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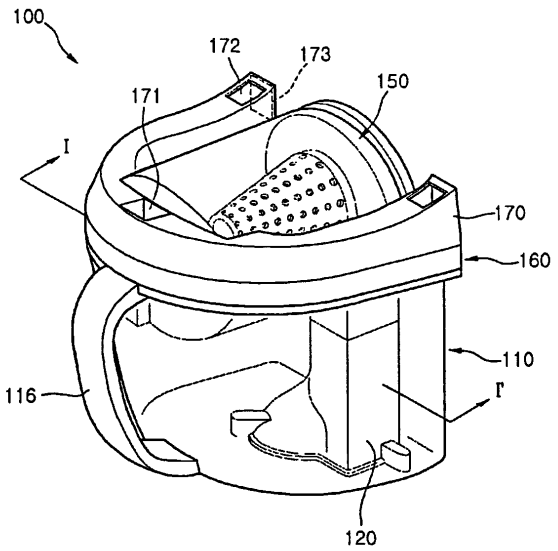
(54) VACUUM CLEANER

(57) Provided is a vacuum cleaner. The vacuum cleaner includes a main body including an air inflow part, an internal passage through which air introduced through the air inflow part is moved, the internal passage being defined in the main body, a dust separation device detachably coupled to the main body, the dust separation device including a dust separation chamber for separating foreign substances from the air flowing into the internal passage, and a passage formation part disposed between the internal passage and the dust separation chamber, the passage formation part having an inclined surface for changing a flow direction of the air passing through the internal passage. Thus, airflow losses may be reduced.

[Fig. 2]



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Description

BACKGROUND

[0001] Embodiments relate to a vacuum cleaner, and more particularly, to a vacuum cleaner in which a structure thereof is improved to improve suction performance.

[0002] Generally, vacuum cleaners are devices that suck air containing dusts using a vacuum pressure generated by a suction motor installed inside a main body to filter the dusts in the main body.

[0003] In such a vacuum cleaner, air sucked from a suction nozzle should smoothly flow into a cleaner main body. In addition, dusts should be easily separated from air containing the dusts. These are good criteria of vacuum cleaner performance.

[0004] A passage for moving sucked air is defined in the vacuum cleaner. The passage may have various shapes from a suction hole of a cleaner body to a discharge part of the suction motor.

[0005] A suction and flow performances of air within the vacuum cleaner are largely affected according to what extent the bent portions of the passage exist. In detail, when air flows in one direction and a bent degree of the passage is minimized if possible, flow losses may be reduced.

[0006] However, in case of a vacuum cleaner according to a related art, since a complicated passage is defined within a main body, a flow direction of air may be curved. That is, the vacuum cleaner according to the related art has a limitation in which the passage is bent at many portions.

[0007] In this case, flow losses may be increased while the air flows to prevent the air from smoothly flowing. Furthermore, since the air does not smoothly flow, foreign substances contained in the air may not be easily separated.

[0008] A cover member for covering at least portion of the main body is disposed on the main body in a state where a dust separation device is coupled. According to the vacuum cleaner according to the related art, when the dust separation device is curved by the cover member, a user does not know whether the dust separation device is coupled.

[0009] Also, when the cover is normally operated (i.e., is closed) in a state where the dust separation device is not coupled, the user does all that for nothing because the cleaning process is performed in the state where the dust separation device is not provided.

[0010] Also, when a push button for separating a dust collection container or a push button for opening a cover of the cleaner is pushed in a state where the user lifts the main body of the cleaner using a handle, a hook structure connected to the main body may be released to separate the dust collection container or open the cover.

SUMMARY

[0011] Embodiments provide a vacuum cleaner which has a passage for easily introducing air sucked within a main body into a dust separation device.

[0012] Embodiments also provide a vacuum cleaner which has a bent degree of a passage to minimize a curved flow of air sucked into the cleaner.

[0013] Embodiments also provide a vacuum cleaner in which a dust separation device is easily detached from a main body and whether the dust separation device is mounted is easily known to the outside.

[0014] Embodiments also provide a vacuum cleaner in which a cover of the cleaner is fixed to a dust collection container to prevent the cover from being opened when a main body is lifted.

[0015] In one embodiment, a vacuum cleaner includes: a main body including an air inflow part; an internal passage through which air introduced through the air inflow part is moved, the internal passage being defined in the main body; a dust separation device detachably coupled to the main body, the dust separation device including a dust separation chamber for separating foreign substances from the air flowing into the internal passage; and a passage formation part disposed between the internal passage and the dust separation chamber, the passage formation part having an inclined surface for changing a flow direction of the air passing through the internal passage.

[0016] The details of one or more embodiments are set forth in the accompanying drawings and the description below. Other features will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Fig. 1 is a perspective view of a vacuum cleaner according to a first embodiment.

[0018] Fig. 2 is a perspective view of a dust separation device according to the first embodiment.

[0019] Fig. 3 is an exploded perspective view of the dust separation device according to the first embodiment.

[0020] Fig. 4 is a bottom perspective view of the dust separation device according to the first embodiment.

[0021] Figs. 5 and 6 are perspective views of a passage formation part according to an embodiment.

[0022] Fig. 7 is a sectional view of an airflow, taken along line I-I' of Fig. 2.

[0023] Fig. 8 is a sectional view of an airflow according to the first embodiment.

[0024] Fig. 9 is a perspective view of a vacuum cleaner in which a cover member is opened according to a second embodiment.

[0025] Fig. 10 is a perspective view of the vacuum cleaner in which a dust separation device is separated according to the second embodiment.

[0026] Fig. 11 is a sectional view of the vacuum cleaner in which the dust separation device is coupled according

to the second embodiment.

[0027] Fig. 12 is a sectional view of the vacuum cleaner in which the dust separation device is separated according to the second embodiment.

[0028] Fig. 13 is an exploded perspective view of a cover member according to a third embodiment.

[0029] Fig. 14 is a sectional view of the cover member according to the third embodiment.

[0030] Fig. 15 is a bottom view of the cover member from which a cover base is removed according to the third embodiment.

[0031] Figs. 16 and 17 are views illustrating operations of a push part and the cover member according to the third embodiment.

[0032] Fig. 18 is a sectional view of a dust separation device according to a fourth embodiment.

[0033] Fig. 19 is a view of a fixing unit according to the fourth embodiment.

[0034] Fig. 20 is a sectional view illustrating a coupling relationship between a cover member and the fixing unit according to the fourth embodiment.

[0035] Fig. 21 is a view illustrating a coupling relationship between the cover member and the fixing unit in a state where the main body is placed on a floor according to the fourth embodiment.

[0036] Fig. 22 is a view illustrating a coupling relationship between the cover member and the fixing unit in a state where the main body is lifted according to the fourth embodiment.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0037] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as being limited to the embodiments set forth herein; rather, that alternate embodiments included in other retrogressive inventions or falling within the spirit and scope of the present disclosure will fully convey the concept of the invention to those skilled in the art.

[0038] Fig. 1 is a perspective view of a vacuum cleaner according to a first embodiment.

[0039] Referring to Fig. 1, a vacuum cleaner 1 according to an embodiment includes a main body 10 defining an outer appearance thereof, a dust separation device 100 detachably disposed on the main body 10, a cover member 20 rotatably coupled to the main body 10, and a movement wheel 30 for easily moving the main body 10 or the vacuum cleaner 1.

[0040] An air inflow part 12 connected to a suction nozzle (not shown) is disposed in a front surface of the main body 10. Although not shown, an extension tube and a connection hose are disposed between the suction nozzle and the air inflow part 12. Air sucked from the suction nozzle passes through the extension tube and the connection hose and flows into the main body 10 through the air inflow part 12. Their detailed descriptions will be omitted.

[0041] A handle part 116 to be grasped by a user is disposed on the dust separation device 100. Thus, the user may detach the dust separation device 100 from the main body 10 in a state where the user grasps the handle part 116.

[0042] A cover handle 21 to be grasped by the user is disposed on the cover member 20. A push part 22 to be manipulated to open the cover member 20 is disposed on the cover handle 21. The push part 22 is connected to hook structures disposed on the main body 10 and the cover member 20. The user may pull the cover handle 21 in a state where the user pushes the push part 22 to open the cover member 20.

[0043] Fig. 2 is a perspective view of a dust separation device according to the first embodiment. Fig. 3 is an exploded perspective view of the dust separation device according to the first embodiment.

[0044] Referring to Figs. 2 and 3, the dust separation device 100 according to the current embodiment includes a dust separation chamber 150 for separating foreign substances (e.g., dusts) from the air sucked into the main body 10, a dust collection unit 110 for storing the dusts separated by the dust separation chamber 150, and lower and upper guides 160 and 170 for guiding the dust separation chamber 150 to couple the dust separation chamber 150 to the dust collection unit 110.

[0045] In detail, a fixing unit 115 for hooking the dust collection unit 110 on the cover member 20 in a state where the cover member 20 is closed is disposed on the dust collection unit 110.

[0046] The handle part 116 of the dust collection unit 110 includes a handle body 117 defining a body of the handle part 116 and a handle cover 118 for covering a side of the handle body 117.

[0047] An air suction part 152 disposed in one side of the dust separation chamber 150 to suck air and a dust discharge part (see reference numeral 154 of Fig. 7) disposed in the other side of the dust separation chamber 150 to discharge the dusts separated from the air are disposed in the dust separation chamber 150. The air suction part 152 and the dust discharge part 154 are disposed in a tangential direction of the dust separation chamber 154.

[0048] The air sucked into the dust separation chamber 150 through the air suction part 152 cyclone-flows along an inner wall of the dust separation chamber 150. The dusts may be separated from the air during the cyclone flow.

[0049] Also, an outer guide 155 for coupling the dust separation chamber 150 to the dust collection unit 110 is disposed outside the dust separation chamber 150.

[0050] A predetermined groove (not shown) is defined in the outer guide 155. When the dust separation chamber 150 is seated on the duct collection unit 110, an upper end of the dust collection unit 110 may be inserted into the groove of the outer guide 155.

[0051] A side surface part 157 defining a side surface of the dust separation chamber 150 is disposed on a side of the dust separation chamber 150. The side surface part 157 is detachably coupled to the dust separation chamber 150. A filter member 158 is coupled to the side surface part 157. The filter member 158 filters the dusts contained in the air sucked into the dust separation chamber 150.

[0052] A guide member 159 for generating the cyclone flow is disposed inside the dust separation chamber 150. The guide member 159 is coupled to the other side surface of the dust separation chamber 150.

[0053] The lower and upper guides 160 and 170 for easily coupling the dust collection unit 110 to the cover member 20 are disposed above the outer guide 155. The lower guide 160 covers an upper side of the outer guide 155, and the upper guide 170 covers an upper side of the lower guide 160.

[0054] A lower hook hole 161 through which the fixing unit 115 passes is defined in the lower guide 160. A first hook part 171 is disposed at a position corresponding to that of the lower hook hole 161. The fixing unit 115 extends upward in a state where it is coupled to the dust collection unit 110 to pass through the lower hook hole 161 and the first hook part 171.

[0055] A second hook part 172 disposed at a position different from that of the first hook part 171 and hooked with the cover member 20 is disposed on the upper guide 170. The second hook part 172 may be provided in plurality on both sides of the upper guide 170. Each of the hook parts 171 and 172 may have a hole shape.

[0056] Also, the dust collection unit 110 includes a passage formation part 120 defining a movement passage of the air introduced into the dust collection unit 110.

[0057] Hereinafter, a constitution of the passage formation part 120 will be described with reference to the accompanying drawings.

[0058] Fig. 4 is a bottom perspective view of the dust separation device according to the first embodiment. Figs. 5 and 6 are perspective views of a passage formation part according to an embodiment.

[0059] Referring to Figs. 4 to 6, an inflow hole 114 for introducing air into the dust collection unit 110 is defined in a bottom part 112 of the dust collection unit 110 according to the current embodiment. The passage formation part 120 defining a movement passage of the air is disposed above the inflow hole 114. That is, the inflow hole 114 defines a lower end of the passage formation part 120.

[0060] In detail, the passage formation part 120 includes a first formation part 121 communicating with the inflow hole 114 and a second formation part 122 extending upward from the first formation part 121.

[0061] The first formation part 121 roundly extends from the bottom part 112 of the dust collection unit 110 toward the second formation part 122. That is, the first formation part 121 has an inclined surface 121a connecting the inflow hole 114 to the second formation part 122. Here, the inclined surface 121a may be a curved surface extending with a predetermined curvature.

[0062] The second formation part 122 may extend upward from a side of the first formation part 121 and have a pipe shape. Although the second formation part 122 has a rectangular parallelepiped shape having a hollow in drawings, the second formation part 122 may have various shapes such as a cylindrical shape.

[0063] A lower connection part 123 connected to the bottom part 112 and an upper connection part 124 connected to the dust separation chamber 150 are disposed on the passage formation part 120. The lower connection part 123 may be referred to as an inlet of the passage formation part 120, and the upper connection part 124 may be referred to as an outlet of the passage formation part 120.

[0064] The lower connection part 123 includes a lower end of the first formation part 121 and a lower end of the second formation part 122. Here, the lower end of the first formation part 121 defines the inflow hole 114, and the lower end of the second formation part 122 is closed by the bottom part 112.

[0065] In summary, the lower end of the first formation part 121 is opened to allow air to be introduced. On the other hand, the lower end of the second formation part 122 is closed by the bottom part 112 to prevent air from being introduced.

[0066] Thus, the air introduced through the inflow hole 114 flows into the first formation part 121 and is moved at a predetermined angle with respect to the bottom part 112. The air passing through the first formation part 121 may be introduced into the dust separation chamber 150 through the second formation part 122. Here, the upper connection part 124 is connected to the air suction part 152.

[0067] The upper connection part 124 is opened to allow air to pass, and the air passing through the upper connection part 124 is introduced into the dust separation chamber 150 through the air suction part 152.

[0068] Although the passage formation part 120 and the air suction part 152 are separately coupled in the drawings, the passage formation part 120 and the air suction part 152 may be integrated with each other.

[0069] Since the passage formation part 120 connects a passage pipe 14 extending from the air inflow part 12 toward the inside of the main body 10 to the air suction part 152, the passage formation part 120 may be referred to as a "connection part". In this case, the first formation part 121 may be referred to as a "first connection part", and the second formation part 122 may be referred to as a "second connection part".

[0070] A coupling boss 125 for coupling the passage formation part 120 to a bottom surface of the dust collection unit 110 is disposed on a lower portion of the passage formation part 120. A coupling protrusion (see reference numeral 113 of Fig. 7) coupled to the coupling boss 125 at a position corresponding to that of the coupling boss 125 is disposed on the dust collection unit 110.

[0071] Fig. 7 is a sectional view of an airflow, taken along line I-I' of Fig. 2. Fig. 8 is a sectional view of an airflow according to the first embodiment.

[0072] Referring to Figs. 7 and 8, a process in which the air introduced into the main body 10 is sucked into the dust separation chamber 150 will be described below.

[0073] The passage pipe 14 defining a passage through which air flows from the air inflow part 12 of the main body 10 up to the dust collection unit 110 is disposed under the dust collection unit 110. Since the passage pipe 14 defines an air passage within the main body 10, the passage defined by the passage pipe 14 may be referred to as an "internal passage". The air moved along the passage pipe 14 is introduced into the dust collection unit 110 through the inflow hole 114.

[0074] The first formation part 121 extends from a side of the passage pipe 14. The air introduced through the inflow hole 114 is moved along a curved surface of the first formation part 121. Thus, the air may smoothly flow along a predetermined curvature radius.

[0075] That is, since the air is slowly changed in direction along the inclined surface 121a, the airflow direction is not significantly changed, i.e., a bent degree of the passage is not large. Thus, the flow losses of the air may be minimized.

[0076] The air passing through the first formation part 121 may be guided by the second formation part 122 and moved into the air suction part 152.

[0077] It is assumed that a flow direction of the air moved along the passage pipe 14 is referred to as a reference symbol "a (a first direction)". Also, it is assumed that a flow direction of the air moved along the outlet of the passage formation part 120, i.e., the air suction part 152 is referred to as a reference symbol "b (a second direction)". Here, the "a" and "b" may be perpendicular to each other.

[0078] On the other hand, a flow direction defined by the passage formation part 120 is referred to as a reference symbol "c (a third direction)" different from the "a" and "b". The direction "c" may be a direction which is slowly changed from the direction "a" to the direction "b".

[0079] Thus, it may prevent the airflow direction from being significantly changed from the direction "a" to the direction "b" due to the passage formation part 120. In this case, the airflow losses may be reduced. Also, since the bent degree of the passage is minimized, a friction between a portion forming the passage and the airflow may be reduced, and thus, noises may be reduced.

[0080] The air introduced into the dust separation chamber 150 separates the dusts therefrom while cyclone-flowing. The separated dusts are discharged through the dust discharge part 154, and the air from which the dusts are separated is discharged through an air discharge part 153.

[0081] Hereinafter, a second embodiment will be described. When compared to the first embodiment, the second embodiment is equal to the first embodiment except for constitutions of a cover member and a dust separation device. Thus, different points therebetween will be mainly described, and also, the same parts as those of the first embodiment will be denoted by the same description and reference numeral.

[0082] Fig. 9 is a perspective view of a vacuum cleaner in which a cover member is opened according to a second embodiment. Fig. 10 is a perspective view of the vacuum cleaner in which a dust separation device is separated according to the second embodiment.

[0083] Referring to Figs. 9 and 10, a seat part 15 for seating a dust separation device 100 is disposed on a main body 10 according to a second embodiment. The seat part 15 may be disposed on a position corresponding to those of bottom and back surfaces of the dust separation device 100.

[0084] An interference rib 17 is disposed on the main body 10 to prevent a cover member 20 from being closed in a state where the dust separation device 100 is separated from the main body 10. The interference rib 17 may be disposed on the seat part 15.

[0085] When the dust separation device 100 is coupled, the interference rib 17 may be inserted into the insertion hole (see reference numeral 173 of Fig. 2) of an upper guide 170. Thus, the interference rib 17 may be referred to as a "guide rib" for guiding the coupling of the dust separation device 100.

[0086] A filter part 180 for filtering air discharged from the dust separation device 100 before the air is introduced into the suction motor (see reference numeral 70 of Fig. 6) is disposed at a rear side of the dust separation device 100. A filter inflow part 182 through which air is introduced is disposed in the filter part 180. The filter inflow part 182 may be disposed at a position corresponding to that of an air discharge part (not shown) of a dust separation chamber 150.

[0087] A cover member 20 includes a hinge part 25 to rotatably couple the cover member 20 to the main body 10.

[0088] A first hook protrusion 53 hooked on a first hook part 171 and a second hook protrusion 54 hooked on a second hook part 172 in a state where the cover member 20 is closed are disposed on the cover member 20. Here, the second hook protrusion 54 may be provided in plurality on a position corresponding to that of the second hook part 172.

[0089] The second hook protrusion 54 interferes with an interference rib 17 in a state where the dust separation device 100 is separated to prevent the cover member 20 from being closed. This will be described below with reference to the accompanying drawings.

[0090] Fig. 11 is a sectional view of the vacuum cleaner in which the dust separation device is coupled according to the second embodiment. Fig. 12 is a sectional view of the vacuum cleaner in which the dust separation device is separated according to the second embodiment. Here, Fig. 11 illustrates a moment at which a push part 22 is pushed and opened.

[0091] Referring to Figs. 11 and 12, a vacuum cleaner

1 according to the second embodiment includes a main body 10 on which the dust separation device 100 is seated, a suction motor 70 disposed on the main body 10 to generate a suction force, and an exhaust part 75 disposed at a side of the main body 10 to discharge air passing through the suction motor 70 to the outside of the cleaner 1. Also, the vacuum cleaner 1 includes a cover member 20 selectively covering upper portions of the main body 10 and the dust separation device 100.

[0092] A link member 50 for selectively hooking the cover member 20 on the main body 10 is disposed on the cover member 20. The link member 50 may be disposed on a bottom surface of the cover member 20.

[0093] In detail, the link member 50 includes a link body 51 linked with the push part 22 and rotatable at a predetermined direction and a second hook protrusion disposed on a side of the link body 51 and 54 hooked or released on/from the second hook part 172 according to the rotation of the link body 51.

[0094] The link body 51 includes a plurality of links interacting with each other. Also, the second hook protrusion 54 defines an end of the link body 51 and is rotatable by an operation of the link body 51.

[0095] Also, a top surface part 170a for guiding a movement of the second hook protrusion 54 when the cover member 20 is closed is disposed on a top surface of the upper guide 170. The top surface part 170a is smoothly inclined right-upward with respect to an upper end of the upper guide 170.

[0096] The second hook part 172 for hooking the second hook protrusion 54 is disposed at a side of the top surface part 170a. The second hook part 172 is disposed above the interference rib 17 in a state where the dust separation device 100 is mounted.

[0097] An opening/closing operation of the cover member 20 in the state where the dust separation device 100 is mounted on the main body 10 will be described.

[0098] When the cover member 20 is rotated in a closing direction in a state where the cover member 20 is opened, the second hook protrusion 54 is moved downward to contact the top surface part 170a. Then, the second hook protrusion 54 is guided by the top surface part 170a and moved in a direction of the second hook part 172.

[0099] When the second hook protrusion 54 reaches the second hook part 172, at least portion of the second hook protrusion 54 is inserted into the second hook part 172 and hooked on an end of the second hook part 172. That is, the second hook protrusion 54 may be hooked on the second hook part 172 before the second hook protrusion 54 interferes with the interference rib 17. Thus, the cover member 20 may be fixed to the dust separation device 100.

[0100] According to the above-described constitution and operation, there is advantageous that the cover member may close the main body and the dust separation device at the same time.

[0101] On the other hand, a user may push a push part 22 to open the cover member 20 in a state where the cover member 20 is closed. Thus, the second hook protrusion 54 is separated from the second hook part 172 by the operation of the link member 50. That is, when viewed in Fig. 1, the second hook protrusion 54 may be rotated in a clockwise direction.

[0102] When the second hook protrusion 54 is separated, the user may pull a cover handle 21 to open the cover member 20.

[0103] Fig. 12 illustrates a state in which the cover member 20 is not fixed to the main body 10 in a state where the dust separation device 100 is not mounted on the main body 10.

[0104] When the cover member 20 is rotated in a closing direction with respect to a hinge part 25, the second hook protrusion 54 may be moved downward. The second hook protrusion 54 contacts an upper portion of the interference rib 17. That is, the second hook protrusion 54 interferes with the interference rib 17.

[0105] Thus, the cover member 20 is not moved downward any more, and thus, the cover member 20 is not fixed to the main body 10. That is, the cover member 20 is vertically vibrated.

[0106] According to the above-described constitution, the user may easily determine the state in which the dust separation device 100 is not mounted. In this state, the user does not make a mistake in the operation of the cleaner.

[0107] Hereinafter, a third embodiment will be described. When compared to the foregoing embodiments, the third embodiment is equal to the foregoing embodiments except for a constitution of a cover member. Thus, different points therebetween will be mainly described, and also, the same parts as those of the foregoing embodiments will be denoted by the same description and reference numeral.

[0108] Fig. 13 is an exploded perspective view of a cover member according to a third embodiment. Fig. 14 is a sectional view of the cover member according to the third embodiment. Fig. 15 is a bottom view of the cover member from which a cover base is removed according to the third embodiment.

[0109] Referring to Figs. 13 and 15, a cover member 200 according to a third embodiment includes a cover base 210 defining a lower outer appearance thereof, a cover cap 220 disposed on the cover base 210, link assemblies 230, 240, and 250 disposed between the cover base 210 and the cover cap 220, and a cover handle 260 manipulated to open the cover member 200.

[0110] In detail, a push part 270 pressed to open the cover member 200 is disposed on the cover handle 260. A coupling protrusion 271 coupled to at least portion of the link assemblies 230, 240, and 250 is disposed on the push part 270. The coupling protrusion 271 may protrude inward from a lower portion of the push part 270.

[0111] Also, an elastic member 262 for supporting at least portion of the push part 270 is disposed in the cover handle 260. When a user pushes the push part 270, the

elastic member 262 is pressed. Also, when the push operation is stopped, the push part 270 may return to an initial position thereof by a restoring force of the elastic member 262.

[0112] The link assemblies 230, 240, and 250 include a first link hooked with a first hook part 171 of the dust separation device 100, a third link 250 hooked with a second hook part 172, and a second link 240 connecting the first link 230 to the third link 250.

[0113] One member may be bent several times to manufacture the first link 230. The first link 230 includes a first hook protrusion 232 inserted into the first hook part 171 and an insertion protrusion 234 coupled to the second link 240. The insertion protrusion 234 may be provided in plurality on both sides of the first link 230.

[0114] The second link 240 includes a guide slit 242 disposed on a side of the second link 240 to slidably couple the insertion protrusion 234 thereto and a link connection part 244 disposed on the other side of the second link 240 and connected to the third link 250.

[0115] The guide slit 242 may be inclined backward and upward. When the insertion protrusion 234 is moved into the guide slit 242, the first link 230 may be rotated in a predetermined direction. The first hook protrusion 232 may be disposed at a front side and the insertion protrusion 234 may be disposed at a rear side with respect to a rotation center of the first link 230.

[0116] The link connection part 244 may be coupled in a manner in which it is inserted into a predetermined groove of the third link 250. Since the second link 240 and the third link 250 are coupled to each other, the links 240 and 250 are integrally moved.

[0117] A protrusion coupling part 254 to which the coupling protrusion 271 is coupled is disposed on the third link 250. The protrusion coupling part 254 has a slit shape so that it is movable in a state where the coupling protrusion 271 is inserted. Also, the protrusion coupling part 254 may be inclined backward and downward.

[0118] A second hook protrusion 252 inserted and hooked into/on the second hook part 172 is disposed on the third link 250. The second hook protrusion 252 may extend backward from a main body of the third link 250.

[0119] The cover base 210 includes a first protrusion through hole 212 through which the first hook protrusion 232 passes downward, a second protrusion through hole 214 through which the second hook protrusion 252 passes downward, and a cover rotation part 215 serving as a rotation center of the cover member 200. Here, the second protrusion through hole 214 may be provided in plurality corresponding to those of the second hook protrusion 252.

[0120] Also, a third link restriction part 216 for restricting a movement range of the third link 250 is disposed on the cover base 210. The third link restriction part 216 may protrude upward from a top surface of the cover base 210.

[0121] Corresponding to this, a third link guide 256 contacting an upper portion of the third link restriction part 216 is disposed under the third link 250. The third link guide 256 may have a hollow shape with an empty inside.

[0122] A cover cap fixing part 228 passing through the inside of the third link guide 256 to extend downward is disposed on the cover cap 220. The cover cap fixing part 228 may be received into the third link restriction part 216. That is, the cover cap fixing part 228 passes through the third link guide 256 and is inserted into the third link restriction part 216.

[0123] During the movement of the third link 250, when the third link guide 256 interferes with the cover cap fixing part 228, the further movement of the third link 250 may be restricted.

[0124] Also, a receiving part 224 for receiving the push part 270 when the push part 270 is moved upward is defined in the cover cap 220. At least portion of the cover cap 220 may pass through the receiving part 224.

[0125] Figs. 16 and 17 are views illustrating operations of a push part and the cover member according to the third embodiment. Fig. 16 illustrates a state in which the cover member 200 is closed, and Fig. 17 illustrates a state in which the cover member 200 is opened.

[0126] Referring to Figs. 16 and 17, the cover member 200 according to the third embodiment is rotatable with respect to a center of the cover rotation part 215. In this process, upper sides of the main body 10 and the dust separation device 100 may be selectively covered.

[0127] When the user pushes the push part 270, the coupling protrusion 271 is moved backward and downward along the protrusion coupling part 254. In this process, the coupling protrusion 271 presses forwardly the third link 250.

[0128] Thus, the third link 250 and the second link 240 are moved forward. When the second link 240 is moved forward, the insertion protrusion 234 of the first link 230 is moved backward and upward along the guide slit 242. Also, when the first hook protrusion 232 is rotated backward, the first hook protrusion 232 may be separated from the dust collection unit 110.

[0129] Here, since the third link guide 256 interferes with the cover cap fixing part 244, the third link 250 is not moved any more. In this state, when the cover member 200 is lifted, the cover member 200 may be opened.

[0130] On the other hand, when the pushing operation of the push part 270 is stopped, the push part 270 and the link assemblies 230, 240, and 250 may return to their initial positions by a restoring force of the elastic member 262.

[0131] When the user intends to close the cover member 200, the user may push the cover member 200. Thus, the first and second hook protrusions 232 and 234 overcome the restoring force of the elastic member 262, and thus may be elastically moved by a predetermined distance.

[0132] In detail, the first hook protrusion 232 is guided to a rear side by the first hook part 171, and the second hook protrusion 234 is guided to a front side by the second

hook part 172. Also, the hook protrusions 232 and 234 may be respectively hooked on the hook parts 171 and 172 while they return to their initial positions by the restoring force of the elastic member 262.

[0133] Hereinafter, a fourth embodiment will be described. When compared to the foregoing embodiments, the fourth embodiment is equal to the foregoing embodiments except for a constitution of a cover member. Thus, different points therebetween will be mainly described, and also, the same parts as those of the foregoing embodiments will be denoted by the same description and reference numeral.

[0134] Fig. 18 is a sectional view of a dust separation device according to a fourth embodiment. Fig. 19 is a view of a fixing unit according to the fourth embodiment. Fig. 20 is a sectional view illustrating a coupling relationship between a cover member and the fixing unit according to the fourth embodiment.

[0135] Referring to Figs. 18 to 20, a fixing unit 400 for hook between a cover member 200 and a dust collection unit 110 is disposed between a dust separation chamber 150 and the dust collection unit 110.

[0136] The fixing unit 400 is fixed to a side of the duct collection unit 110. Also, the fixing unit may be received into a side opposite to that of a handle part 116 with respect to the dust collection unit 110, i.e., into the dust collection unit 100. The fixing unit 400 may be fixed in position within the first hook part 171 described in the foregoing embodiments.

[0137] In detail, the fixing unit 400 includes a fitting mounting part 410 fitted into the dust collection unit 110 to face an upper side and a hook fixing part 440 disposed above the fitting mounting part 410 to allow a first hook protrusion 232 to be hooked. Here, the fixing unit 400 may have a thickness corresponding to a distance spaced between the dust separation chamber 150 and the dust collection unit 110.

[0138] Also, a coupling hole 420 for coupling the fixing unit 400 is defined in the fixing unit 400. A coupling member is coupled to the coupling hole 420, and thus, the fixing unit 400 may be fixed in position.

[0139] The hook fixing part 440 includes an upper hook end 442 contacting an upper portion of the first hook protrusion 232 and a lower hook end 444 contacting a lower portion of the hook protrusion 234. Here, the first hook protrusion 232 may have a hook shape so that it is received between the upper hook end 442 and the lower hook end 444.

[0140] The upper hook end 442 and the lower hook end 444 may be respectively referred to as a "first hook end" and "second hook end" in that they 442 and 444 are hooked on at least one side and at least the other side of the first hook protrusion 232.

[0141] The upper hook end 442 and the lower hook end 444 are vertically spaced a predetermined distance from each other. The spaced distance may be less than a height from an upper portion to a lower portion of the first hook protrusion 232. That is, the first hook protrusion 232 may be hooked between the hook ends 442 and 444 in a state where it 232 is inclined.

[0142] A curved portion 442a having a shape corresponding to the hook shape of the first hook protrusion 232 is disposed on the upper hook end 442. The curved portion 442a may be rounded from a lower end of the upper hook end 442 toward an upper end.

[0143] Fig. 21 is a view illustrating a coupling relationship between the cover member and the fixing unit in a state where the main body is placed on a floor according to the fourth embodiment. Fig. 22 is a view illustrating a coupling relationship between the cover member and the fixing unit in a state where the main body is lifted according to the fourth embodiment.

[0144] An operation of the first hook protrusion 232 and the fixing unit 400 according to the current embodiment will be described with reference to Figs. 21 and 22.

[0145] When the main body of the cleaner is placed on a floor and the cover member 200 is closed, the first hook protrusion 232 is hooked in a state where it is fitted between the upper hook end 442 and the lower hook end 444 as shown in Fig. 21.

[0146] In this state, when a user pushes the push part 270, the cover member 200 may be opened by the operation described in the third embodiment.

[0147] When the main body is lifted, as shown in Fig. 22, the cover member 200 is lifted slightly from the dust separation device 100. In this process, the first hook protrusion 232 is slightly moved upward. Thus, the first hook protrusion 232 is moved toward an upper side of the upper hook end 442 along the curved portion 442a and coupled more deeply.

[0148] In detail, when the main body is lifted, since the coupling protrusion 271 is lifted upward in the state the coupling protrusion 271 is inserted into the protrusion coupling part 254, the third link 250 is pressed upward. Thus, the third link 250 and the second link 240 are moved upward.

[0149] When the second link 240 is moved upward, a force which lifts the insertion protrusion 234 inside the guide slit 242 is applied to the insertion protrusion 234. Thus, a force which lifts the first link 230 is applied to move the first hook protrusion 232 upward.

[0150] According to the above-described processes, the first hook protrusion 232 is moved upward to deeply couple the first hook protrusion 232 into the upper side of the upper hook end 442.

[0151] In this state, even though the user pushes the push part 270, since the first hook protrusion 232 is deeply coupled to the upper hook end 442, the opening of the cover member 200 may be restricted by the operations of the link assembles 230, 240, and 250.

[0152] Thus, even though the user makes a mistake to push the push part in a state where the user holds the cleaner, since the cover member is not opened, safety may be secured.

[0153] According to the above-described constitutions, since the curved airflow is minimized, the flow loss-

es may be reduced.

[0154] Specifically, since the passage extending from the passage pipe disposed within the cleaner to the inside of the dust collection unit is rounded, the air may smoothly flow. Also, the friction between the airflow and the passage formation part may be reduced to reduce noises due to the friction.

[0155] Also, since the cover member covers the main body and the dust separation device at the same time, the cleaner may be easily manipulated and convenient in use.

[0156] Also, since the dust separation device may be easily detached from the main body and whether the dust separation device is mounted may be easily known to the outside, a possibility of malfunction of the cleaner may be decreased. Also, since the cover member is closed only when the dust separation device is coupled to the main body, reliability of products may be improved.

[0157] Also, since the cleaner cover is coupled to the dust collection container and a separate coupling component for detaching the dust collection container is not required, the cleaner may be easily disassembled and assembled. Also, since the cover is hooked on the dust collection container and the main body at many portions, the coupling therebetween may be firm.

[0158] Also, when the main body of the cleaner is lifted, it may prevent the cover from being opened, irrelevant to the pushing operation of the push button for opening the cover. That is, even though the user pushes the push button in the state where the main body of the cleaner is lifted, the opening of the cover may be prevented.

[0159] Thus, it may prevent the main body of the cleaner from dropping down by the opening of the cover when the main body is moved. Therefore, the cleaner may be further stably moved.

[0160] According to the above-described embodiments, since the curved airflow within the cleaner is minimized, the flow losses may be reduced.

[0161] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the spirit and scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the drawings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. A vacuum cleaner comprising:

a main body comprising an air inflow part;

an internal passage through which air introduced through the air inflow part is moved, the internal passage being defined in the main body;

a dust separation device detachably coupled to the main body, the dust separation device comprising a dust separation chamber for separating foreign substances from the air flowing into the internal passage; and

a passage formation part disposed between the internal passage and the dust separation chamber, the passage formation part having an inclined surface for changing a flow direction of the air passing through the internal passage.

2. The vacuum cleaner according to claim 1, wherein the passage formation part comprises:

a first passage formation part extending roundly from a side of the internal passage; and

a second passage formation part extending from the first passage formation part to a side of the dust separation chamber.

3. The vacuum cleaner according to claim 1, wherein the dust separation device further comprises a dust collection unit for storing dusts separated through the dust separation chamber, and the passage formation part is disposed within the dust collection unit.

4. The vacuum cleaner according to claim 1, further comprising:

a cover member selectively hooked with the dust separation device; and

an interference rib disposed in the main body, the interference rib interfering with the cover member in a state where the dust separation member is detached.

5. The vacuum cleaner according to claim 4, further comprising:

a hook protrusion disposed on a bottom surface of the cover member; and

a hook part disposed on the dust separation device, the hook part being hooked with the hook protrusion.

6. The vacuum cleaner according to claim 1, further comprising:

a selectively openable cover member covering at least side of the dust separation device;

a push part manipulated to open the cover member; and

a link assembly linked according to the manipulation of the push part.

7. The vacuum cleaner according to claim 6, wherein the link assembly comprises:

a first link hooked on one side of the dust separation device;
a second link to which the first link is movably coupled; and
a third link hooked on the other side of the dust separation device, the third link being coupled to the second link.

8. The vacuum cleaner according to claim 7, further comprising:

a coupling protrusion disposed on the push part, the coupling protrusion being coupled to the third link; and
a protrusion coupling part in which the coupling protrusion is movably inserted.

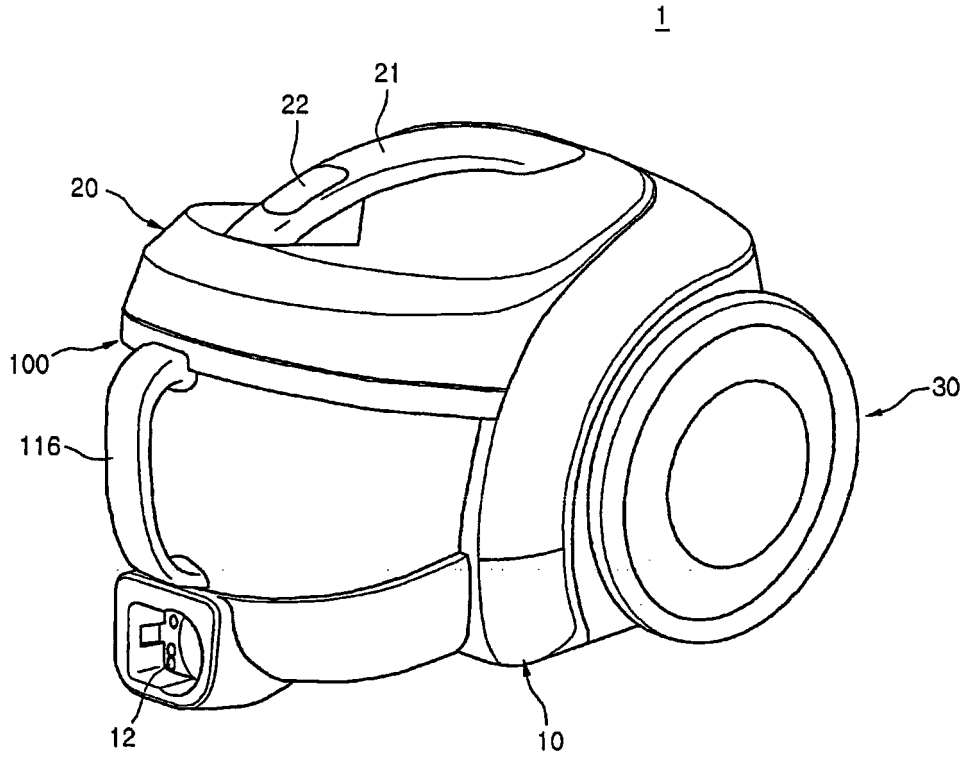
9. The vacuum cleaner according to claim 1, further comprising:

a cover member on which a hook protrusion is disposed, the cover member selectively covering the dust separation device; and
a fixing unit disposed on the dust separation device, the fixing unit being coupled to the hook protrusion.

10. The vacuum cleaner according to claim 9, wherein the fixing unit comprises:

a first hook end contacting one side of the hook protrusion; and
a second hook end spaced from the first hook end, the second hook end contacting the other side of the hook protrusion.

[Fig. 1]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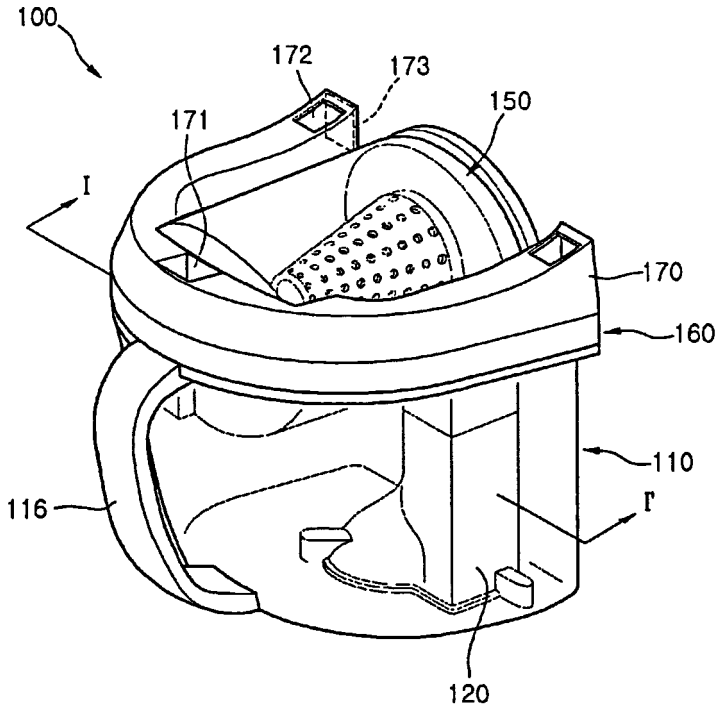
[Fig. 2]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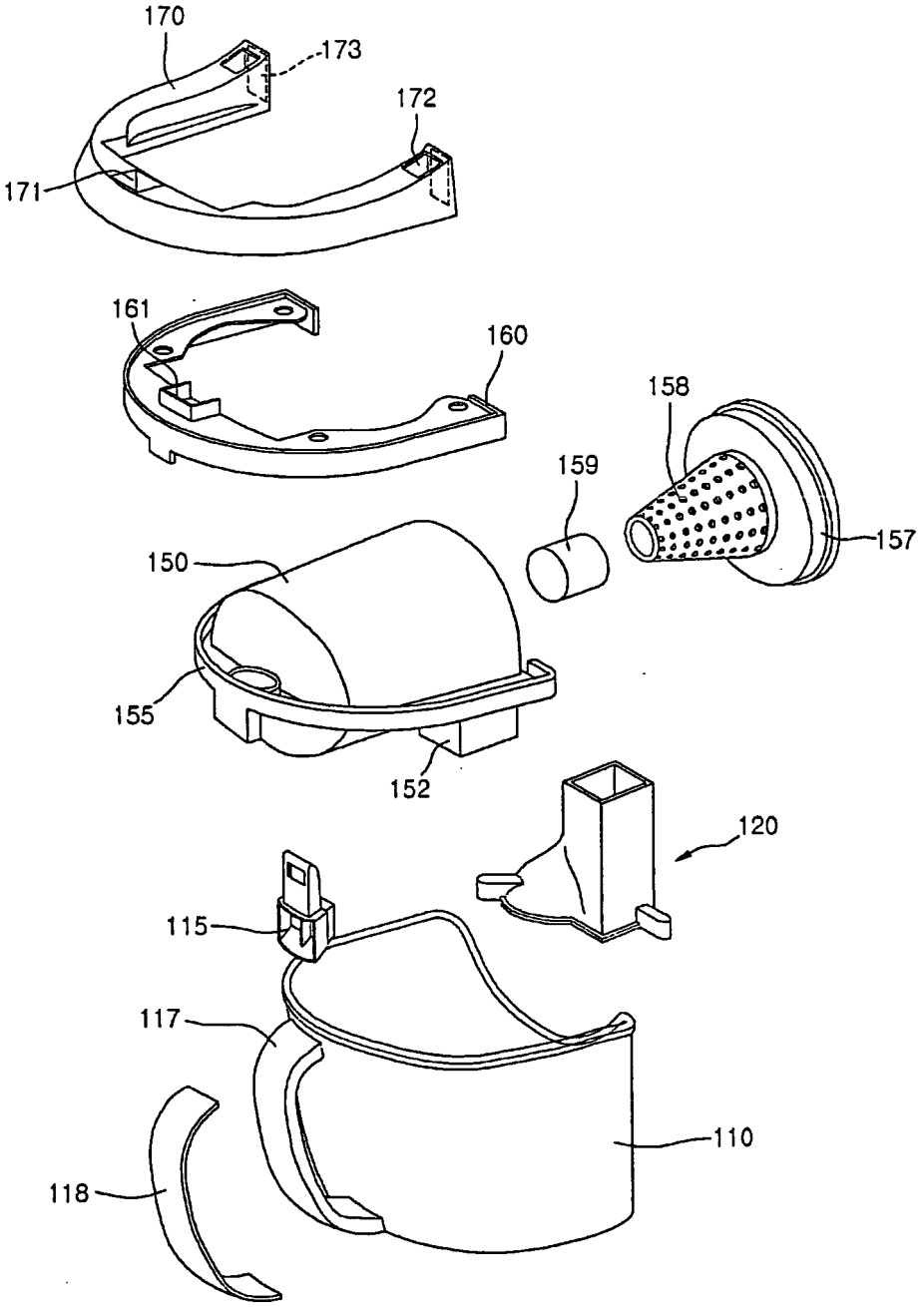
[Fig. 3]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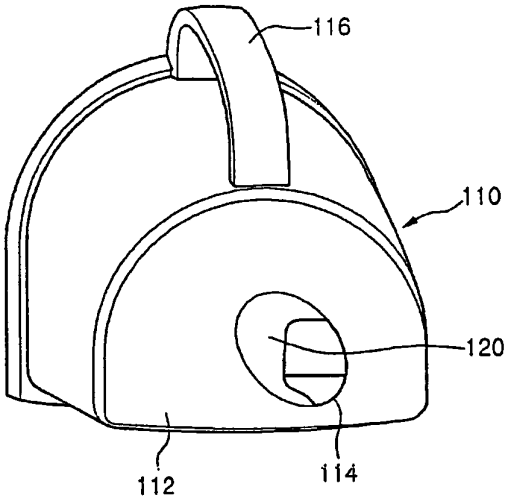
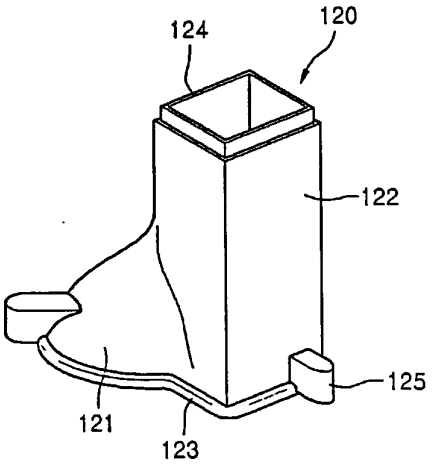
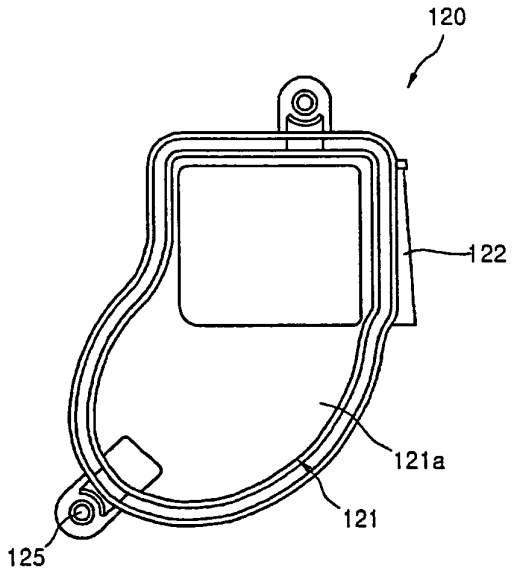
[Fig. 4]



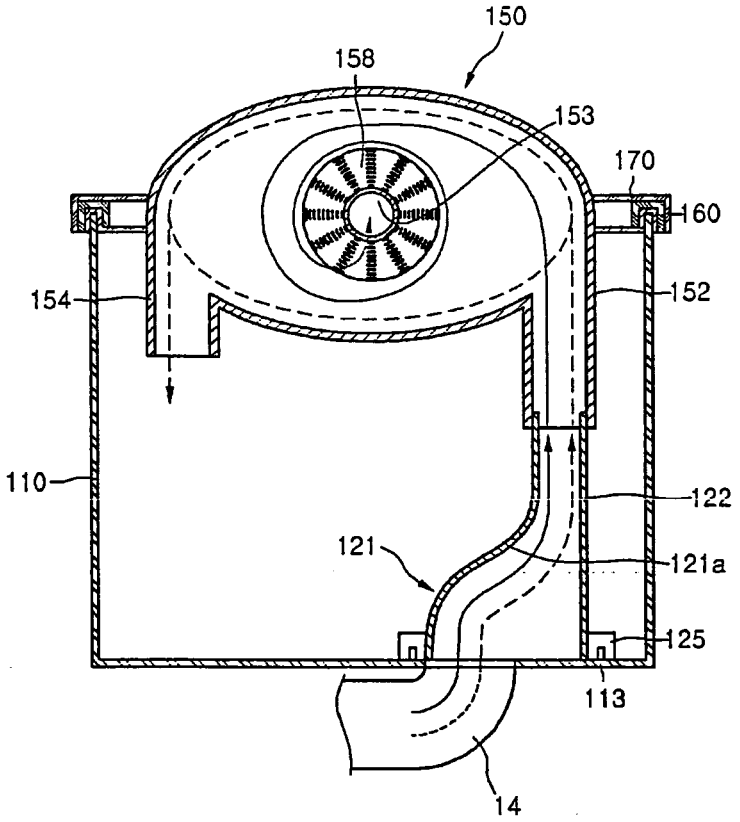
[Fig. 5]



[Fig. 6]



[Fig. 7]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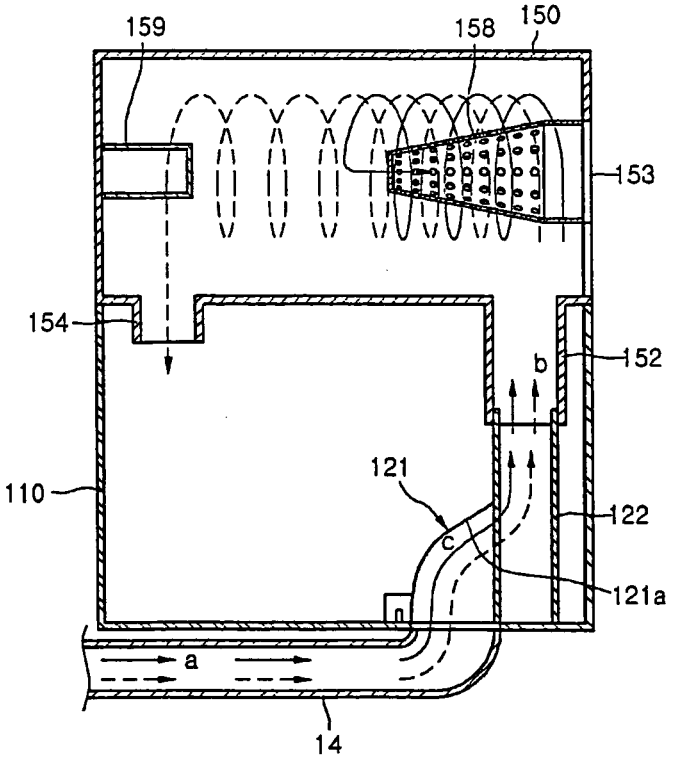
[Fig. 8]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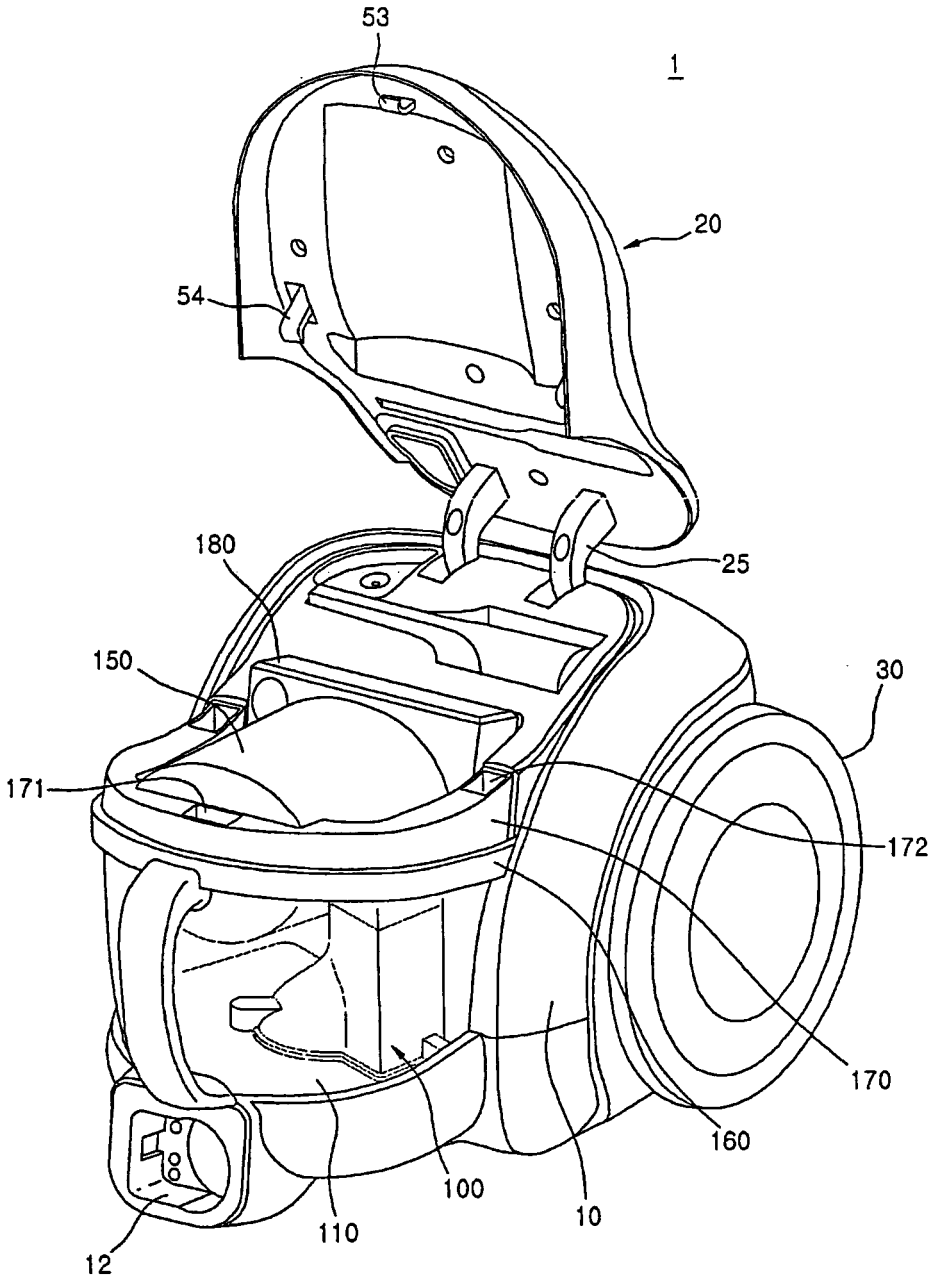
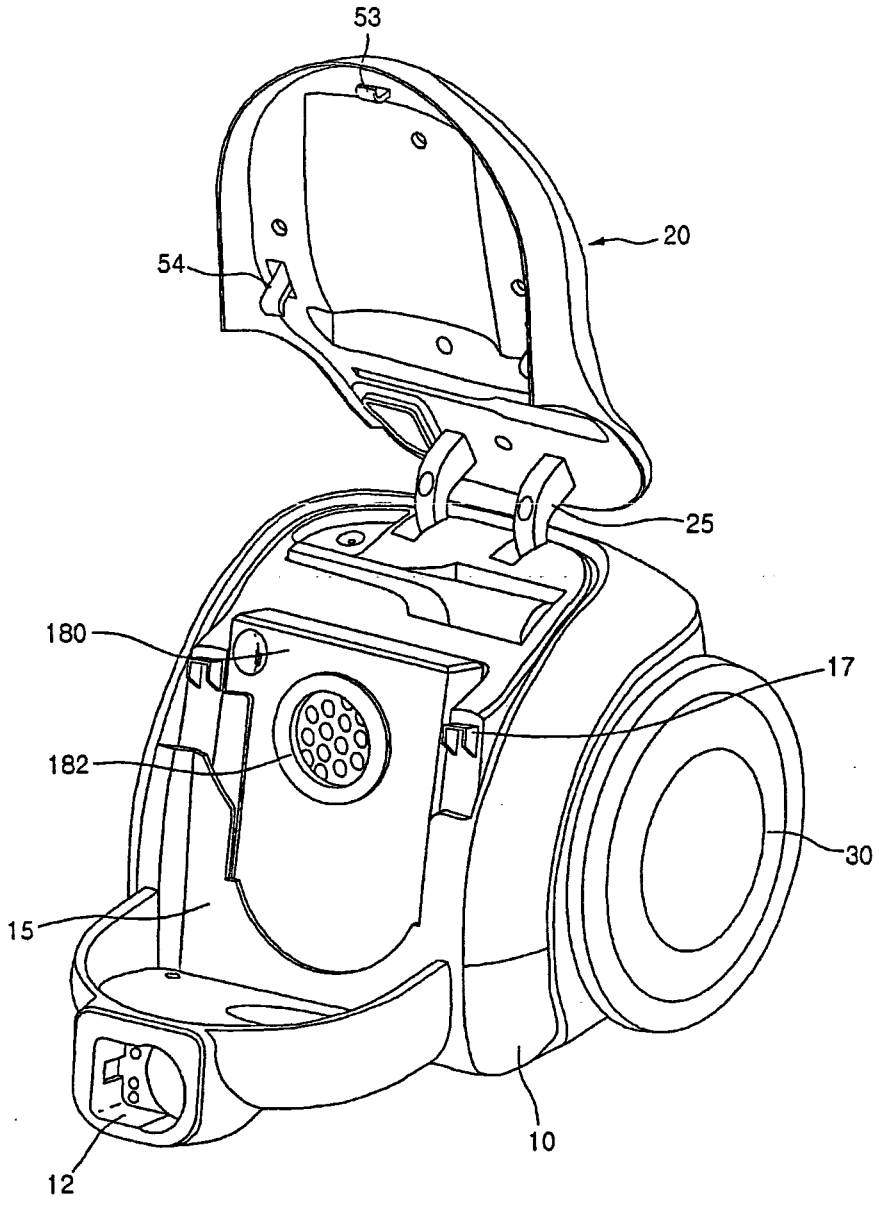
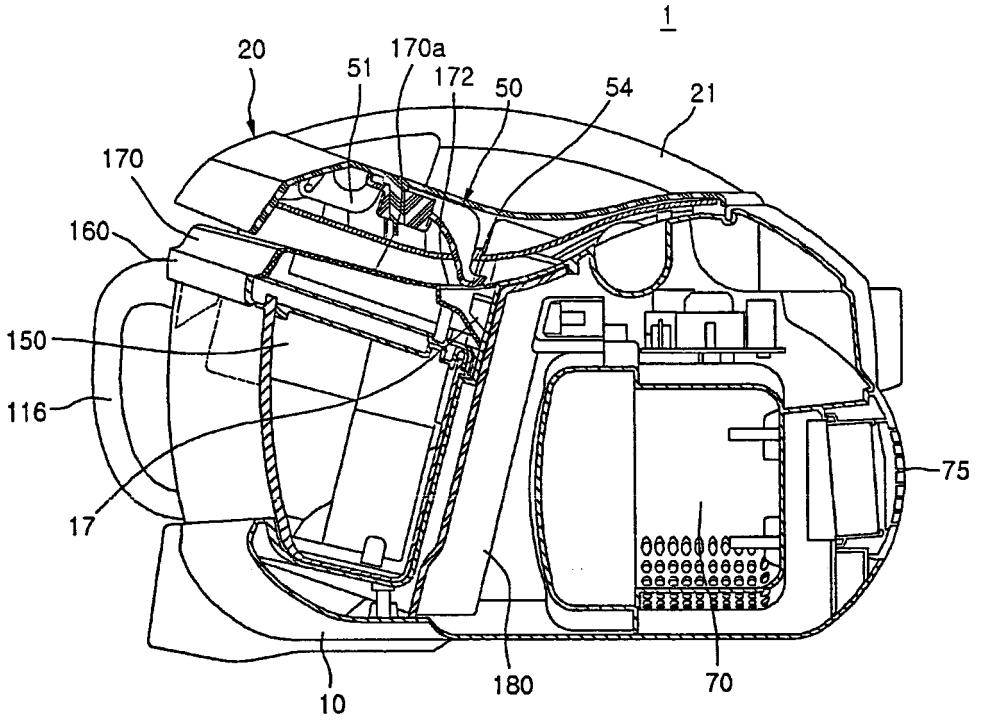
[Fig. 9]



[Fig. 10]



[Fig. 11]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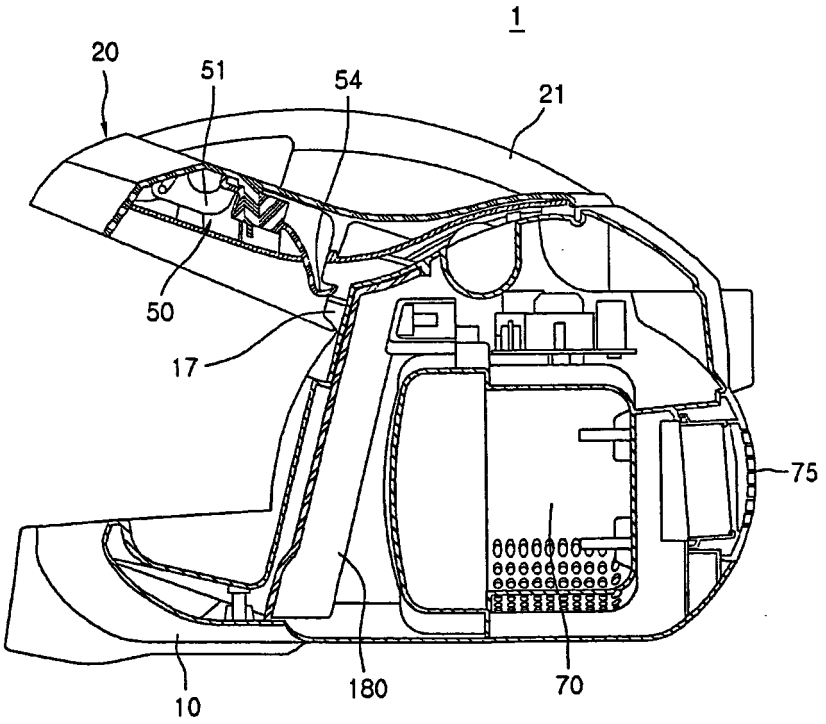
[Fig. 12]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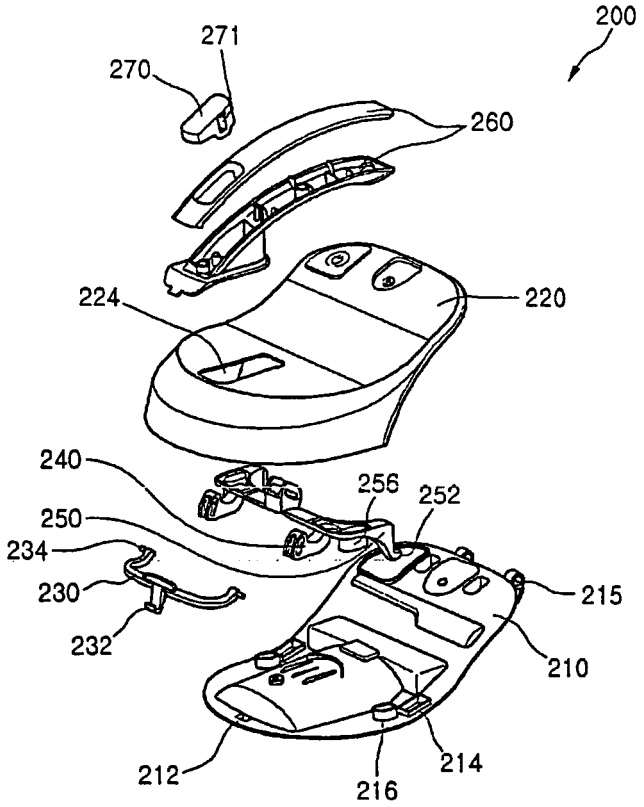
[Fig. 13]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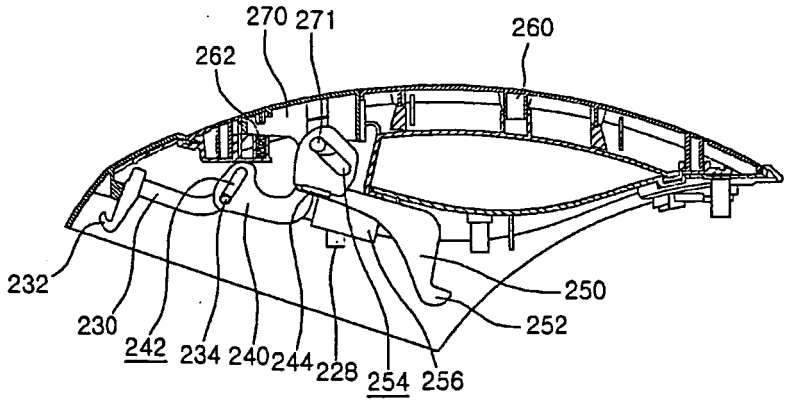
[Fig. 14]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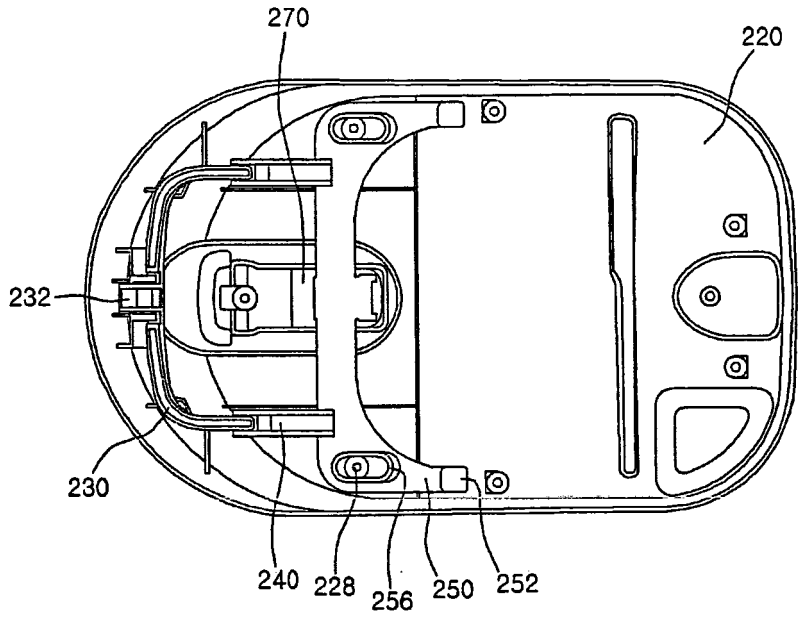
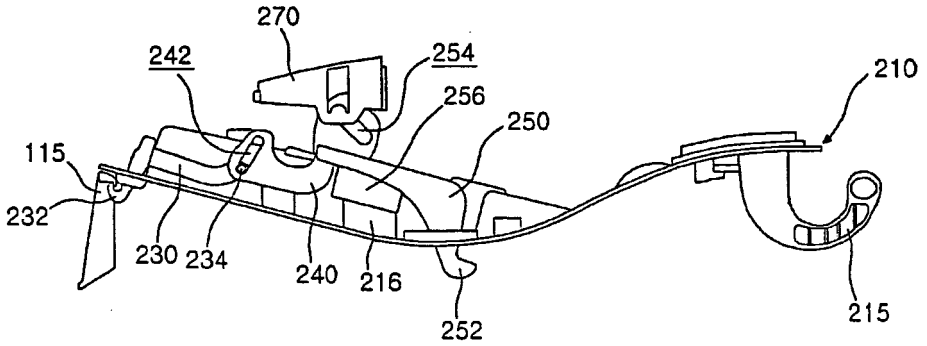
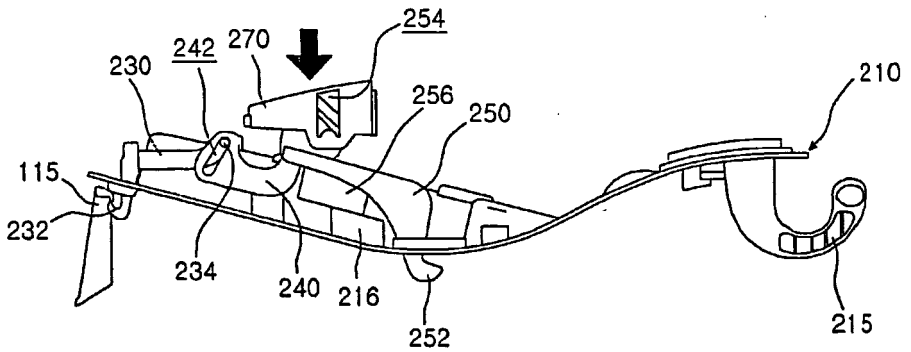
[Fig. 15]



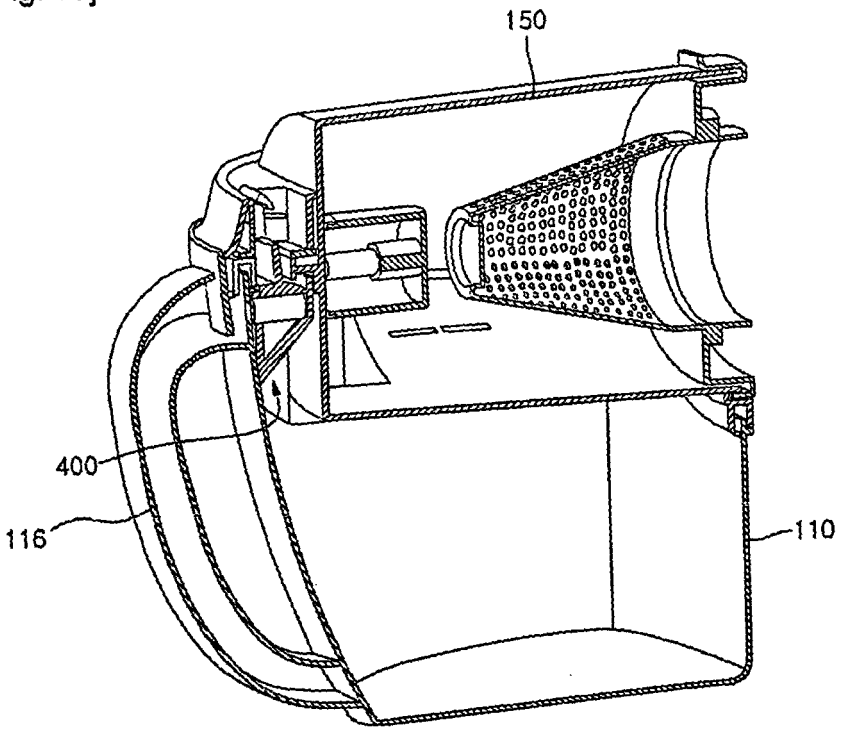
[Fig. 16]



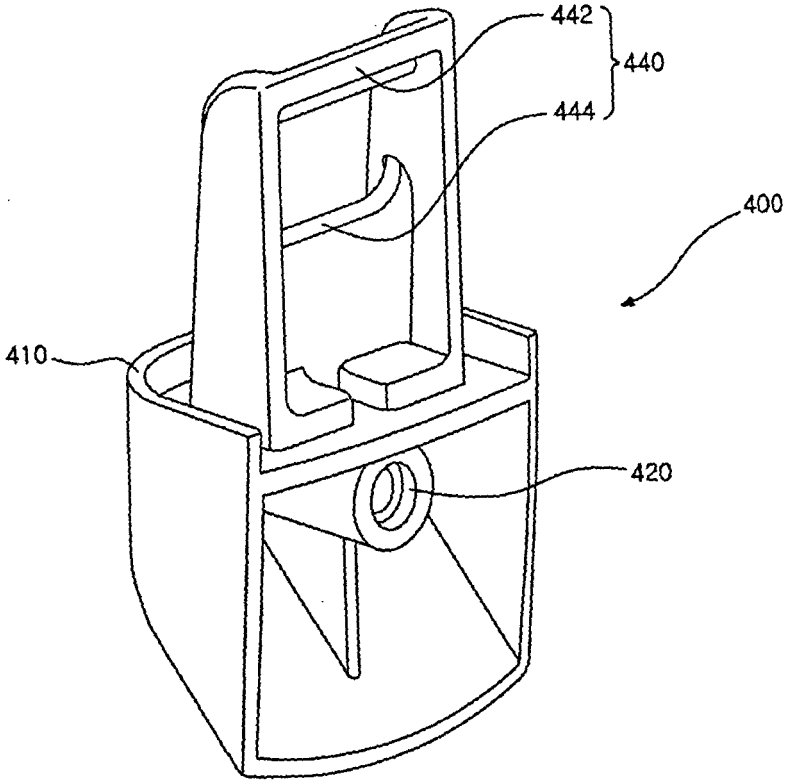
[Fig. 17]



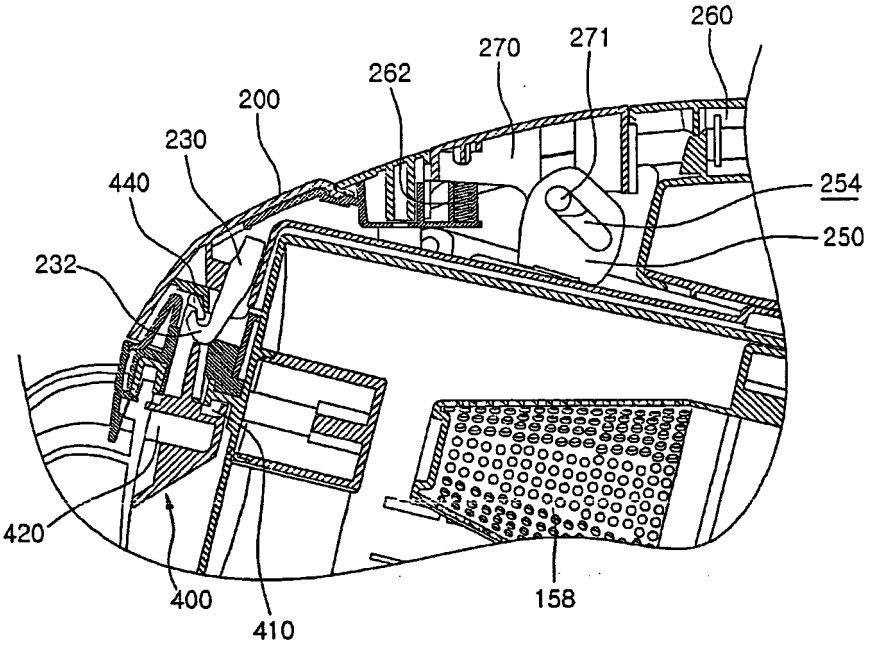
[Fig. 18]



[Fig. 19]



[Fig. 20]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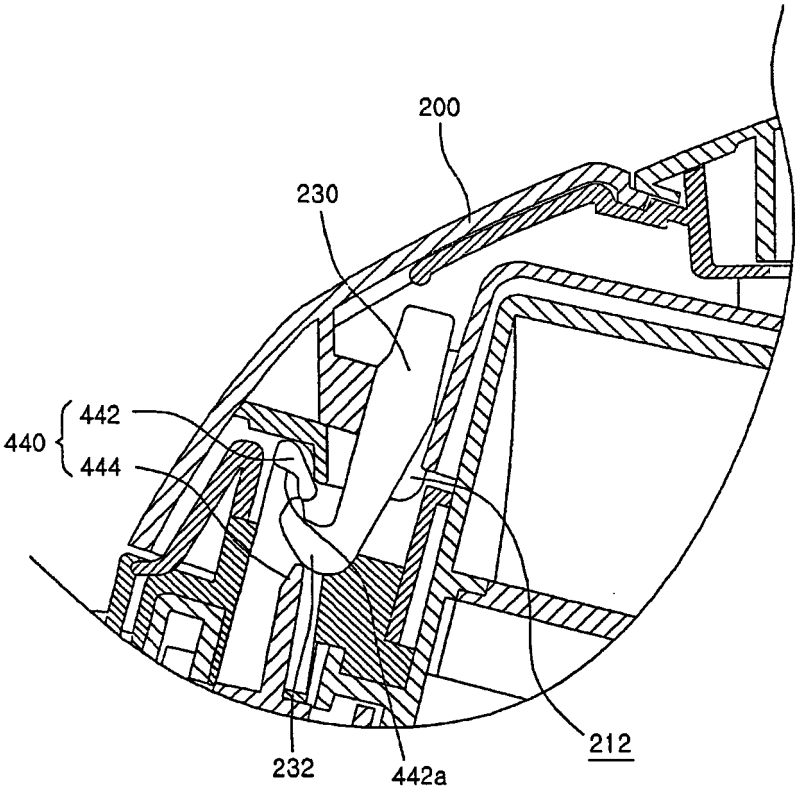
[Fig. 21]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[Fig. 22]