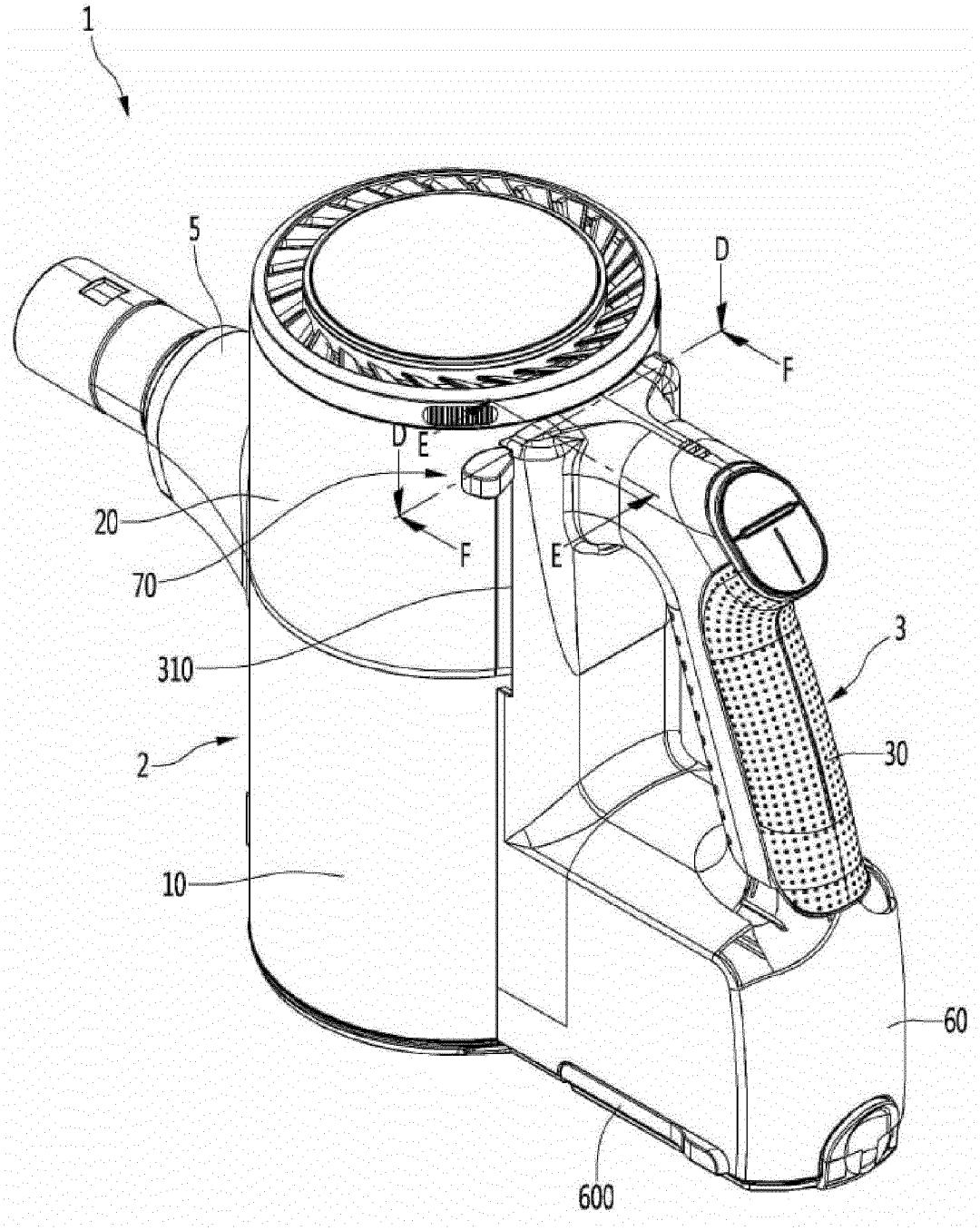
a dustbin having a slit formed on one side thereof;
a compression lever housing disposed on an outside of the slit and mounted to the dustbin;
a compression plate disposed on an inside of the dustbin and configured to ascend in a direction in which the slit extends; and
a compression guide having at least a portion thereof inserted into an inside of the dustbin through the slit, an inside thereof coupled to the compression plate and an outside thereof coupled to the compression lever to move along the slit; and
a sealer having a forward surface coming in close contact with the slit, and a side surface coming in close contact with the compression guide.

18. The cleaner of claim 17, comprising:
a compression rail fixed to an inside of the compression lever housing, disposed on an outside of the sealer, and extending along the slit to guide the compression guide.

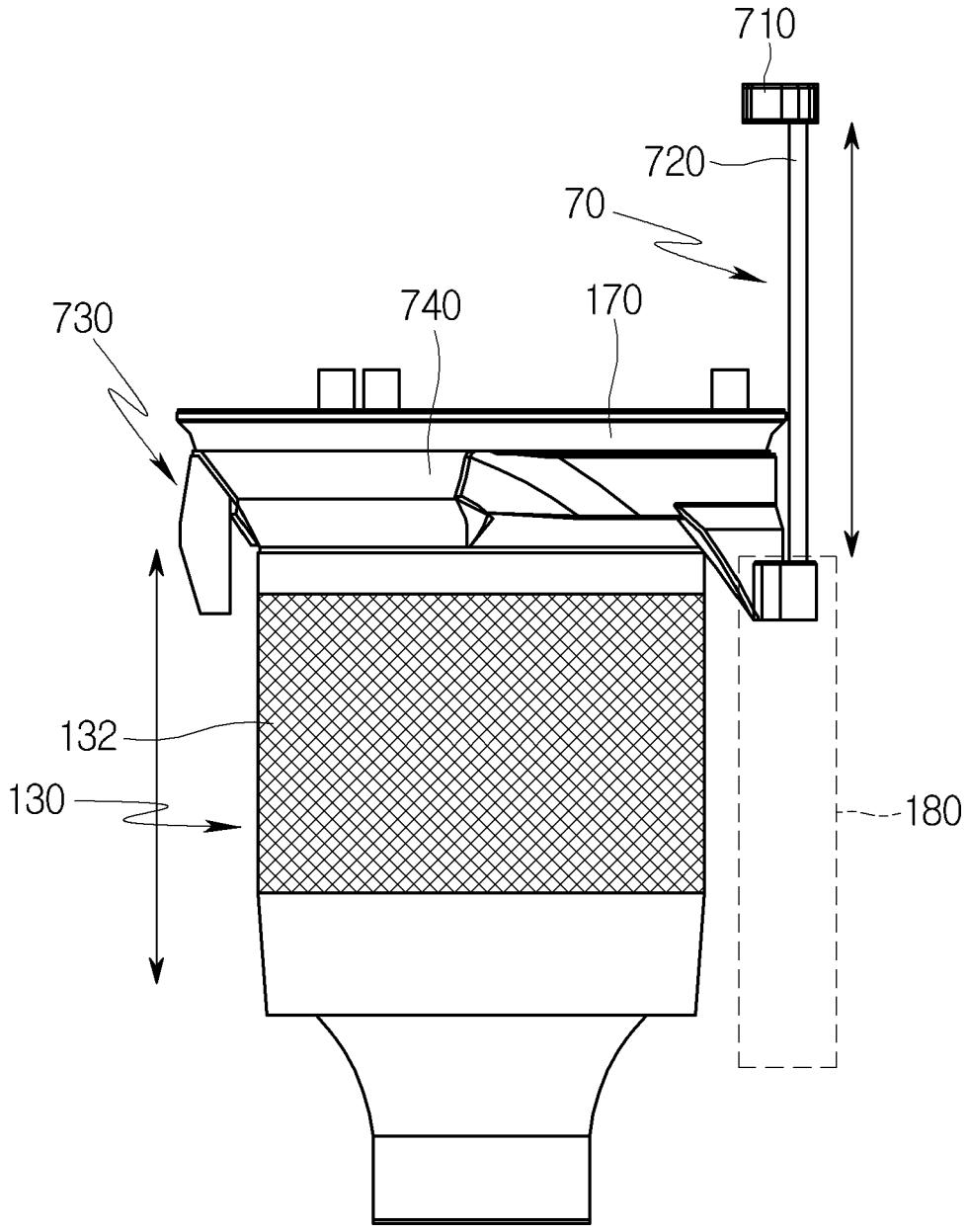
19. The cleaner of claim 17,

wherein the sealer is provided in plurality, and
wherein a left sealer comes in close contact with a left side end of the compression guide, and a right sealer comes in close contact with a right side end of the compression guide.

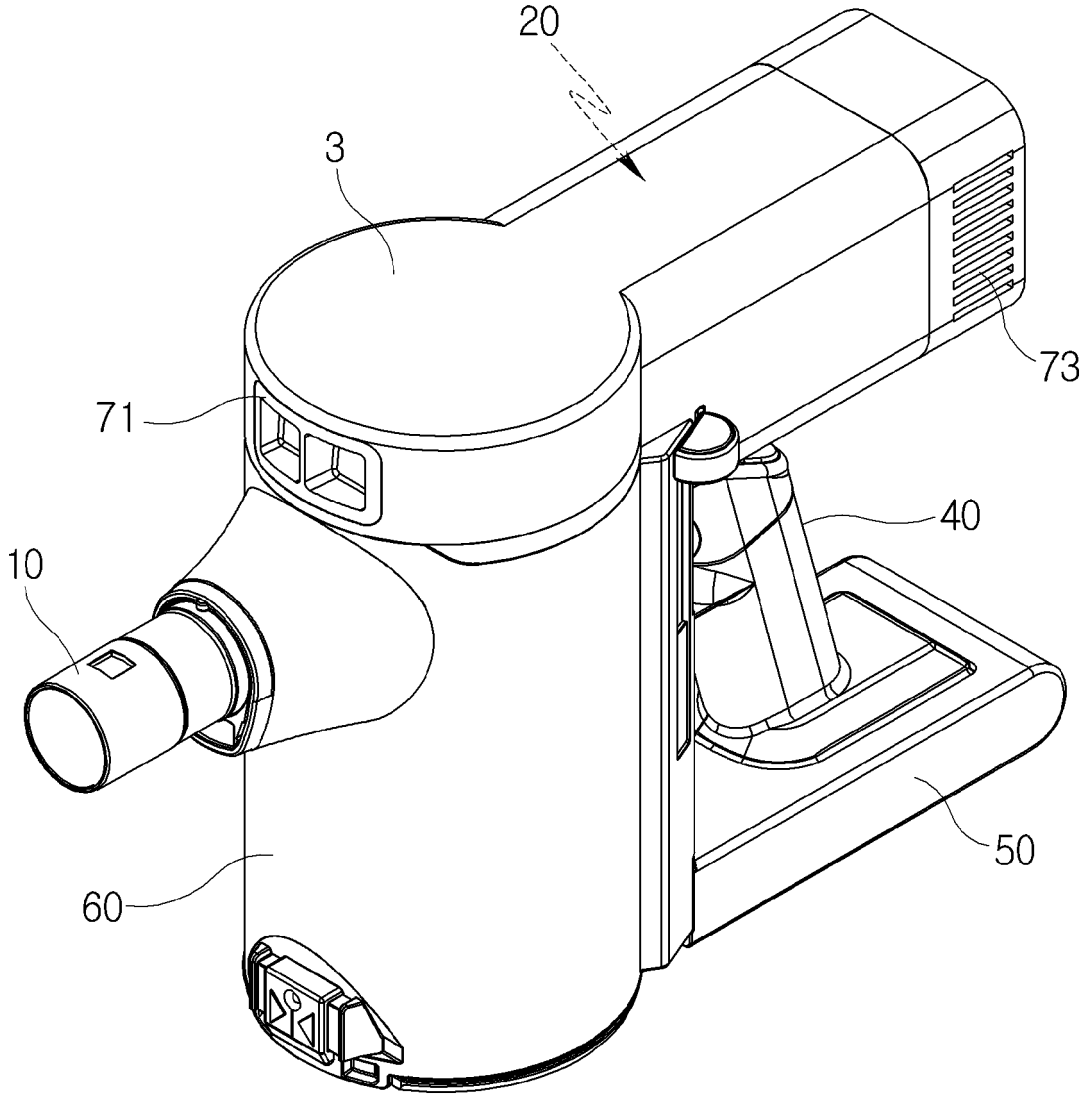
[Fig. 1]



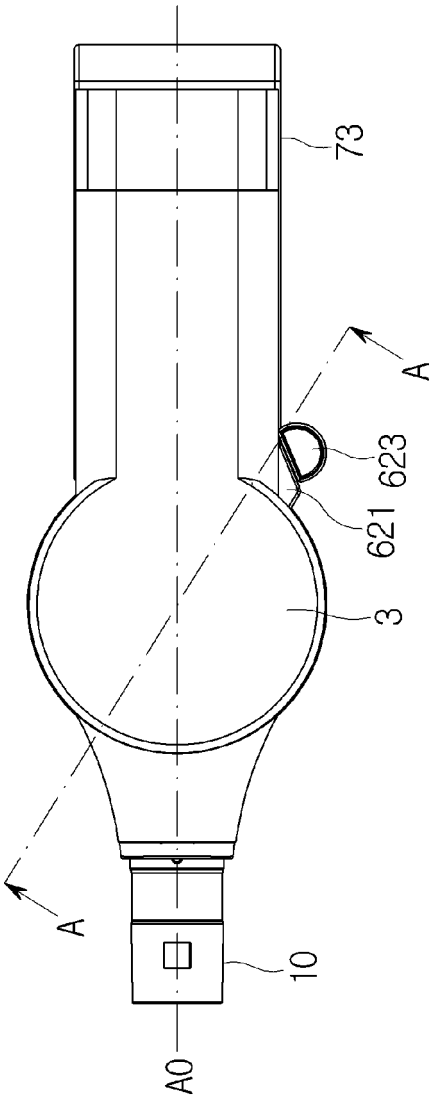
[Fig. 2]



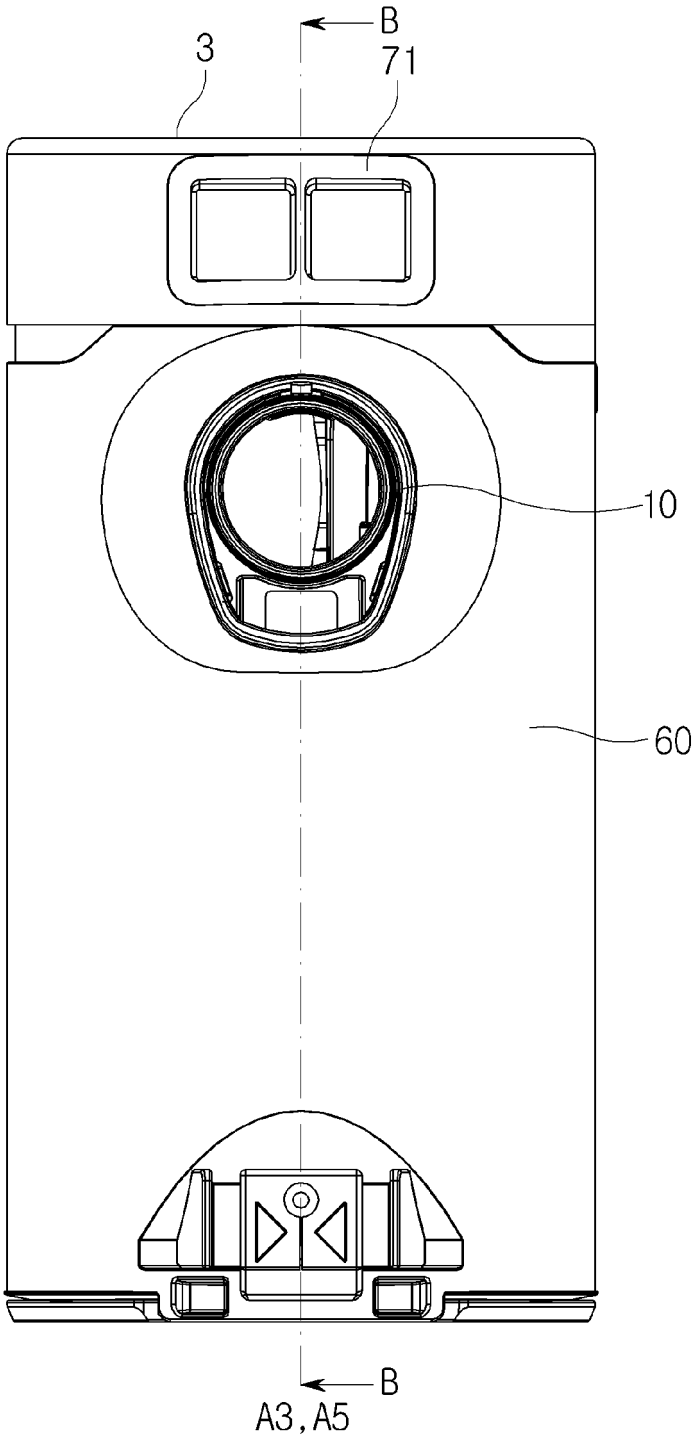
[Fig. 3]



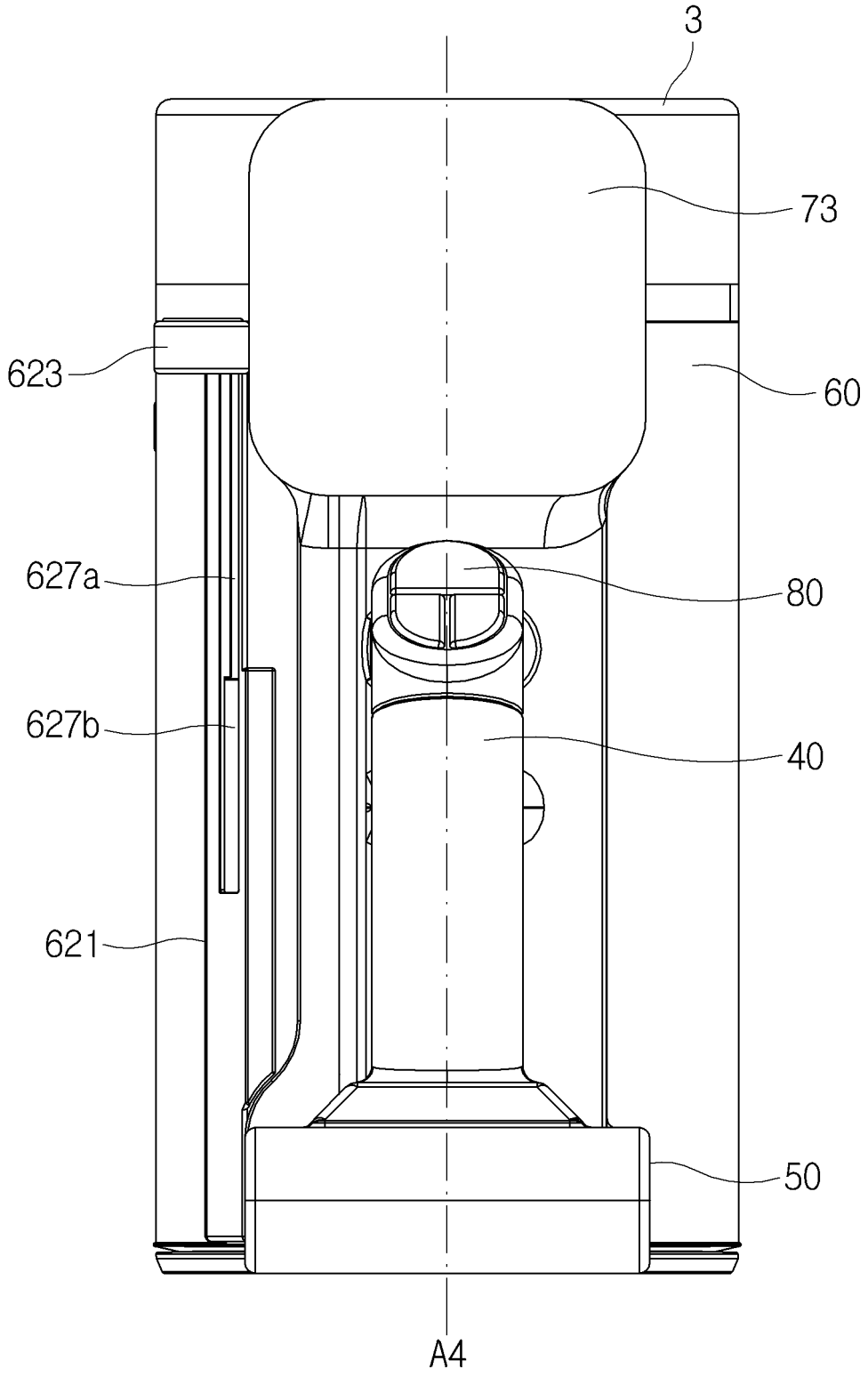
[Fig. 4]



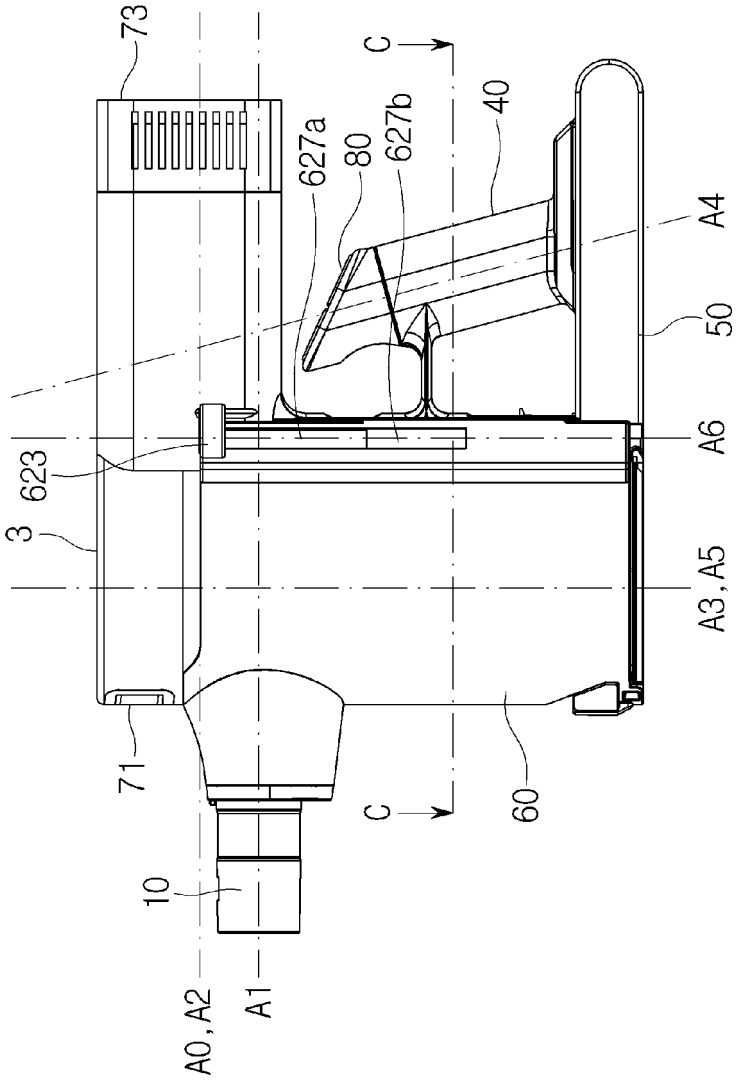
[Fig. 5]



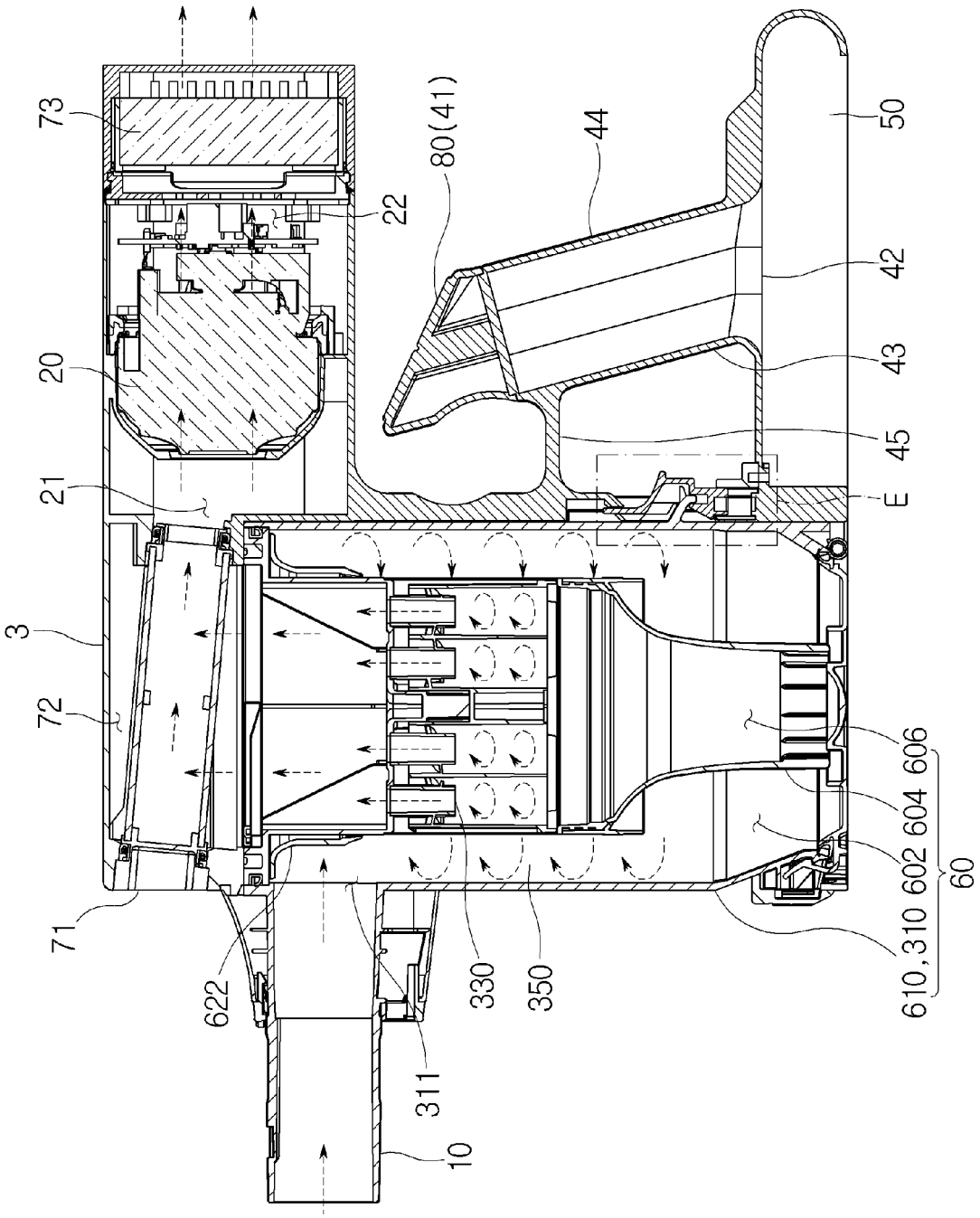
[Fig. 6]



[Fig. 7]



[Fig. 8]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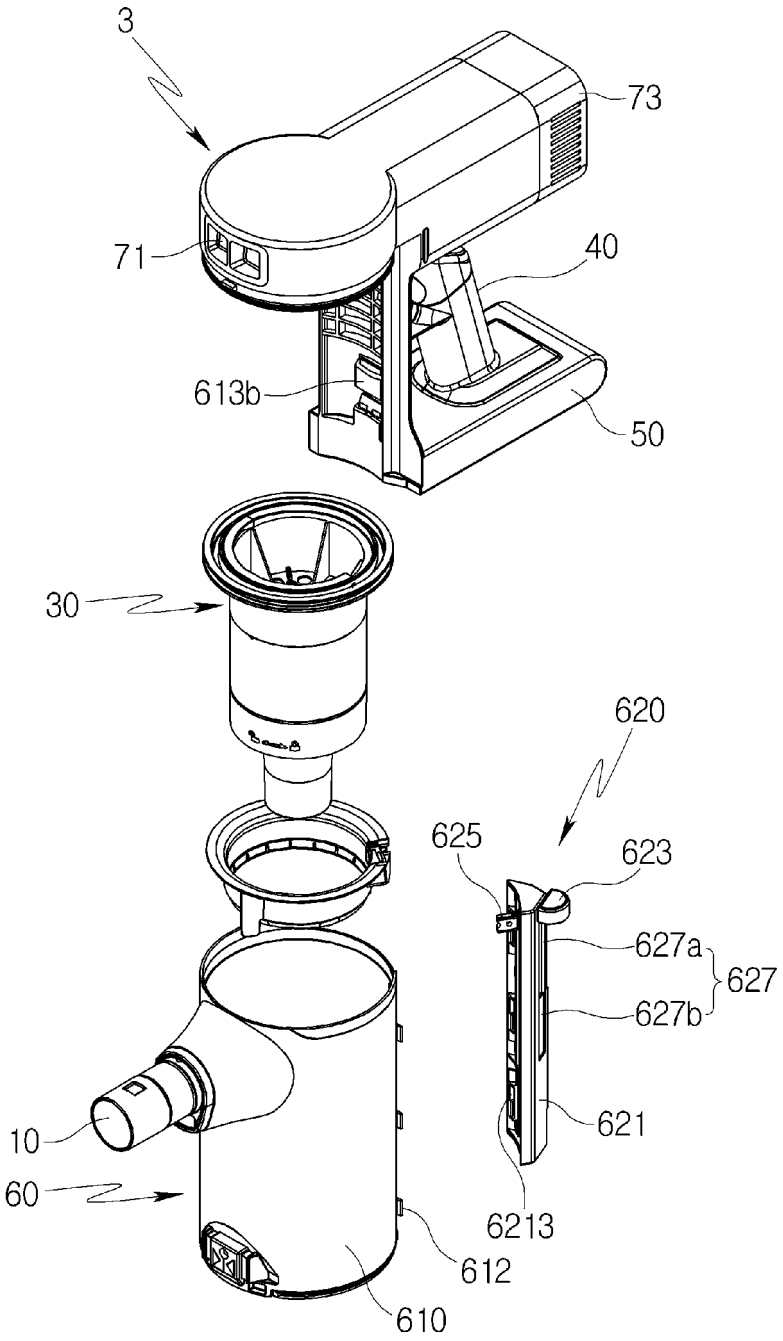
[Fig. 9]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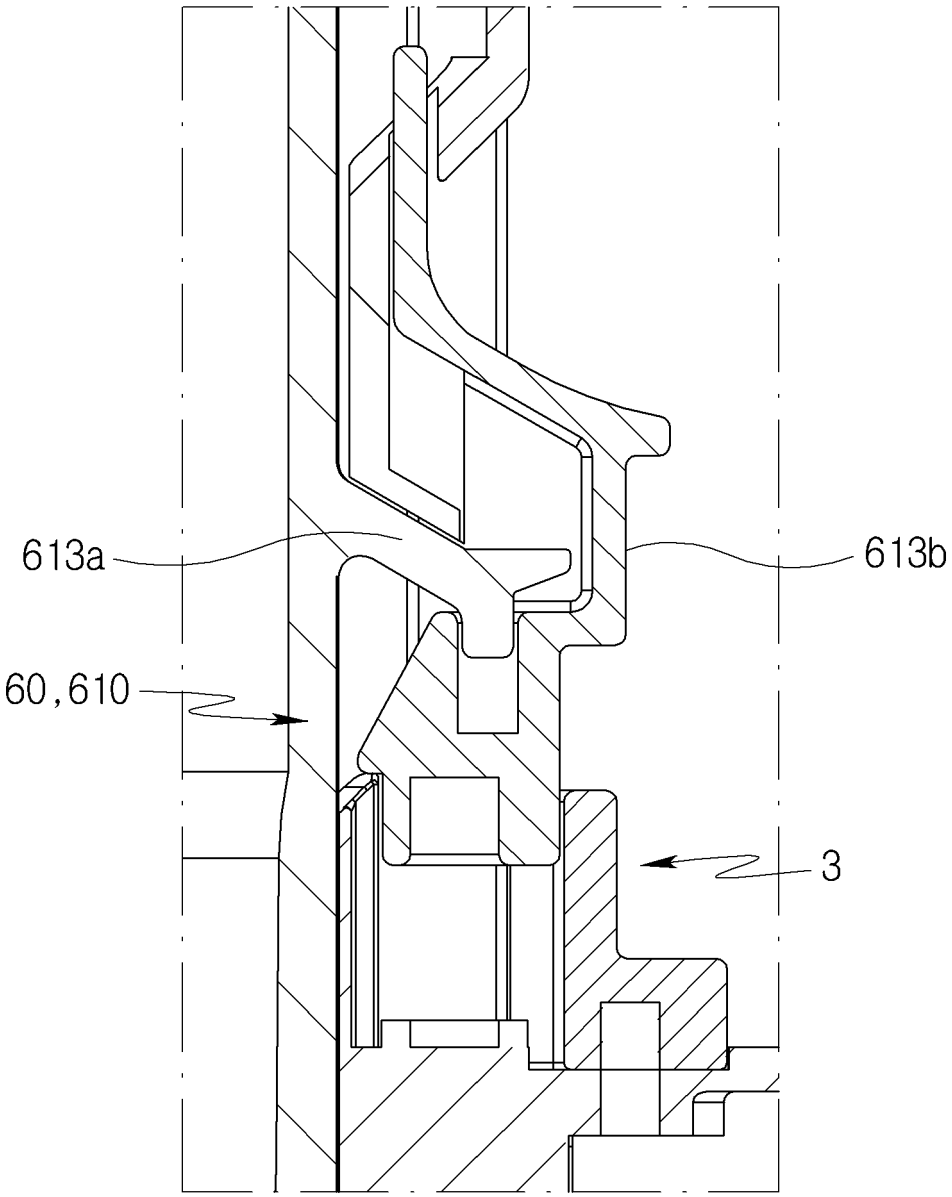
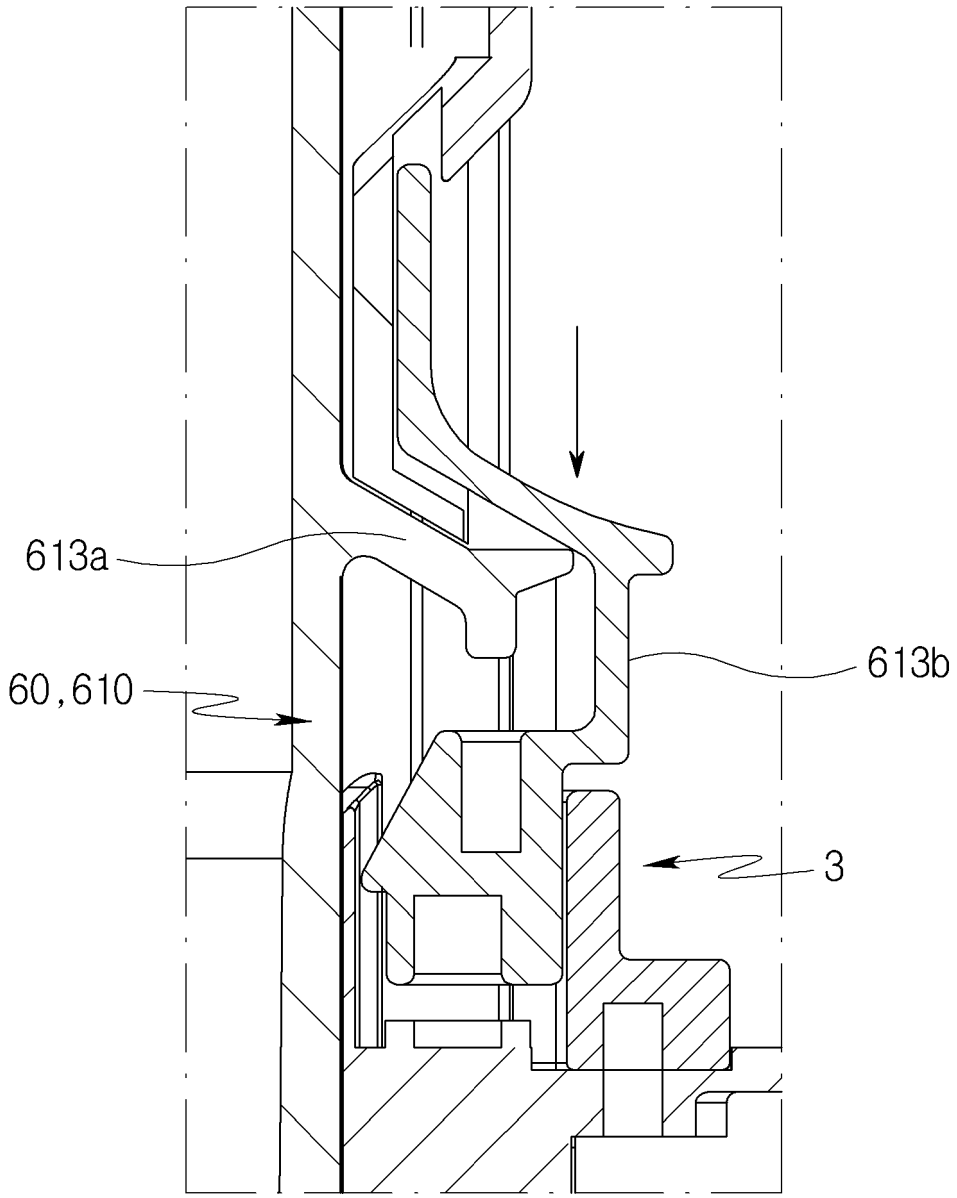
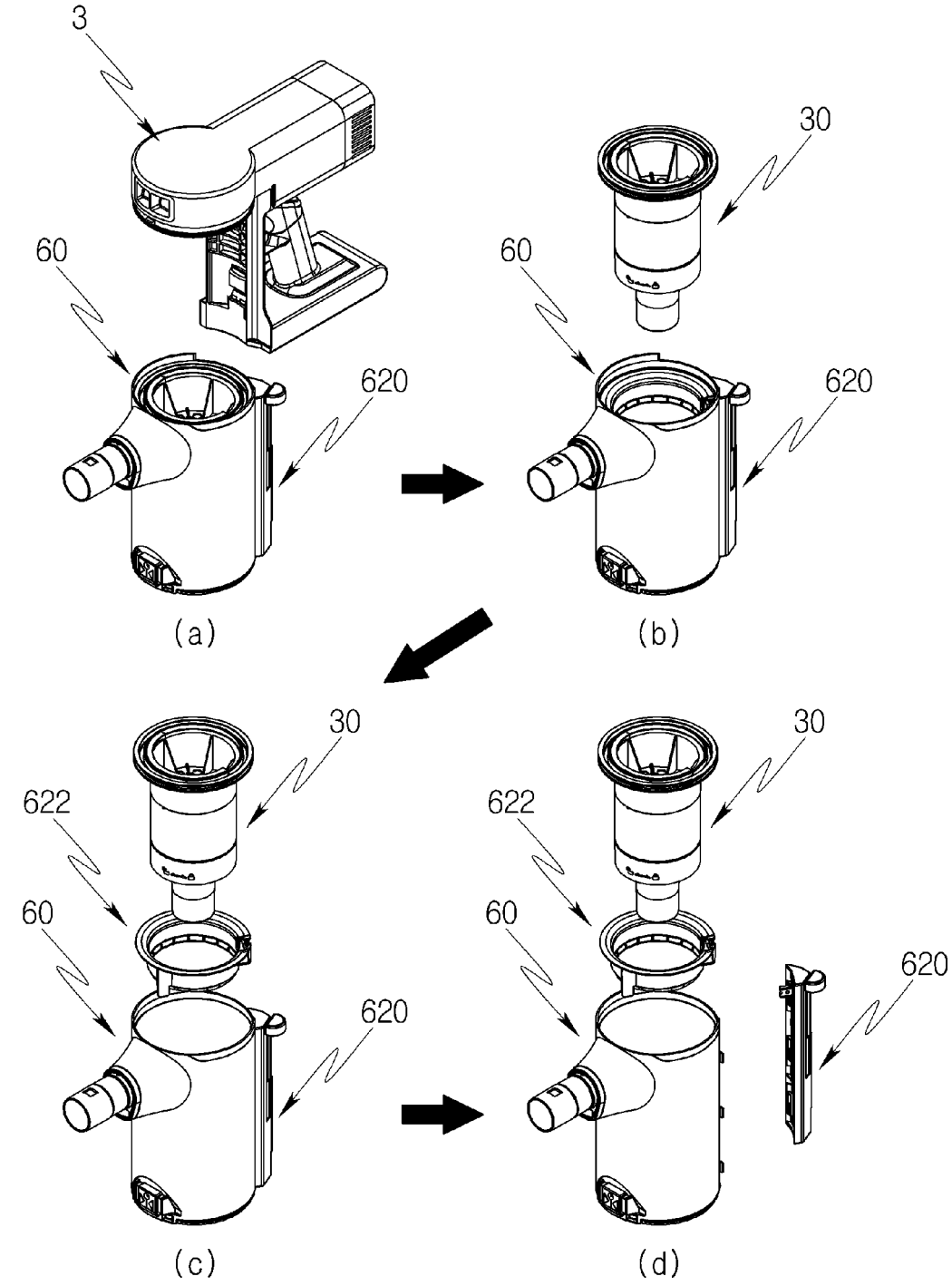
[Fig. 10a]



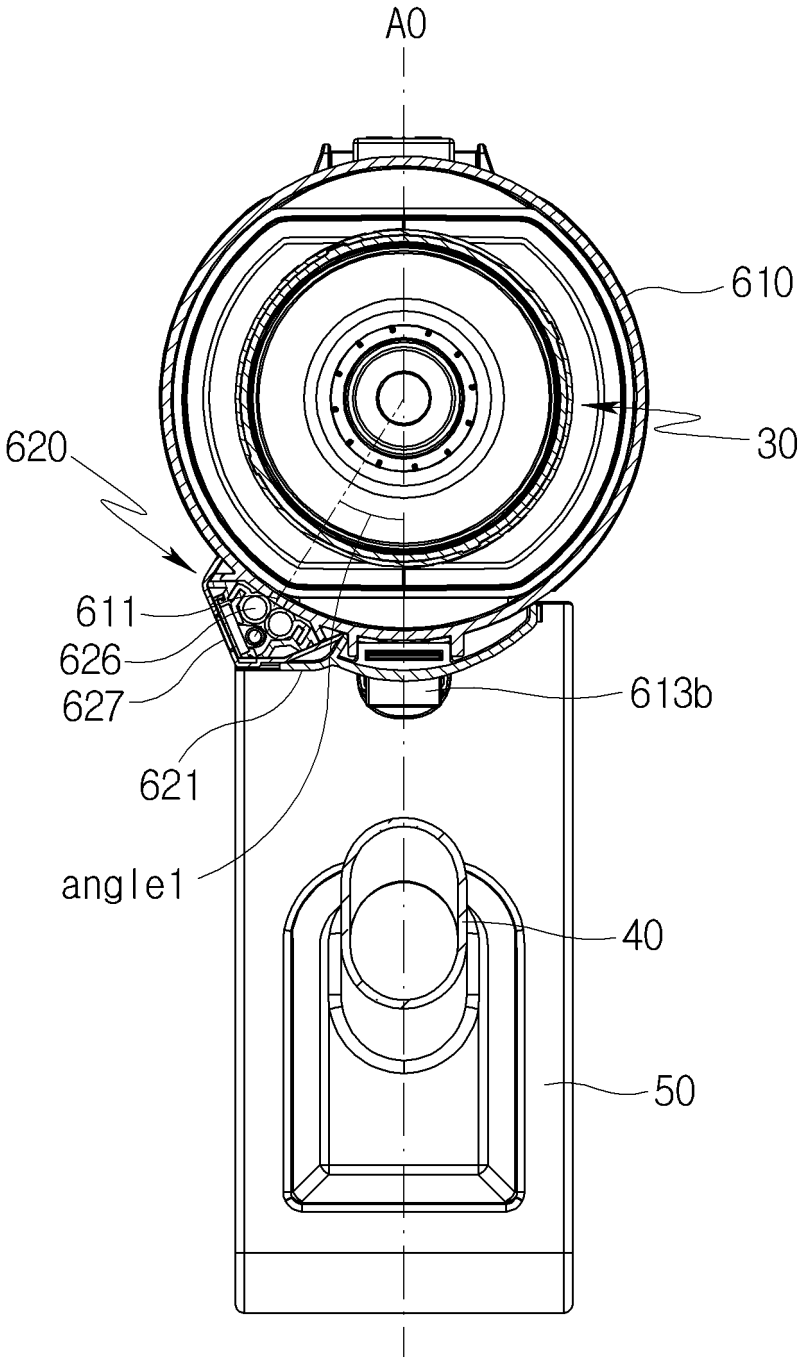
[Fig. 10b]



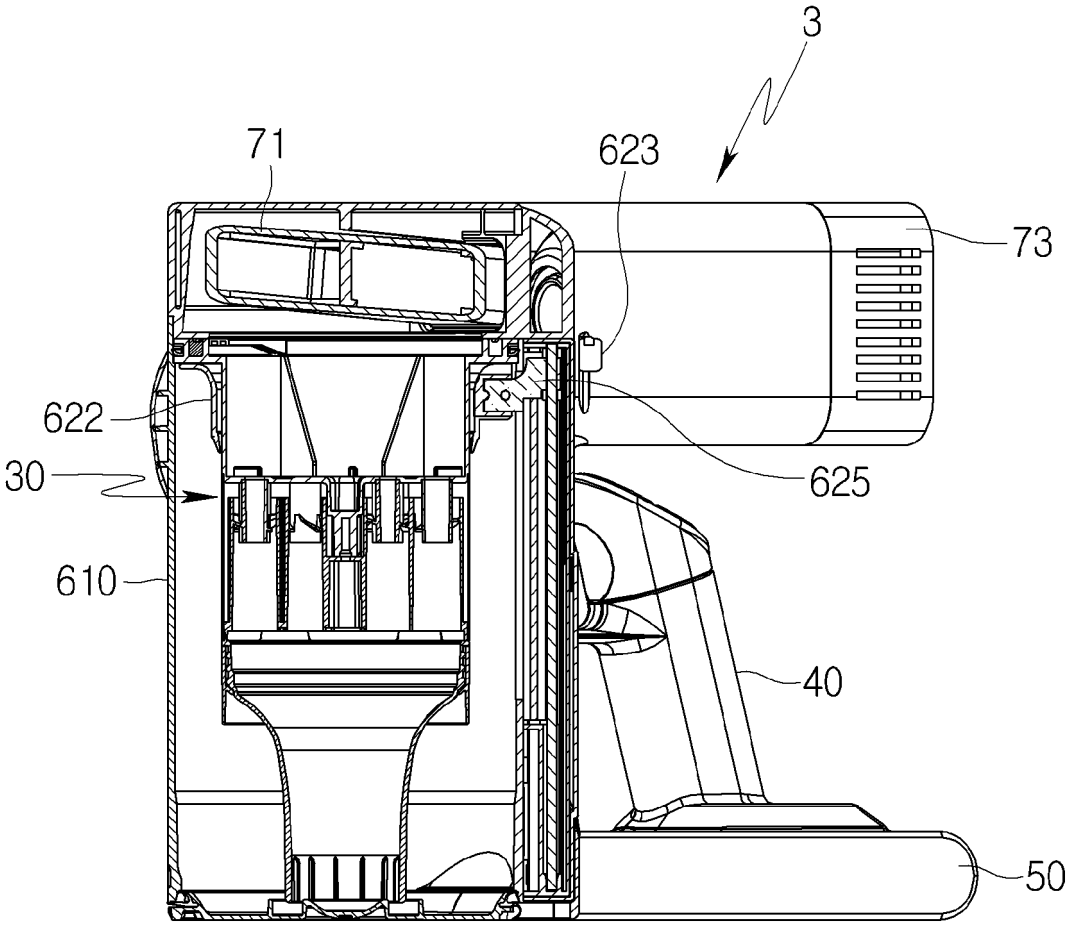
[Fig. 11]



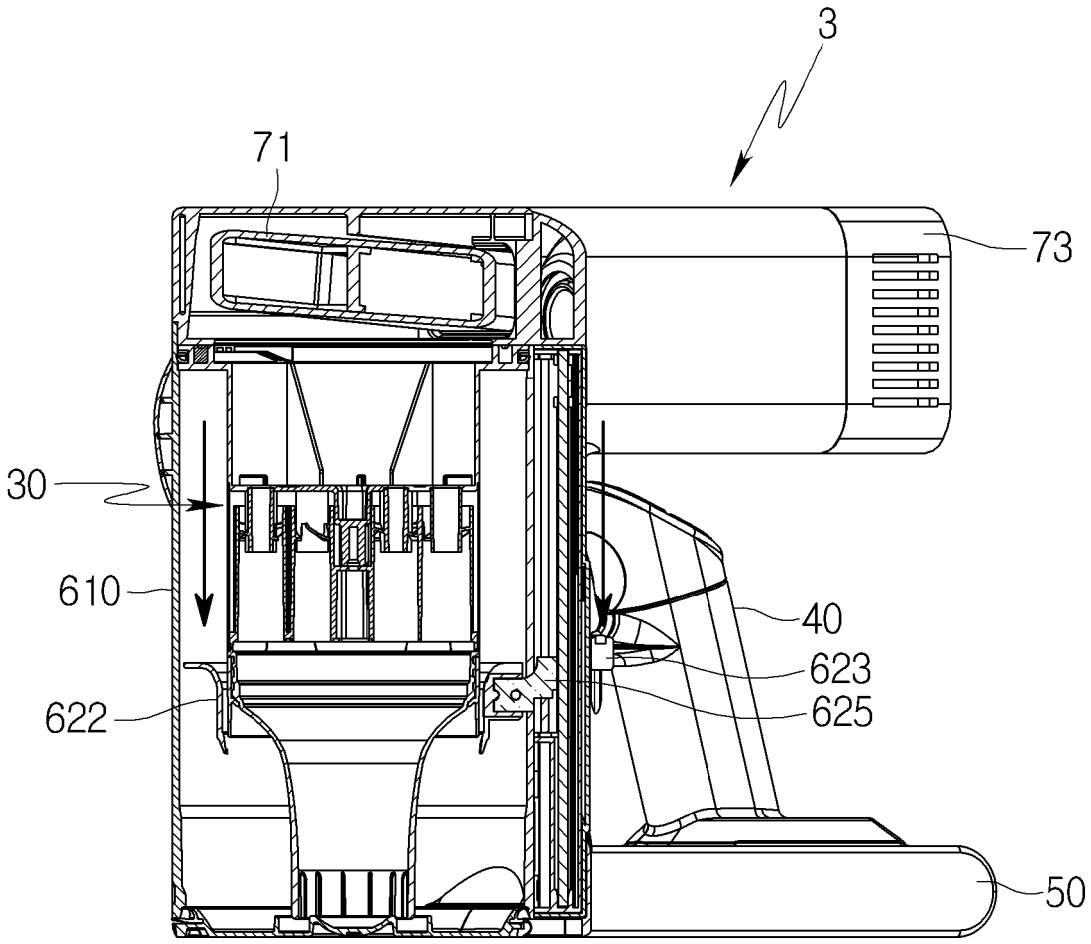
[Fig. 12]



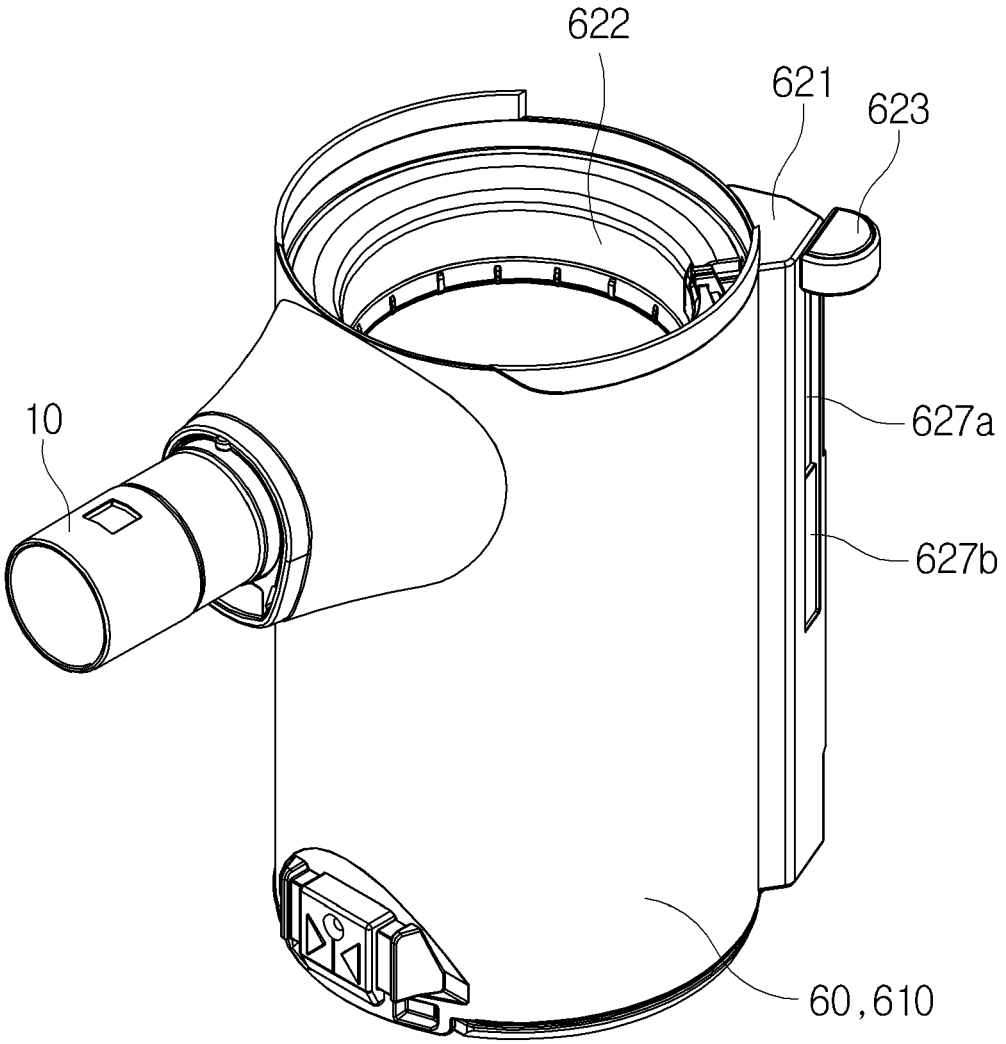
[Fig. 13a]



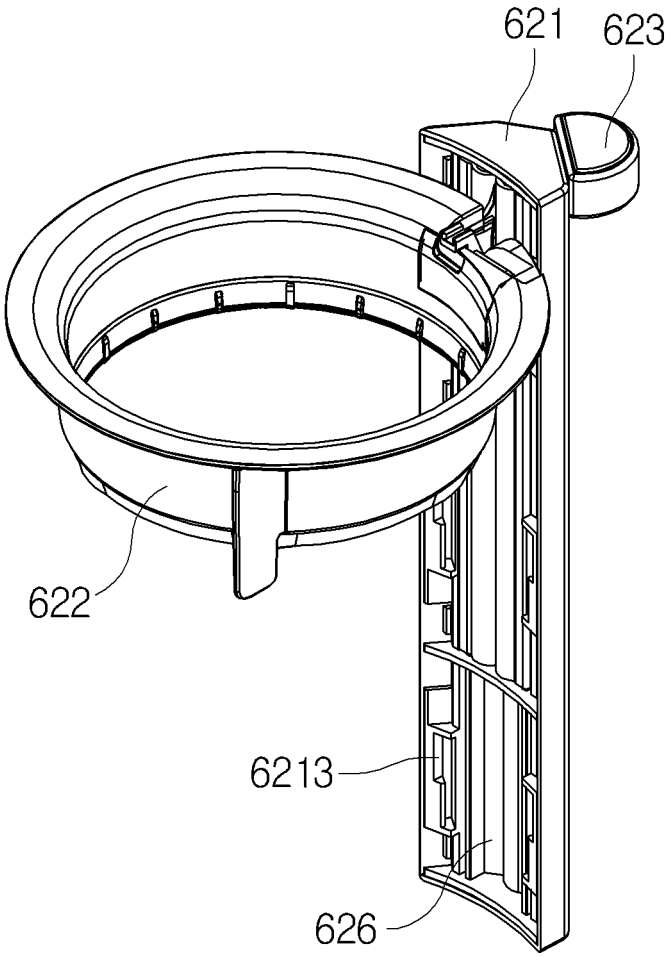
[Fig. 13b]



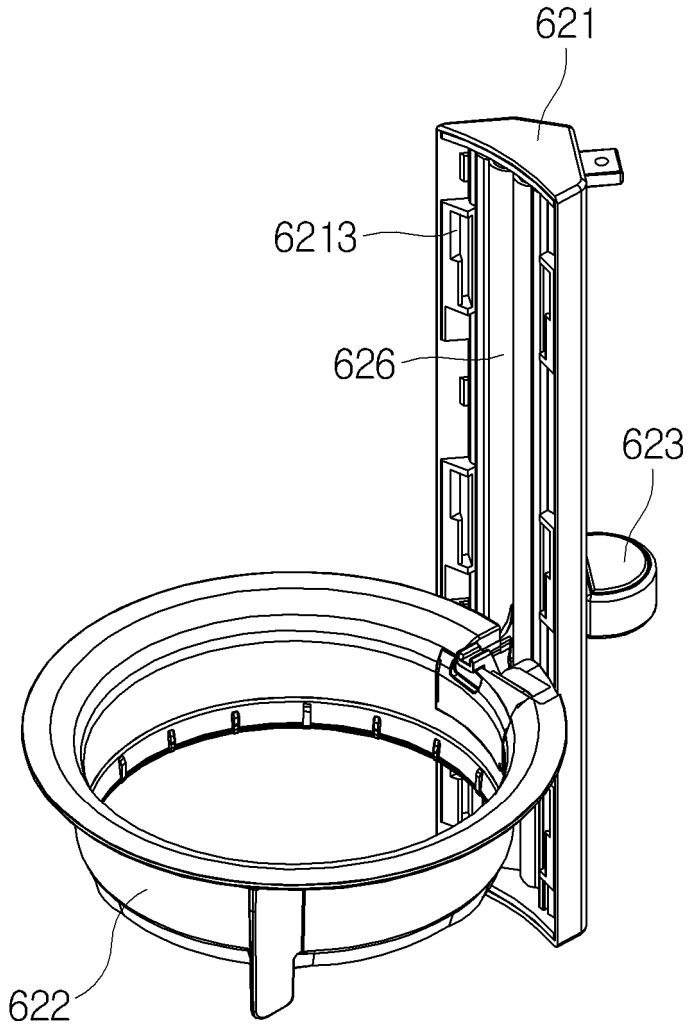
[Fig. 14]



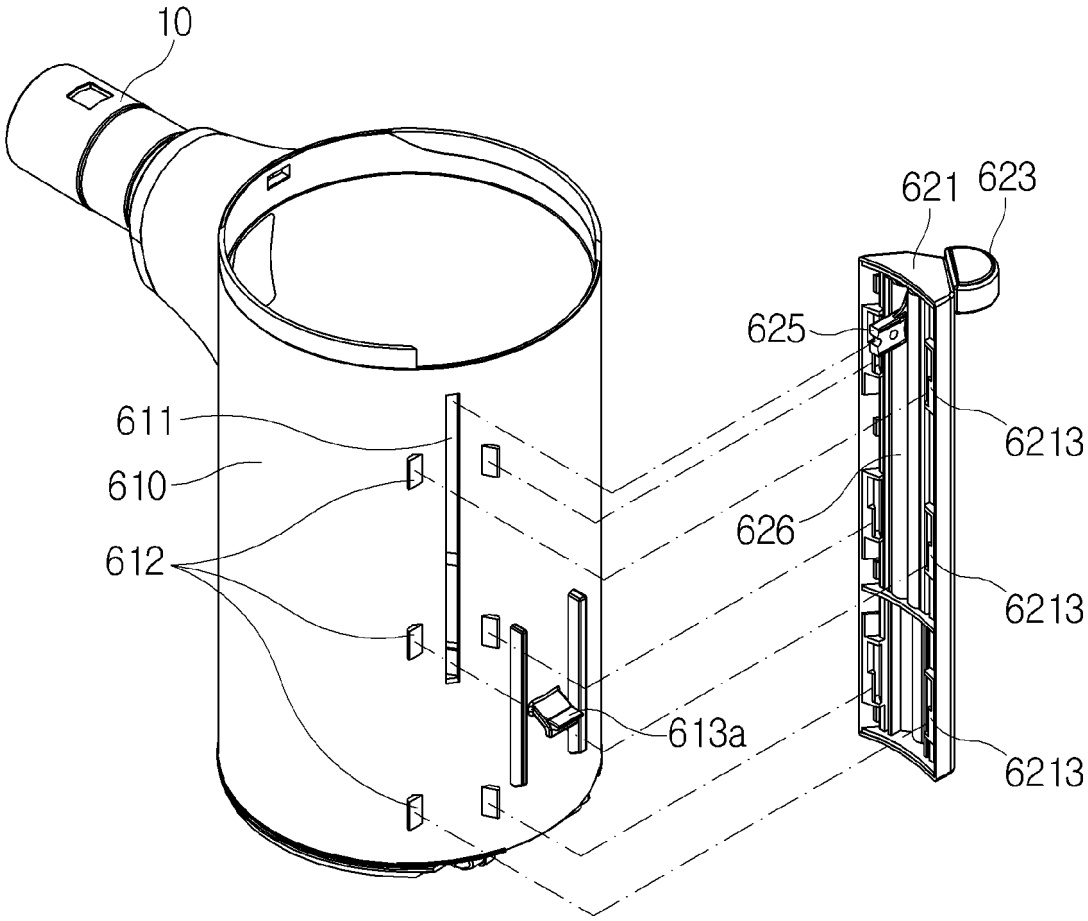
[Fig. 15a]



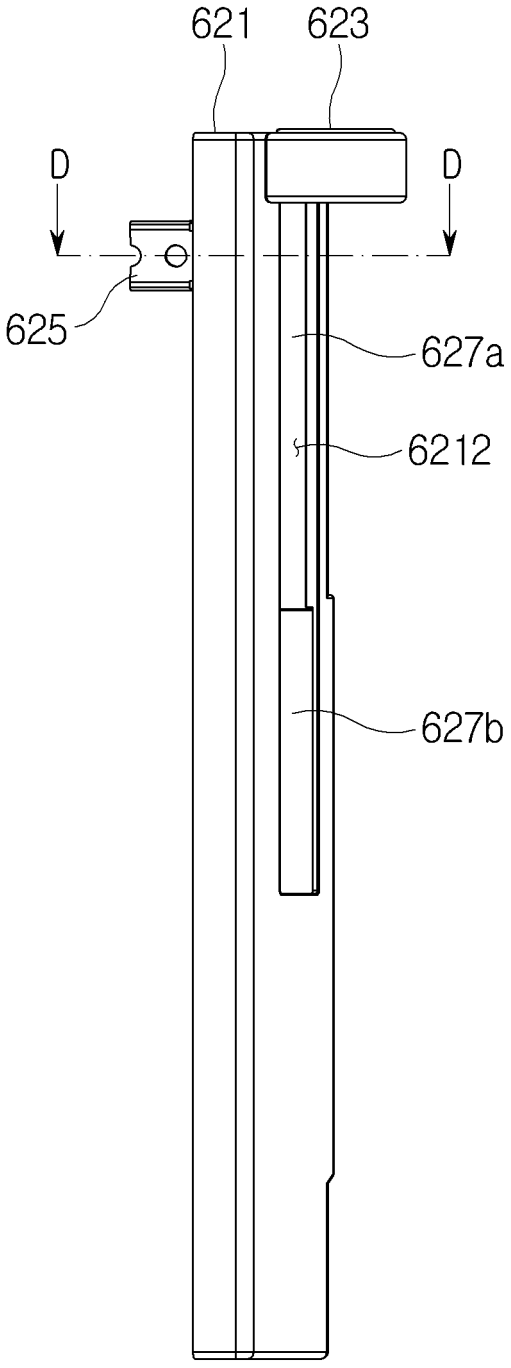
[Fig. 15b]



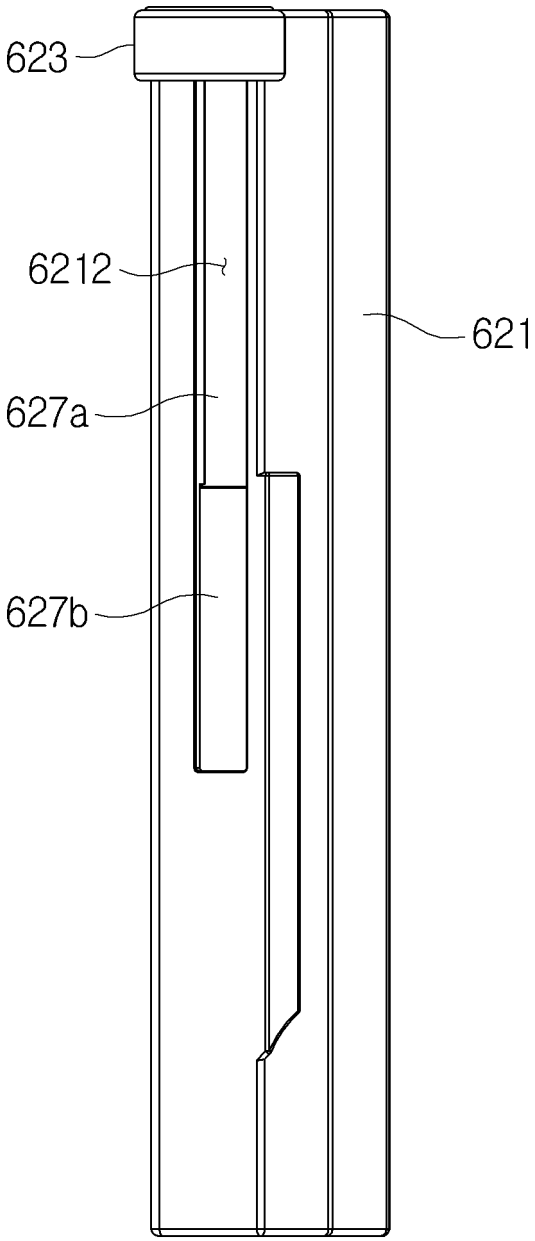
[Fig. 16]



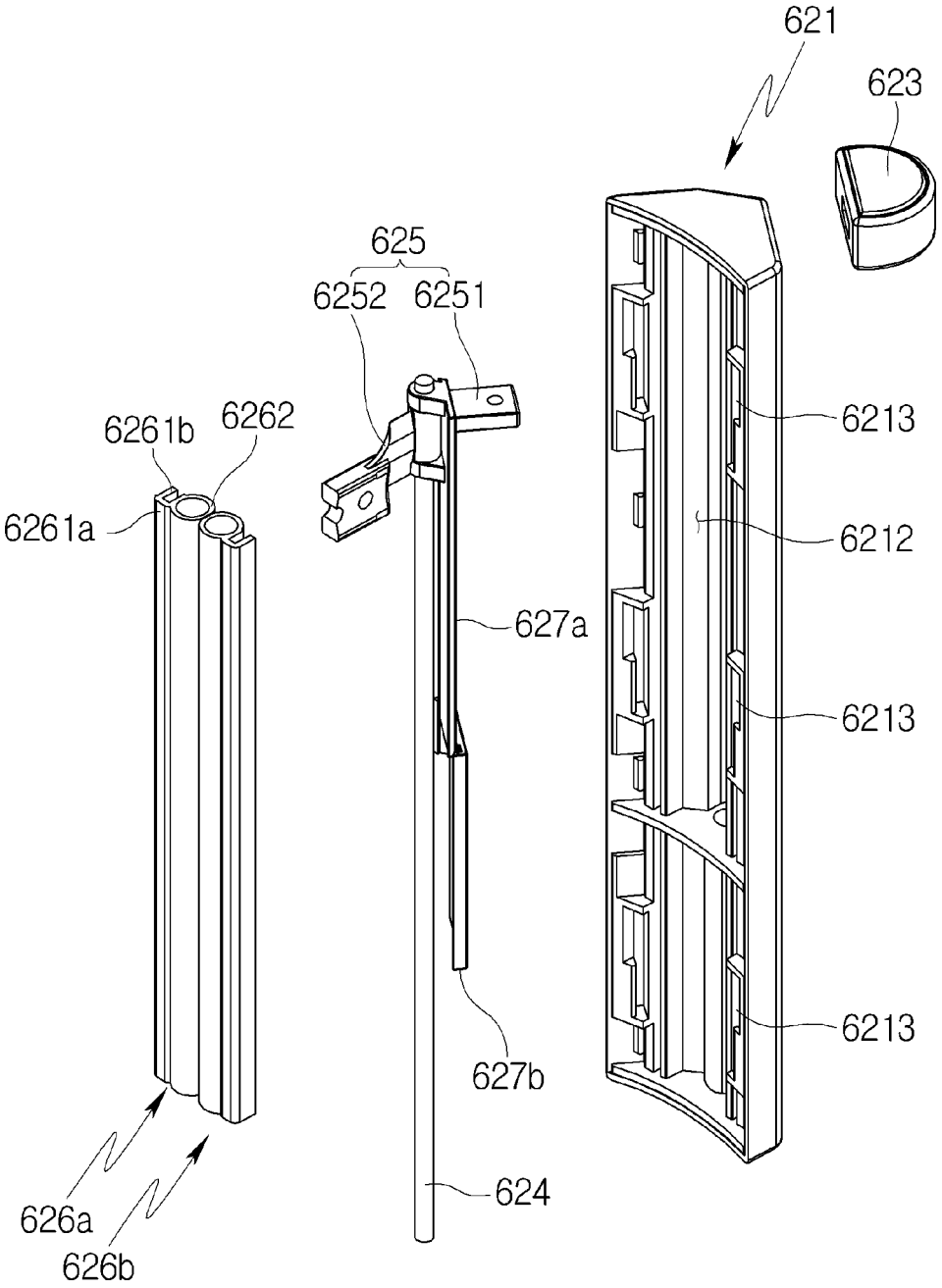
[Fig. 17]



[Fig. 18]



[Fig. 19]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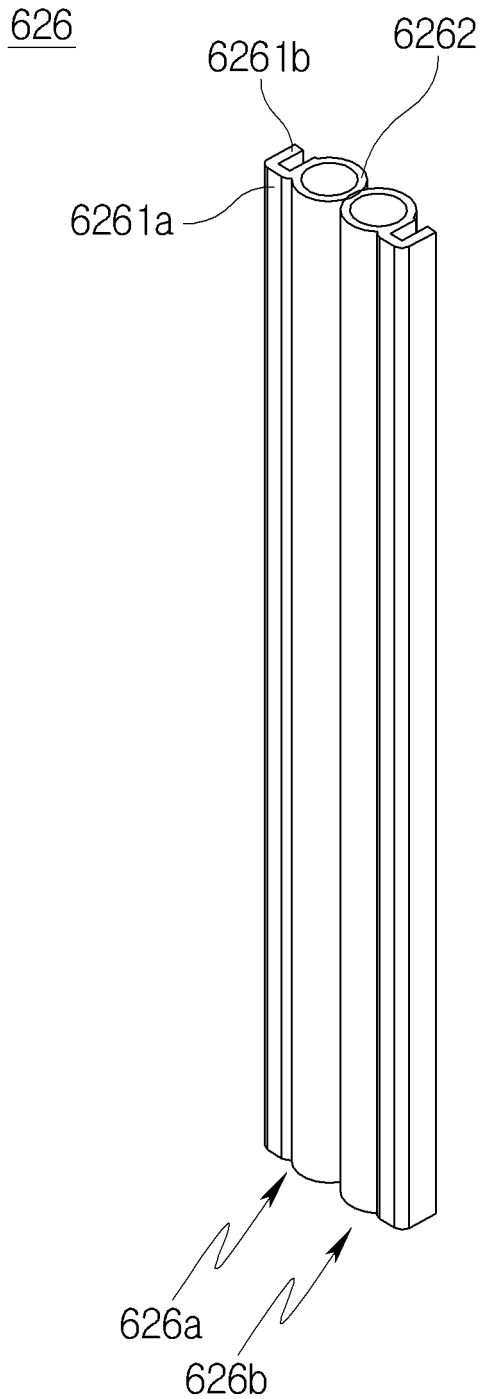
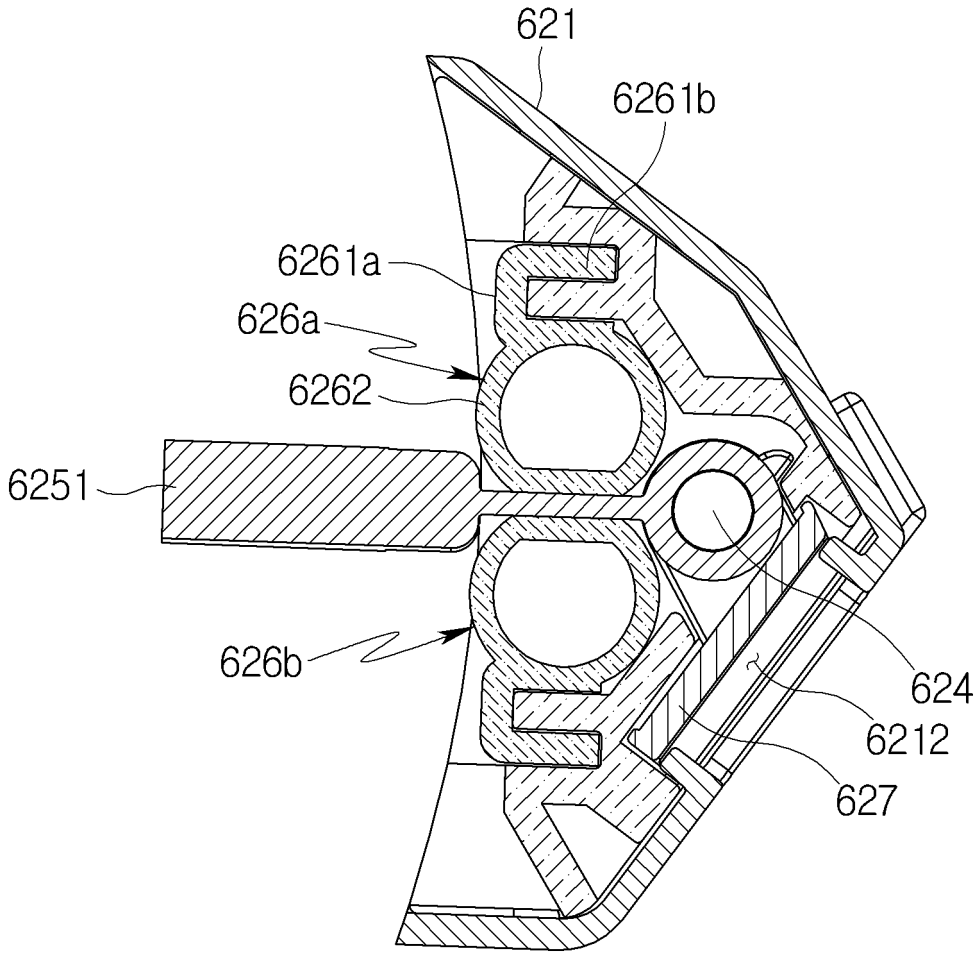
[Fig. 20]



[Fig. 21]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2022/003994

A. CLASSIFICATION OF SUBJECT MATTER

A47L 9/10(2006.01)i; **A47L 9/16**(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 9/10(2006.01); A47L 5/28(2006.01); A47L 9/14(2006.01); A47L 9/16(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(cleaner), 슬릿(slit), 슬롯(slot), 압축(compress), 가압(pressure), 레버(lever), 실러(sealer), 가이드(guide), 압축판(compression plate), 차폐판(shield plate)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-2020-0140163 A (LG ELECTRONICS INC.) 15 December 2020 (2020-12-15) See paragraphs [0069]-[0101], [0158]-[0187] and [0224]-[0290] and figures 1-11.	1-3,7-10,12-13,15-19
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☑ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

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"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)
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"P" document published prior to the international filing date but later than the priority date claimed
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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
05 July 2022	**05 July 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/KR2022/003994

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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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
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REFERENCES CITED IN THE DESCRIPTION

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