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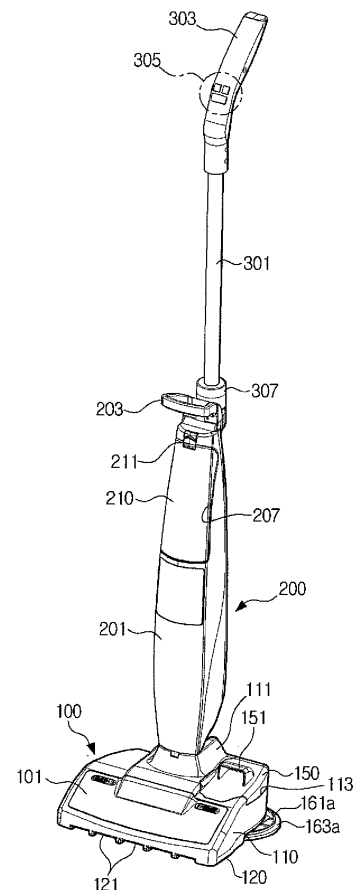
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(54) **Steam vacuum cleaner**

(57) A steam vacuum cleaner includes a suction port assembly comprising a dust receptacle formed therein, and an impeller driven by a motor to draw in air and dust from an object being cleaned through a suction port formed on a lower portion and to discharge the suctioned air and dust into the dust receptacle, a main body comprising a water tank, and a heater unit to receive water from the water tank and generate steam, a lower portion of the main body being hinged to a portion of the suction port assembly, and a floorcloth plate formed on a lower portion of the suction port assembly, and comprising at least one floorcloth attached thereto.

FIG. 1



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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent application No. 12/071,620, filed February 25, 2008, which claims priority from Korean Patent Application No. 2007-0091234, filed September 7, 2007, in the Korean Intellectual Property Office, the entire disclosure of which is hereby incorporated by reference.

[0002] Also, this application claims the benefit under 35 U.S.C. § 119(a) from Korean Patent Application No. 2008-65477 filed July 7, 2008, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0003] The present invention relates to a vacuum cleaner, and more particularly, to a steam vacuum cleaner having a vacuum cleaning and a steam cleaning functions to increase a cleaning efficiency.

2. Description of the Related Art

[0004] A steam vacuum cleaner having both vacuum cleaning and steam cleaning functions is available. This type of vacuum cleaner can vacuum an object being cleaned, while concurrently ejecting steam onto the object so as to remove contaminants from the object being cleaned more efficiently.

[0005] Meanwhile, conventional general steam vacuum cleaners can use a limited level of power which is generally 2000 W (Watt) at the maximum. Therefore, it is necessary to additionally employ high voltage components including high voltage line for these vacuum cleaners to use more than 2000 W of power, and so the price increases.

[0006] Such a conventional general steam vacuum cleaner includes a suction motor which consumes approximately 1300 W of power, and a small-sized heater unit which consumes approximately 700 W of power for steam cleaning. Therefore, this conventional steam vacuum cleaner can not compare with the performance of a steam-only cleaner which consumes approximately 1200 W of power and employs a large-sized and approximately 800cc of high capacity heater unit.

[0007] A small-sized heater unit also has the drawback that components such as ejection nozzles are frequently blocked and become incapable of operating by the coating of scale which grows inside the heater unit due to hard incrustation such as Ca^{2+} and Mg^{2+} .

[0008] A conventional general steam vacuum cleaner has a large-sized body and a long stick part to adjust a suction port assembly, and thus a user may experience inconvenience when storing the steam vacuum cleaner.

SUMMARY OF THE INVENTION

[0009] The present invention has been developed in order to overcome the above drawbacks and other problems associated with the conventional arrangement.

[0010] The present invention provides a steam vacuum cleaner which vacuums an object being cleaned, while concurrently ejecting steam onto the object to increase cleaning efficiency.

[0011] The present invention also provides a steam vacuum cleaner which consumes less power than a vacuum cleaner, but provides improved steam cleaning performance.

[0012] The present invention also provides a steam vacuum cleaner fabricated with a compact size, and thus it is convenient to store the steam vacuum cleaner.

[0013] An aspect of the present invention provides a steam vacuum cleaner, including a suction port assembly comprising a dust receptacle formed therein, and an impeller driven by a motor to draw in air and dust from an object being cleaned through a suction port formed on a lower portion and to discharge the suctioned air and dust into the dust receptacle, a main body comprising a water tank, and a heater unit to receive water from the water tank and generate steam, a lower portion of the main body being hinged to a portion of the suction port assembly, and a floorcloth plate formed on a lower portion of the suction port assembly, and comprising at least one floorcloth attached thereto.

[0014] The heater unit consumes from about 1200 W to about 1900 W of power, and the motor consumes from about 80 W to about 100 W of power. Accordingly, the total power consumption may be kept around 1400 W. The heater unit may include a sheath heater housed therein.

[0015] The heater unit may be a large-capacity unit that holds from about 700 cc to about 900 cc of water therein. Accordingly, clogging of a steam feed line due to scale is prevented.

[0016] The motor may desirably be an AC motor, since the heater unit uses the AC power.

[0017] The impeller may be formed on a passage between the suction port and the dust receptacle. The passage may include a first passage in which a first end is formed adjacent to the suction port and a second end opposite to the first end is formed adjacent to the impeller, an impeller casing part to surround the impeller, the impeller casing part being in fluid communication with the second end of the first passage, and a second passage in which a first end is in fluid communication with the impeller casing part and a second end opposite to the first end is in fluid communication with the dust receptacle.

[0018] The steam vacuum cleaner may further include a drum brush rotatably disposed in the suction port, to receive a driving force of the motor and move the dust of the object being cleaned to the first end of the first passage.

[0019] The steam vacuum cleaner may further include a partition member engaged with a lower portion of the suction port assembly to divide a space defined between the lower portion of the suction port assembly and the surface being cleaned into a vacuum cleaning area and a steam cleaning area so that dust being drawn in through the suction port is not mixed with the steam being emitted from a lower rear portion of the suction port assembly.

[0020] The steam vacuum cleaner may further include a rotating unit arranged inside the suction port assembly to rotate the floorcloth plate.

[0021] The steam vacuum cleaner may further include an operating handle comprising a stick part to be slid into the main body or slid out of the main body along the length direction of the main body.

[0022] The present invention provides a steam vacuum cleaner including a suction port assembly comprising a suction port on a lower portion and a dust receptacle detachably attached therein, a pump disposed in the suction port assembly to suck in dust from a surface being cleaned through the suction port and to transfer the dust to the dust receptacle, a steam unit disposed on the suction port assembly, a floorcloth unit disposed on the suction port assembly to scrub the surface using steam supplied from the steam unit, and a stick part hinged with a lower portion of the suction port assembly, and having variable length.

[0023] The stick part may include a first stick in which one end is connected to the suction port assembly, and a second stick hinged with another end of the first stick folded to contact a lower stick. The first stick may include at least one pair of protrusions longitudinally disposed at predetermined intervals around which electric wires are wound, and the second stick may not collide with the pair of protrusions when being folded.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

FIGS. 1 and 2 are perspective views of a steam vacuum cleaner according to a first exemplary embodiment of the present invention;

FIGS. 3 and 4 are perspective view of a suction port assembly from which an upper cover illustrated in FIG. 1 is removed;

FIGS. 5 and 6 illustrate an impeller illustrated in FIG. 4;

FIG. 7 illustrates another example of an impeller;

FIG. 8 is a bottom perspective view of the suction port assembly illustrated in FIG. 1;

FIG. 9 is a perspective view illustrating a stationary floorcloth plate applied to the suction port assembly;

FIG. 10 is a perspective view illustrating an interior

of the main body illustrated in FIG. 1;

FIG. 11 is a perspective view illustrating another example of a main body;

FIG. 12 illustrates contaminants being drawn from an object being cleaned into the suction port assembly;

FIG. 13 is a partially enlarged view provided to explain the operation of a screening member attached to the bottom of the suction port assembly;

FIG. 14 is a perspective view of a steam vacuum cleaner according to a second exemplary embodiment of the present invention;

FIGS. 15 and 16 are internal perspective views of the suction port assembly illustrated in FIG. 14;

FIG. 17 is a bottom perspective view of the suction port assembly illustrated in FIG. 14;

FIG. 18 is a schematic plan view of a pump and a passage which are disposed in the suction port assembly to vacuum a surface;

FIGS. 19 and 20 are a perspective view and a side view respectively of a steam hole which is disposed in the suction port assembly;

FIG. 21 is a schematic view of another exemplary embodiment of the steam hole illustrated in FIG. 19;

FIG. 22 is a schematic plan view of a floorcloth illustrated in FIG. 15;

FIG. 23 is a sectional view taken along the line A-A illustrated in FIG. 22; and

FIG. 24 is a side view of folding or unfolding condition of a stick part illustrated in FIG. 14.

[0025] Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0026] Hereinafter, certain exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0027] The matters defined in the description, such as a detailed construction and elements thereof, are provided to assist in a comprehensive understanding of the invention. Thus, it is apparent that the present invention may be carried out without those defined matters. Also, well-known functions or constructions are omitted to provide a clear and concise description of exemplary embodiments of the present invention.

[0028] Referring to FIGS. 1 and 2, a steam vacuum cleaner according to a first exemplary embodiment of the present invention includes a suction port assembly 100, a main body 200, a stick part 301, and a handle 303. The suction port assembly 100 may desirably be hinged with respect to the main body 200 for easy operation of a user. Accordingly, the user may grip the handle 303, and keeps the main body 200 lean backward while operating the cleaner.

[0029] The suction port assembly 100 may include an upper casing 110, a lower casing 120, a drum brush 125, a motor 130, an impeller 135, a dust receptacle 150, a rotating unit 160, and a pair of floorcloth plates 161a and 161b.

[0030] The upper casing 110 may include a hinge part 111 engaged with a hinge axis 202 (FIG. 10) formed on a lower rear portion of the main body 200, and a hole 113 formed to receive the dust receptacle 150. Removably attached to the upper casing 110 is a translucent cover 101 to allow a user to view a drum brush 125 (FIG. 3) rotating inside the suction port assembly 100. Because a user can check whether the drum brush 125 rotates or not during cleaning operation through the translucent cover 101, the user can immediately deal with any problem occurring in the drum brush 125 such as non-rotation of the drum brush 125 due to foreign substance clogging the suction port 123. As a result, problems such as motor overload can be avoided.

[0031] The lower casing 120 may be detachably engaged with the lower portion of the upper casing 110, to define a space in cooperation with the upper casing 110 to protect the elements housed therein such as the drum brush 125, the motor 130 and the impeller 135. Referring to FIG. 8, the lower casing 120 includes the suction port 123 extending widthwise along the lower front side to draw in dust and air from an object being cleaned. The drum brush 125 is rotatably disposed within the suction port 123. The outer circumference of the drum brush 125 is engaged with a plurality of cleaning ribs 126 made of soft material.

[0032] The lower casing 120 includes passages formed therein for dust entering through the suction port 123 to flow to the dust receptacle 150. The passages include a first passage 143, an impeller casing 144, and a second passage 145. The first passage 143 includes an inlet 141 formed at a first end formed adjacent to the suction port 123. A second end of the first passage 143, which is opposite to the inlet 141, is in fluid communication with the impeller casing 144. A first end of the second passage 145 is in fluid communication with the impeller casing 144, and a second end of the second passage 145 opposite to the first end is in fluid communication with a dust inlet 153 of the dust receptacle 150. The impeller casing 144 has an inner diameter larger than an outer diameter of the impeller 135 to allow the impeller 135 housed therein to rotate. Accordingly, dust entering the inlet 141 passes the first passage 143, the impeller casing 144 and the second passage 145 in sequence, before being collected in the dust receptacle 150.

[0033] The lower casing 120 also includes a partition rib 180 (FIG. 8) to divide the lower space of the lower casing 120 where the suction port 123 is formed, into a vacuum cleaning area and a steam cleaning area on which the floorcloths 163a and 163b are arranged. The partition rib 180 extends alongside the suction port 123 in back of the suction port 123.

[0034] Referring to FIG. 13, the lower portion of the

partition rib 180 contacts the object being cleaned to prevent dust suctioned through the suction port 123 from mixing with the steam, or being moistened by the steam and staying fast to the object being cleaned. A steam ejecting hole (not illustrated) is formed in a lower rear portion of the lower casing 120 to eject the steam.

[0035] The motor 130 according to the exemplary embodiment of the present invention consumes approximately 80 W to 100 W of power, which is different from a general suction motor of a vacuum cleaner that consumes approximately 700 W to 800 W of power. The heater unit 240 uses AC power, and it is desirable that the motor 130 also uses AC power. Referring to FIGS. 3 and 4, the motor 130 includes a driving shaft 131 engaged with the center of rotation of the impeller 135 to drive the impeller 135. The driving shaft 131 maintains a parallel relationship with the drum brush 125 when the motor 130 is mounted in the lower casing 120 so that the driving force of the motor 130 can be directly transmitted to the drum brush 125 via the driving belt 133. A driving force transmitting means (not illustrated) may be formed on one end of the driving shaft 131 of the motor 130 to transmit the driving force to the rotating unit 160. Accordingly, according to the rotation of the driving shaft 131, the motor 130 transmits driving force to the drum brush 125, the impeller 135 and the rotating unit 160 concurrently.

[0036] Referring to FIG. 5, the impeller 135 has a suction hole 136 formed at the center of one end closer to the first passage 143 to guide the dust and air exiting out of the first passage 143 and entering into the impeller 135. The impeller 135 also includes a pair of blades 137a and 137b formed in a symmetrical manner with respect to the center of rotation of the impeller 135. The blades 137a and 137b are formed to have a predetermined radius of curvature. The ends of the blades 137a and 137b are distanced from each other so as to create a pair of discharge openings 139a and 139b therebetween. Accordingly, dust is suctioned through the suction hole 136 and discharged through the discharge holes 139a and 139b by the impeller 135 using centrifugal force, passed through the second passage 145 and entered into the dust receptacle 150. The impeller 135 may have unlimited number of blades 137a and 137b. Referring to the example illustrated in FIG. 7, the impeller 175 may include four blades 177a, 177b, 177c and 177d to further enhance flow rate of the discharged dust-entrained air. Discharge openings 179a, 179b, 179c and 179d are formed between the blades 177a, 177b, 177c and 177d.

[0037] At least the upper portion of the dust receptacle 150 is made out of translucent material. The translucent upper portion of the dust receptacle 150 is exposed outside when the dust receptacle 150 is seated in the hole 113 of the upper casing 110 to allow a user to look inside the dust receptacle 150 and check the amount of dust collected therethrough. The dust receptacle 150 may also include a discharge part 155 (FIG. 2) to discharge the dust and air outside. The discharge part 155 may include a filter (not illustrated) to filter minute dust from the air

being discharged out of the dust receptacle 150.

[0038] The rotating unit 160 is arranged on the lower casing 120 and in back of the motor 130. The rotating unit 160 includes a plurality of worm gears (not illustrated) and bevel gears (not illustrated). The rotating unit 160 receives driving force from the motor 130 to rotate the pair of circular floorcloth plates 161a and 161b attached to the lower portion of the lower casing 120. The pair of floorcloth plates 161a and 161b may include Velcro tapes (not illustrated) disposed on the lower portions to be attached to or detached from the floorcloths 163a and 163b.

[0039] The floorcloths 163a and 163b may be stationary instead of being rotatable. Referring to FIG. 9, a combination of a floorcloth plate 430, which is detachably attached to the rear portion of the partition rib 480 on the lower portion of the lower casing 420, and a rectangular floorcloth 440, which is detachably attached to the lower portion of the floorcloth plate 430, may be employed. The floorcloth plate 430 includes a plurality of spaced holes 431a, 431b, 431c and 431d formed on the upper portion to be snap-engaged with a plurality of protrusions 427a, 427b, 427c and 427d formed on a part of the lower portion of the lower casing 420 where the floorcloth plate 430 is placed.

[0040] The floorcloth plate 430 also includes an elongated hole 433 to allow the streams of steam, which are emitted out of a plurality of steam holes 426 formed on the lower casing 420, to hit the object being cleaned without being obstructed by the floorcloth plate 430. The floorcloth plate 430 may include a foot-operating pedal 435 extending from the rear portion so that a user can step on the foot-operating pedal 435 and disengage the floorcloth plate 430 from the lower casing 420 with ease. When a stationary floorcloth 440 is employed, the rotating unit 160 is not necessarily employed in the suction port assembly 400. In FIG. 9, reference numeral 410 denotes the upper casing, 425 is the drum brush, and 429 is the wheel.

[0041] Referring to FIGS. 1, 2 and 10, the main body 200 includes a front cover 201. The front cover 201 includes an opening 207 formed on the upper portion to receive a removable water tank 210 therein, and a locking button 211 to lock the water tank 210 in place or release the water tank 210 from the locking state. The main body 200 also includes a carrier handle 203 inclinedly extending forward so that a user can grip it and carry the cleaner. The main body 200 additionally includes a stick receiving part 205 extending along the length direction of the main body 200 in the rear portion so that the stick part 301 is slid into or out of the stick receiving part 205, and a pair of wire winding projections 251 and 252 spaced vertically apart from each other, around which electric wires (not illustrated) are wound.

[0042] A rear portion of the water tank 210 is inserted in the main body 200. The water tank 210 is removable through the opening 207. Elements such as pump 220, safety valve 230 and heater unit 240 are all housed in the main body 200.

[0043] The water tank 210 is made out of a translucent material to allow a user to look inside the water tank 210 and check the water level through the front side of the water tank 210 which is exposed to the outside.

[0044] The pump 220 receives water from the water tank 210 and supplies a predetermined amount of water to the heater unit 240 through a water pipeline 231. A discharge pipe 233 in fluid communication with the main body 200 is formed on one side of the water pipeline 231. The safety valve 230 is installed on the discharge pipe 233 to prevent backflow of water back to the pump 220 when the water supply is obstructed due to pressure generating inside the heater unit 240. The discharge pipe 233 is used as a passage to discharge the water outside the main body 200.

[0045] Unlike other small-sized heater units generally employed in the conventional steam cleaners, the heater unit 240 according to the exemplary embodiment of the present invention employs a sheath heater which consumes approximately 1200 W to 1900 W of power, and a large-sized heater unit 240 which holds approximately 700 cc to 900 cc of water. If the motor 130 consumes approximately 80 W to 100W of power, the cleaner consumes maximum 1400 W of power. Accordingly, the steam vacuum cleaner according to the exemplary embodiment of the present invention can save approximately 600 W of power, when compared to a general conventional steam vacuum cleaner that consumes approximately 2000 W of power.

[0046] Because the heater unit 240 is sized to accommodate a large amount of water, the possibility of having scale clogging steam emitting pipe 241 is greatly decreased due to increased inner area. In FIG. 10, a reference numeral 221 denotes an inlet port.

[0047] Referring to FIG. 10, the main body 200 has a relatively slim shape because the pump 220 is arranged on the upper portion of the heater unit 240. However, many other alternatives are possible. For example, the pump 520 may be arranged on a side portion of the heater unit 540 (FIG. 11). In this case, the height of the main body 500 is reduced and therefore, the cleaner can be compact-sized. Both the main bodies 500 and 200 illustrated in FIGS. 11 and 10 have substantially the same construction, with an exception regarding the location of the pump 520. In FIG. 11, reference numeral 503 denotes the carrier handle, 521 is the inlet port, 530 is the safety valve, 531 is the water pipeline, 533 is the discharge pipe, 601 is the stick part, 603 is the operating handle, 605 is the operating button part, and 607 is the stick fixing part.

[0048] Referring to FIG. 10, the stick part 301 has a predetermined length, and can be withdrawn out of the stick receiving part 205 (FIG. 2) to meet the height of a user, or inserted therein. The stick fixing part 307 arranged on the upper portion of the stick receiving part 205 locks or unlocks the stick part 301.

[0049] The operating handle 303 is engaged with the upper portion of the stick part 301 for the grip of a user, and includes the operating button part 305 having a plu-

rality of buttons to drive the motor 130 and the heater unit 240. The user may operate vacuum cleaning and steam cleaning concurrently or separately, through manipulating on the operating button part 305.

[0050] An example of operating both vacuum and steam cleaning concurrently using the steam vacuum cleaner constructed as explained above according to the first exemplary embodiment of the present invention will be explained below.

[0051] When a user commands to drive the motor 130 and the heater unit 240 through the operating button part 305, the cleaner starts vacuum and steam cleaning.

[0052] For vacuum cleaning, the driving shaft 131 of the motor 130 rotates, thereby driving the drum brush 125, the impeller 135 and the rotating unit 160 concurrently.

[0053] Referring to FIG. 12, the drum brush 125 rotates so that the cleaning ribs 126 contact an object being cleaned to move the dust D to the proximity to the inlet 141 of the first passage 143. The dust D is suctioned through the inlet 141 due to the suction force generated from the rotating impeller 135, guided through the first passage 143 and entered into the suction hole 136 of the impeller 135.

[0054] Dust is separated in the impeller 135 by the centrifugal force, discharged through the discharge openings 139a and 139b, guided through the second passage 145, and entered into the dust receptacle 150 through the dust inlet 153. Because of relatively short passages 143, 144 and 145 to draw dust into the dust receptacle 150, less force is required to suction, and as a result, a low-power consuming AC motor 140 can be used without compromising the efficiency of the cleaner.

[0055] Referring to FIG. 10, for steam cleaning, the sheath heater (not illustrated) housed inside the heater unit 240 is heated, thereby heating and turning the water held in the heater unit 240 into steam. The steam is then emitted onto an object being cleaned through the steam emitting pipe 241 and the steam emitting holes (not illustrated) of the lower casing 120.

[0056] The pair of floorcloth plates 161a and 161b are rotated in accordance with the driving of the rotating unit 160, to rotate the floorcloths 163a and 163b attached to the lower portion to wipe out the steam-heated object.

[0057] Referring to FIG. 13, the streams of emitted steam are blocked from moving toward the suction port 123 due to the presence of the partition rib 180. Additionally, because dust D is also blocked by the partition rib 180 from moving toward the steam while being brushed and moved to the inlet 141 by the drum brush 125, dust D is not mixed with the steam. Additionally, the problem of dust D being moistened by the steam being emitted and staying fast to the object being cleaned can be avoided.

[0058] As explained above, according to the first exemplary embodiments of the present invention explained above, by using an AC motor 130 which consumes far less power than the suction motors used in the general

steam vacuum cleaner, and a large-sized heater unit 240 having higher efficiency and performance which consumes more power than the conventional applications, a better steam cleaning efficiency is provided with the same or reduced power consumption.

[0059] Furthermore, because the large-sized heater unit 240 provides a large-sized steam emitting pipe 241, the steam emitting pipe 241 is less likely to be clogged by the scale and thus is usable for a longer period of time.

[0060] The structure of a steam vacuum cleaner according to a second exemplary embodiment of the present invention will be explained with reference to the drawings.

[0061] Referring to FIGS. 14 to 17, the steam vacuum cleaner according to the second exemplary embodiment of the present invention may include a suction port assembly 1300, a pump 1330, a steam unit 1350, a floorcloth unit 1370, and a stick part 1400.

[0062] The suction port assembly 1300 includes a main body 1310 and a cover 1320 which is engaged with an upper portion of the main body 1310. Wheels 1301 and 1303 are rotatably mounted at the rear of both ends of the suction port assembly 1300 such that the cleaner can move over a surface being cleaned.

[0063] A suction hole 1304 is formed on a front bottom surface of the main body 1310, and a brush housing 1305 is formed on an upper side corresponding to the suction hole 1304. A drum brush 1306 is rotatably disposed so that dust is sucked in from a surface being cleaned toward the suction hole 1304.

[0064] Both ends of the drum brush 1306 are supported by respective sides of the brush housing 1305, and one end 1306a of the drum brush 1306 is connected to a second driving shaft 1331b of a first motor 1331 through a belt 1307 in order to receive a driving force from the first motor 1331 of the pump 1330.

[0065] A dust receptacle 1308 is detachably attached to a rear side of the main body 1310, and the main body 1310 includes first and second suction passages 1309a and 1309b which connect the suction hole 1304 to the dust receptacle 1308. One end of the first suction passage 1309a is connected to an inlet hole 1305a of the brush housing 1305, and the other end is connected to an impeller casing part 1309c disposed to one end of the brush housing 1305. One end of the second suction passage 1309b is connected to the impeller casing part 1309c, and the other end is connected to an outlet hole 1308b of a dust receptacle casing part 1308a surrounding the dust receptacle 1308. The dust laden air flowing into the brush housing 1305 through the suction hole 1304 flows into the inlet hole 1305a, passes the first suction passage 1309a, the impeller casing part 1309c, and the second suction passage 1309b, and is collected in the dust receptacle 1308 through the outlet hole 1308b. The dust receptacle 1308 includes a filter 1308c on an upper portion, whereby preventing fine particles of the dust from leaking out thereof.

[0066] Referring to FIG. 18, the pump 1330 includes

a first motor 1331 and an impeller 1333. The first motor 1331 is disposed outside of the impeller casing part 1309c. The impeller 1333 is rotatably mounted on the impeller casing part 1309c, and receives a driving force of the first 1331 motor by the rotation of a first driving shaft 1331a. The impeller casing part 1309c is penetrated by the first driving shaft 1331a of the first motor 1331, and is sealed by a sealing member (not shown), so that pressure loss is prevented from the first and second suction passages 1309a and 1309b. The pump 1330 rotates the impeller 1333, maintains the insides of the first and second suction passages 1309a and 1309b in a vacuum condition, and pumps air and dust from the suction hole 1304 in order to collect the dust into the dust receptacle 1308.

[0067] Referring to FIGS. 19 and 20, the steam unit 1350 is disposed on a rear portion of the suction port assembly 1300, and includes a water tank 1351, a pump 1353, a heater housing 1355, and a sheath heater 1357.

[0068] Part of the water tank 1351 is detachably inserted in the cover 1320. One side of the pump 1353 is connected to the water tank 1320, and supplies water stored in the water tank 1320 to a predetermined amount to the heater housing 1355. The pump 1353 may employ a micro pump to supply the small amount of water periodically or continuously to the heater housing 1355 since the sheath heater 1357 heats water instantaneously. The heater housing 1355 is disposed under the water tank 1351, and part of the sheath heater 1357 is inserted in the heater housing 1355, so that the sheath heater 1357 heats water flowing into the heater housing 1355 instantaneously. The steam unit 1350 according to the second exemplary embodiment of the present invention generates steam by instantaneously heating water, but this should not be considered limiting.

[0069] A steam unit 1350a may be implemented in a water tank type. Referring to FIG. 21, the steam unit 1350a includes a water tank 1358, and a sheath heater 1359 part which is inserted into the water tank. The steam unit 1350a heats water stored in the water tank 1358 using the sheath heater 1359, and supplies steam to the floorcloth unit 1370. In this case, a user may fix the water tank 1358 to the cover 1320, and pour water into the water tank 1358 through a water pouring part 1358a formed on an upper portion of the water tank 1358.

[0070] Referring to FIGS. 22 and 23, the floorcloth unit 1370 includes a pair of floorcloth plates 1371 and 1373, and a rotation driving part 1377.

[0071] The pair of floorcloth plates 1371 and 1373 is rotatably formed on a lower portion of the main body 1310 of the suction port assembly 1300. The pair of floorcloth plates 1371 and 1373 may be disposed at a rear portion of the suction hole 1304 (referring to FIG. 17) in order to prevent dust and air flowing into the suction hole 1304 from colliding. The pair of floorcloth plates 1371 and 1373 is formed substantially in a circular shape. The pair of floorcloth plates 1371 and 1373 includes a plurality of floorcloth attaching parts 1371b and 1373b which are

attached to a bottom surface thereof, and steam passages 1371c and 1373b which are arranged radiating from the center.

[0072] The pair of floorcloth plates 1371 and 1373 includes protrusions 1371d and 1373d which are protruded from upper center surface, and the protrusions 1371d and 1373d are pressed into cylinder parts 1378b and 1379b. Steam discharging holes 1371e and 1373e are formed inside the pair of protrusions 1371d and 1373d, and the pair of protrusions 1371d and 1373d is connected to through holes 1375a and 1376a which are formed in a pair of connecting shafts 1375 and 1376. The through holes 1375a and 1376a are connected to a steam supply pipe 1355a connected to the heater housing 1355, and thus steam supplied from the steam unit 1350 flows along the through holes 1375a and 1376b, the steam discharging holes 1371e and 1373e, and steam passages 1371c and 1373c. In doing so, the steam is saturated in floorcloths 1371a and 1373a attached on the pair of floorcloth plates 1371 and 1373.

[0073] The rotation driving part 1377 includes a second motor 1377a, a pair of worms 1378a and 1379a, and a pair of worm gears 1378c and 1379c.

[0074] The second motor 1377a is disposed between the pair of connecting shafts 1375 and 1376, and a pair of driving shafts 1377b and 1377c are extended to the pair of connecting shafts 1375 and 1376 on the same shaft. The pair of worms 1378a and 1379a are formed around the circumference of the pair of driving shafts 1377b and 1377c, and the pair of worm gears 1378c and 1379c are extendedly formed around circumferences of the pair of cylinder parts 1378b and 1379b. The pair of worms 1378a and 1379a and the pair of work gears 1378c and 1379c transfer the driving force of the second motor 1377a to the pair of connecting shafts 1375 and 1376, which causes the pair of floorcloth plates 1371 and 1373 to concurrently rotate in different directions.

[0075] Referring to FIG. 24, the stick part 1400 includes a first stick 1410 and a second stick 1430 which are overlapped.

[0076] One end of the first stick 1410 is hinged with a rear portion of the suction port assembly 1300, and one surface includes at least one pair of supporting protrusions 1411 and 1413 which are vertically disposed at a predetermined interval. Electric wires are wound around the pair of supporting protrusions 1411 and 1413.

[0077] One end of the second stick 1430 is hinged with another end of the first stick 1410 by a hinge part 1420, and a handle 1431 is extended to another end of the second stick 1430. The second stick 1430 rotates at 180 degrees and is folded, so as to contact the first stick 1410. The second stick 1430 may be folded so as not to impact with the pair of supporting protrusions 1411 and 1413.

[0078] When a vacuum cleaner is not used, the stick part 1400 is folded. Therefore, the vacuum cleaner can be easily stored in a small space.

[0079] While certain exemplary embodiments of the present invention have been shown and described with

reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims and their equivalents.

Claims

1. A steam vacuum cleaner comprising:

a suction port assembly comprising a dust receptacle formed therein, and an impeller driven by a motor to draw in air and dust from an object being cleaned through a suction port formed on a lower portion and to discharge the suctioned air and dust into the dust receptacle;
a main body comprising a water tank, and a heater unit to receive water from the water tank and generate steam, a lower portion of the main body being hinged to a portion of the suction port assembly; and

a floorcloth plate formed on a lower portion of the suction port assembly, and comprising at least one floorcloth attached thereto.

2. The steam vacuum cleaner of claim 1, wherein the heater unit consumes from about 1200 W to about 1900 W of power, and the motor consumes from about 80 W to about 100 W of power.

3. The steam vacuum cleaner of any claims 1 and 2, wherein the heater unit is a large-capacity unit that holds from about 700 cc to about 900 cc of water therein.

4. The steam vacuum cleaner of any claims 1 to 3, wherein the impeller is formed on a passage between the suction port and the dust receptacle.

5. The steam vacuum cleaner of claim 6, wherein the passage comprises:

a first passage in which a first end is formed adjacent to the suction port and a second end opposite to the first end is formed adjacent to the impeller;

an impeller casing part to surround the impeller, the impeller casing part being in fluid communication with the second end of the first passage; and

a second passage in which a first end is in fluid communication with the impeller casing part and a second end opposite to the first end is in fluid communication with the dust receptacle.

6. The steam vacuum cleaner of any of claims 1 to 5, further comprising an operating handle comprising

a stick part to be slid into the main body or slid out of the main body along the length direction of the main body.

7. A steam vacuum cleaner, comprising:

a suction port assembly comprising a suction hole formed on a bottom surface, a dust receptacle is detachably attached to the suction port assembly;

a pump disposed in the suction port assembly, to draw in dust laden air from an object being cleaned, and to transfer the dust laden air to the dust receptacle;

a steam unit disposed on the suction port assembly;

a floorcloth unit disposed on the suction port assembly, to scrub the object using steam supplied from the steam unit; and

a stick part hinged with a portion of the suction port assembly, and having variable length.

8. The steam vacuum cleaner of claim 7, wherein the stick part comprises:

a first stick of which one end is connected to the suction port assembly; and

a second stick hinged with another end of the first stick, wherein the second stick is folded so as to contact the first stick.

9. The steam vacuum cleaner of claim 8, wherein the first stick comprises:

at least one pair of protrusions longitudinally disposed at predetermined intervals around which electric wires are wound.

10. The steam vacuum cleaner of any of claims 8 and 9, wherein the second stick does not collide with the pair of protrusions when being folded.

11. The steam vacuum cleaner of any of claims 7 to 10, wherein the pump comprises:

an impeller formed on a passage connecting between the suction hole and the dust receptacle; and

a first motor disposed outside of the passage, to drive the impeller.

12. The steam vacuum cleaner of any of claims 7 to 11, wherein the floorcloth unit comprises:

a pair of floorcloth plates rotatably disposed to the bottom surface of the suction port assembly, in which a floorcloth is attached to a bottom sur-

face of the floorcloth plates; and
a rotation driving part to drive the pair of floor-
cloth plates.

- 13.** The steam vacuum cleaner of any of claims 7 to 12, 5
wherein the pair of floorcloth plates comprises:

steam passages radially formed on the bottom
surface of the floorcloth plates.

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- 14.** The steam vacuum cleaner of any of claims 7 to 13,
wherein the steam unit comprises:

a water tank;
a heater housing;
a sheath heater, of which part is inserted in the
heater housing; and
a pump to supply water stored in the water tank
to the heater housing.

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FIG. 1

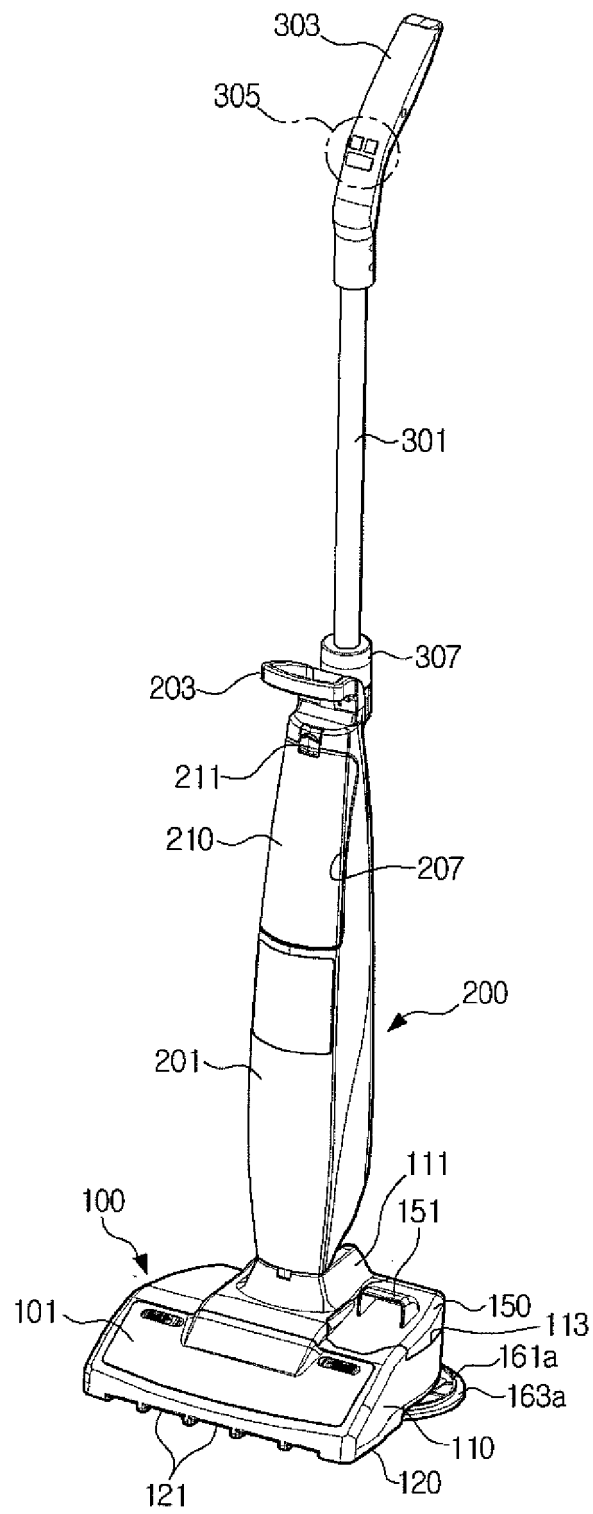


FIG. 2

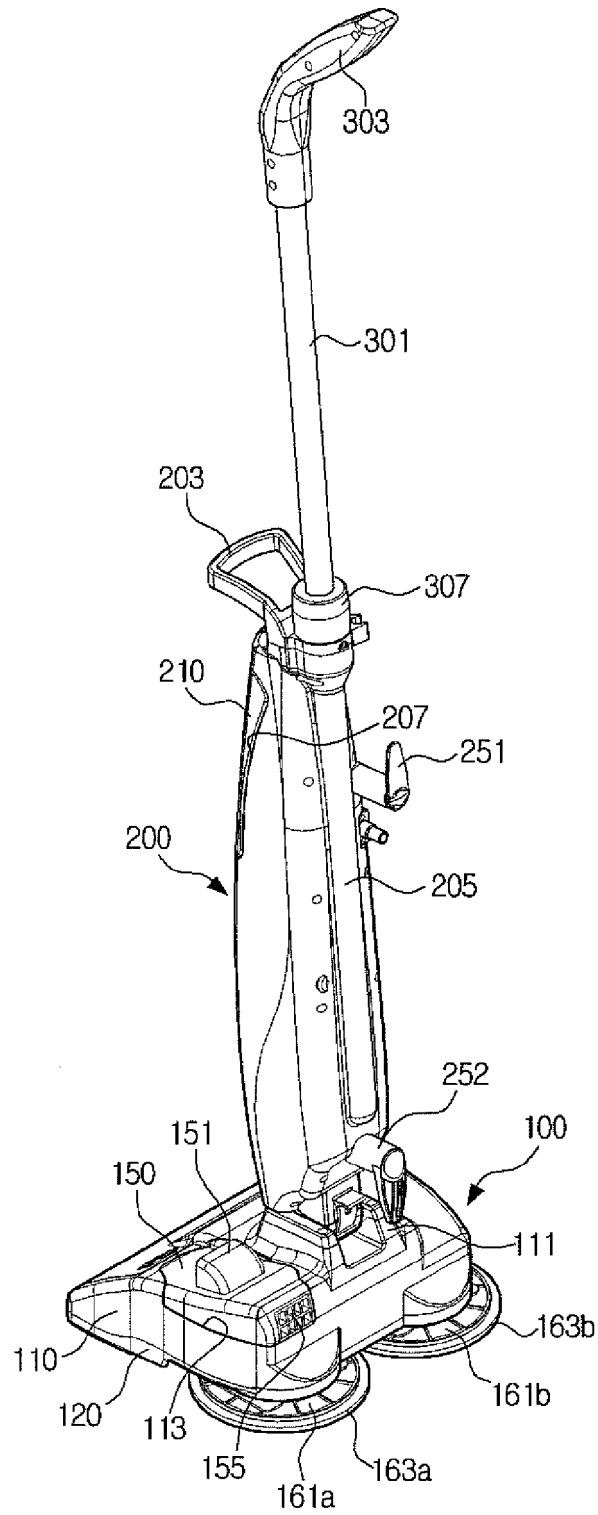


FIG. 3

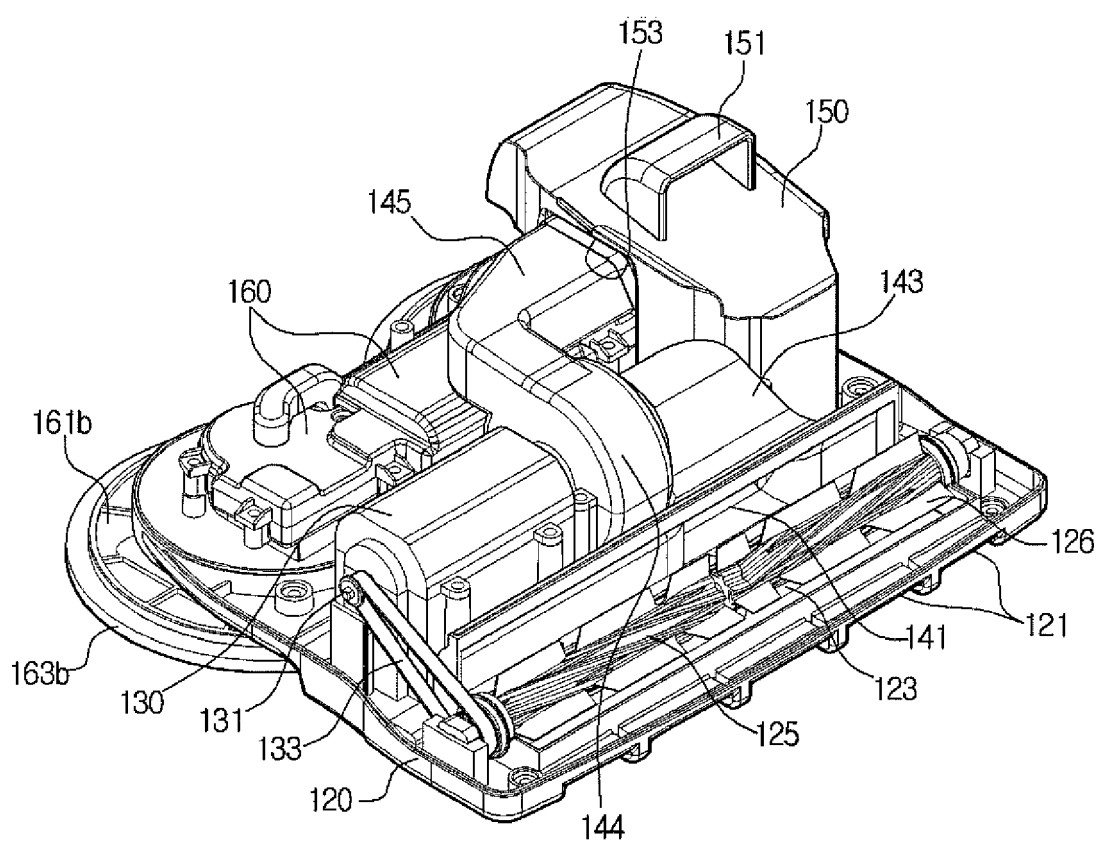


FIG. 4

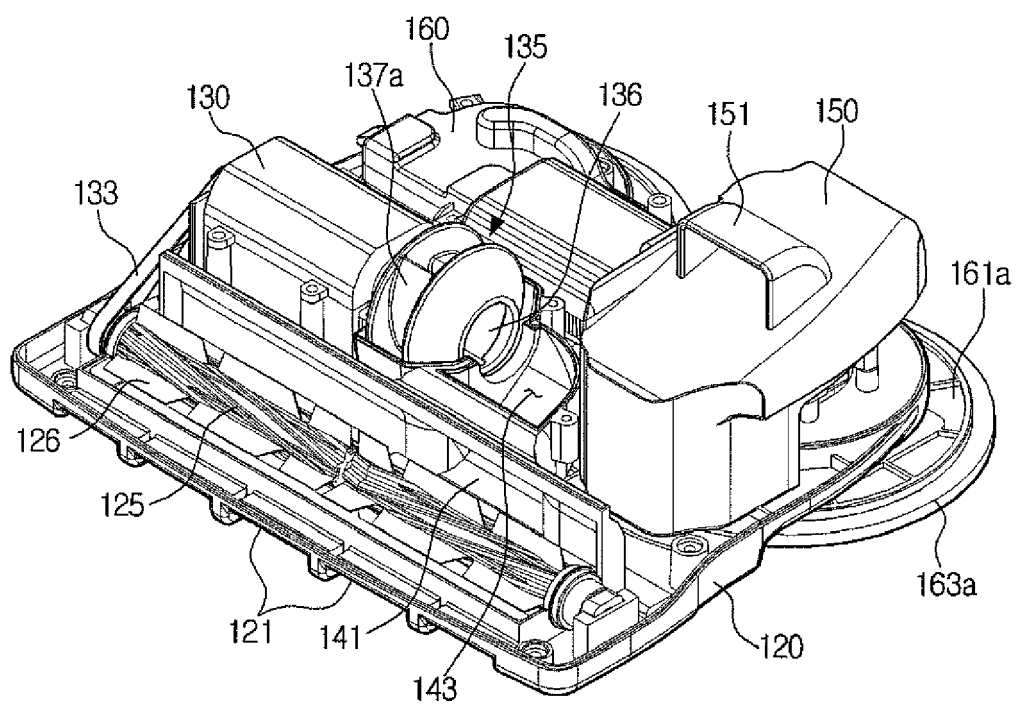


FIG. 5

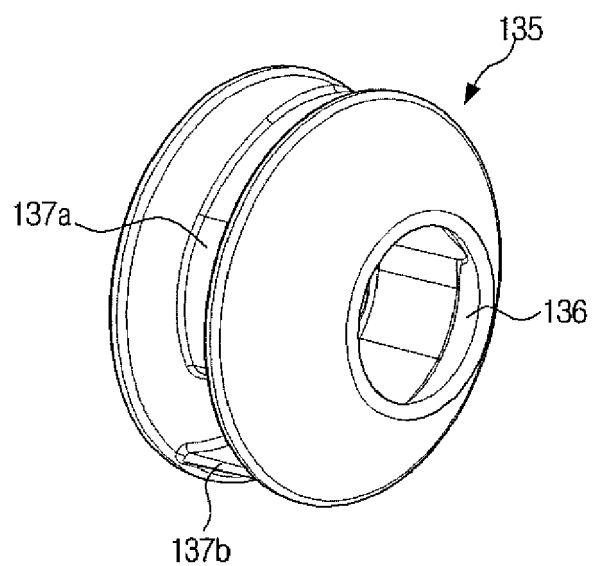


FIG. 6

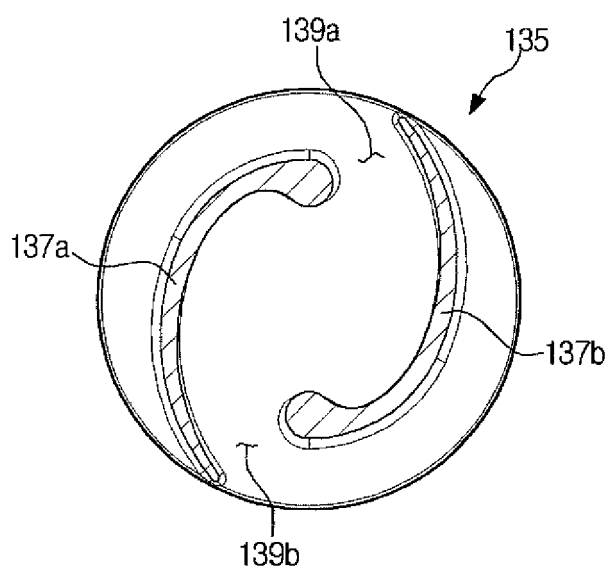


FIG. 7

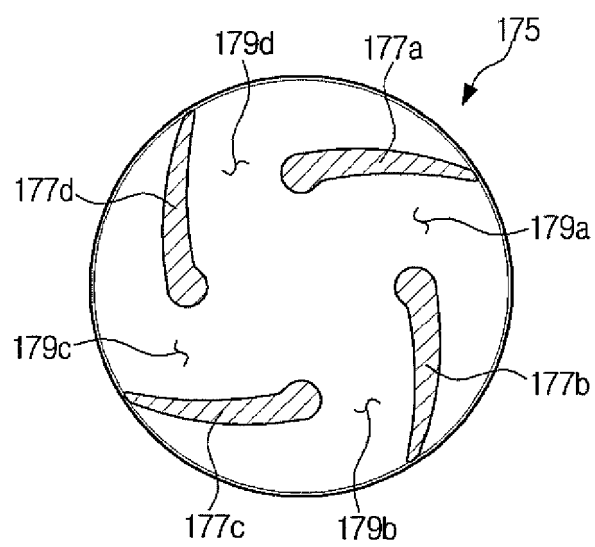


FIG. 8

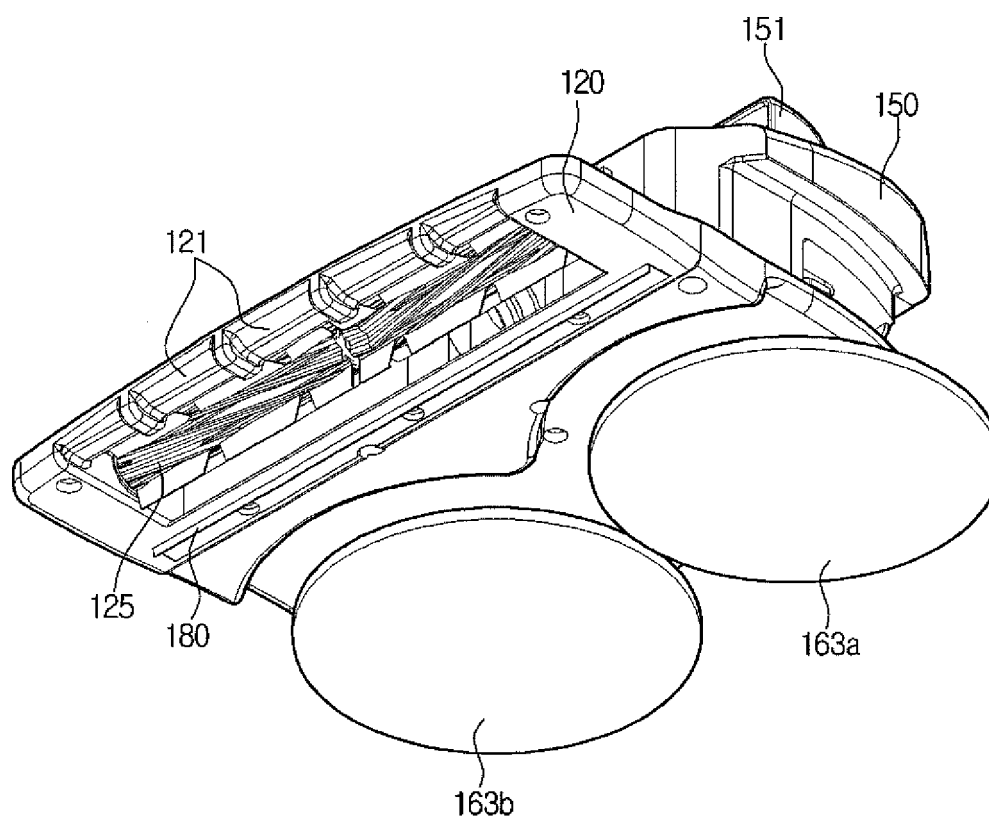


FIG. 9

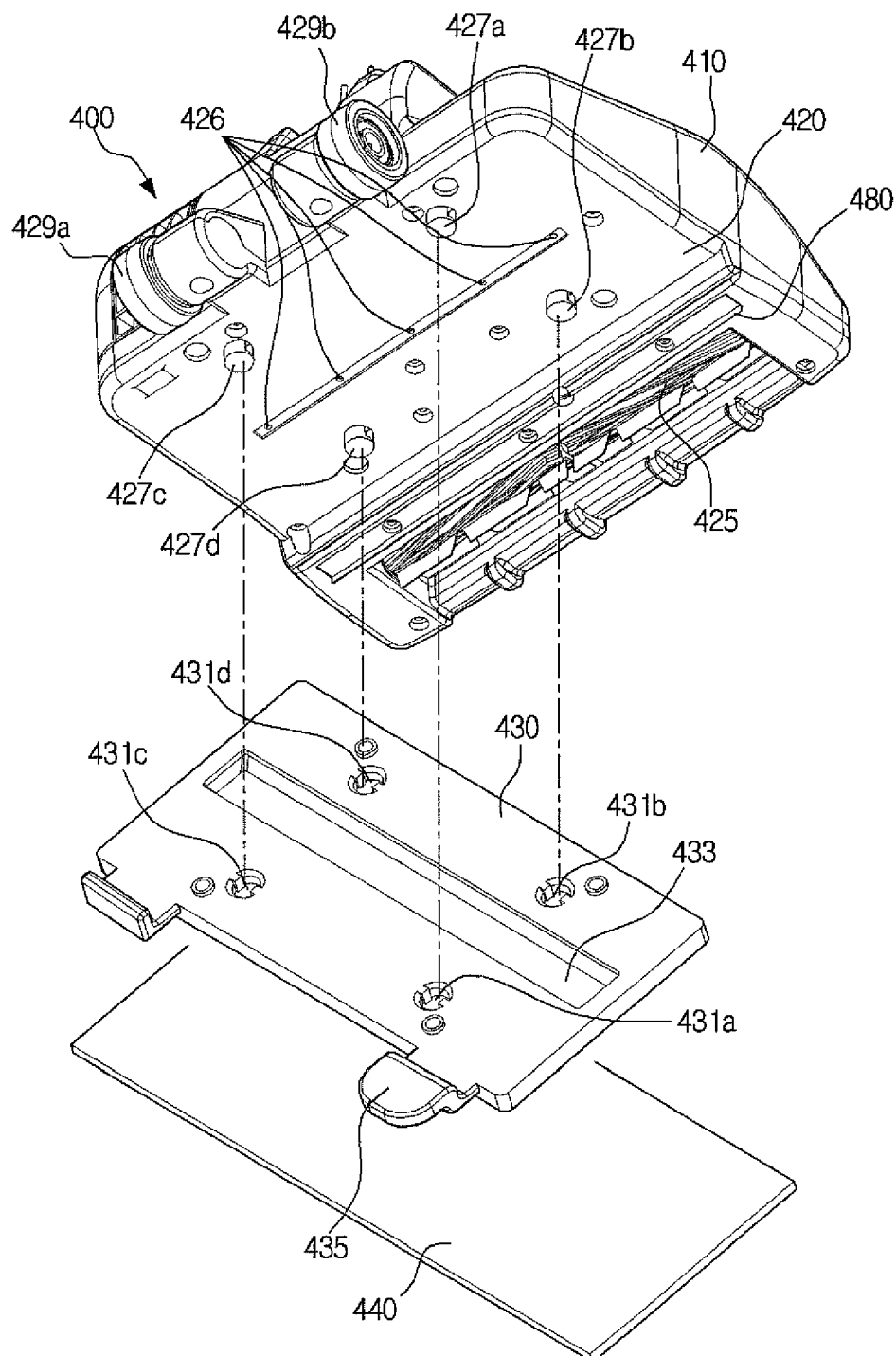


FIG. 10

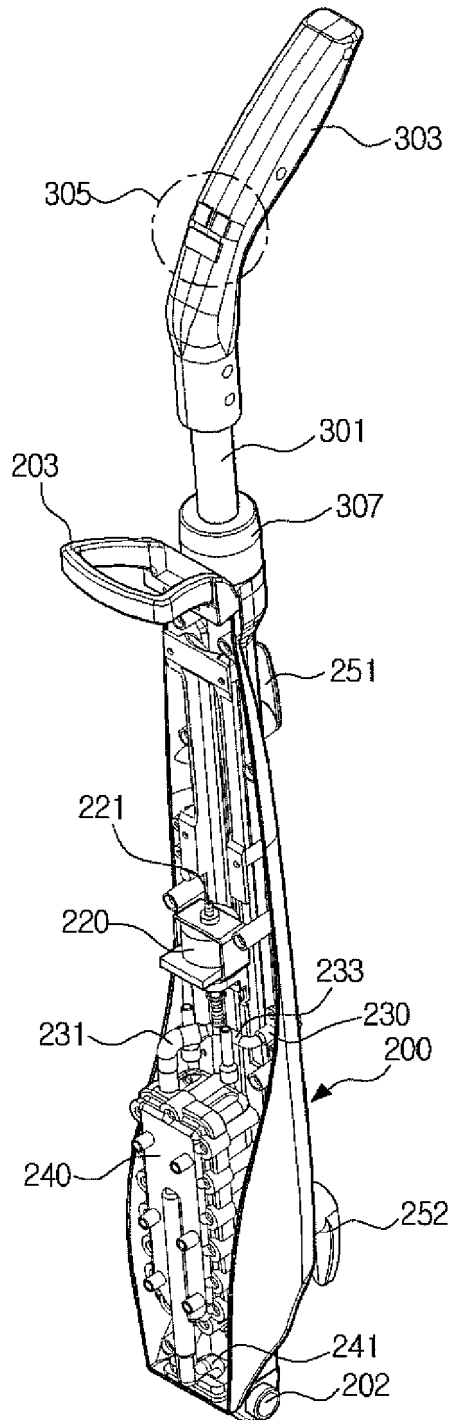


FIG. 11

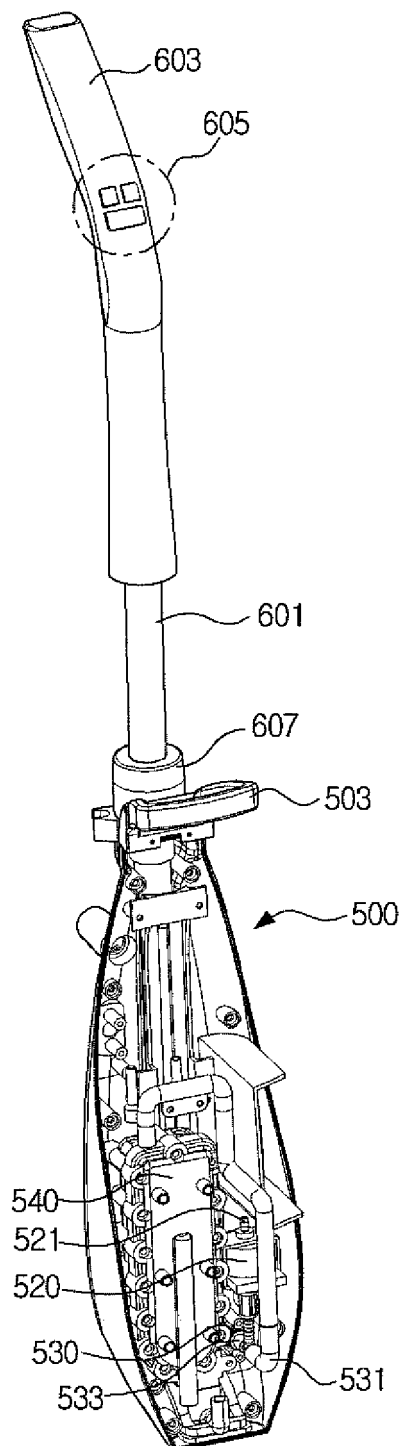


FIG. 12

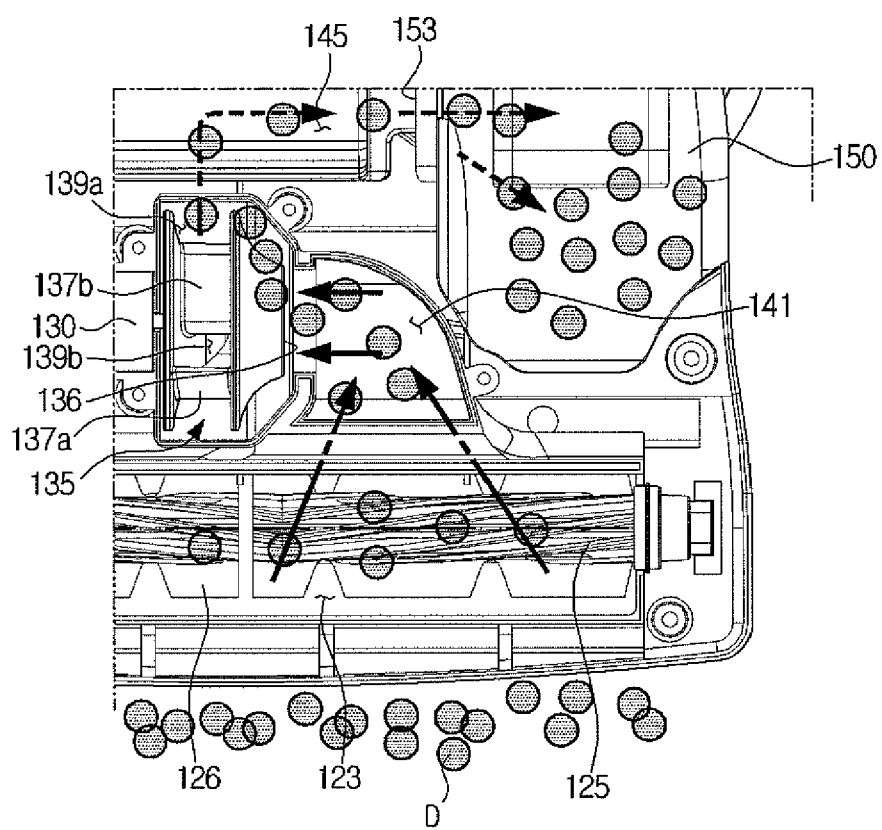


FIG. 13

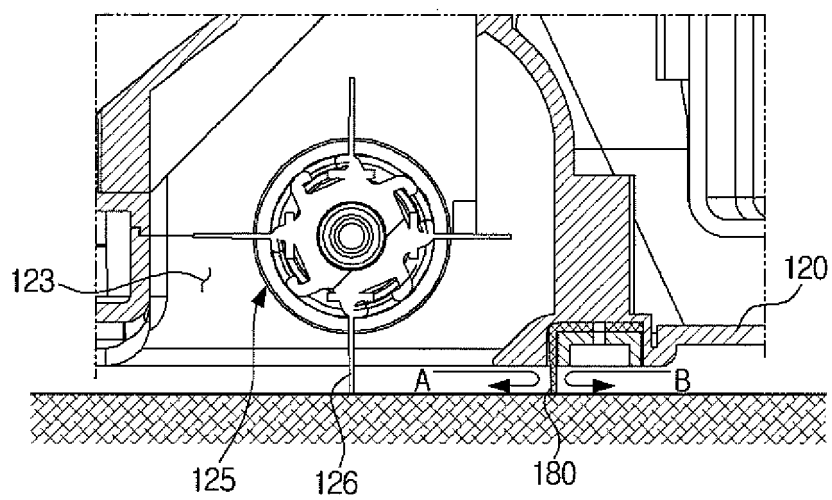


FIG. 14

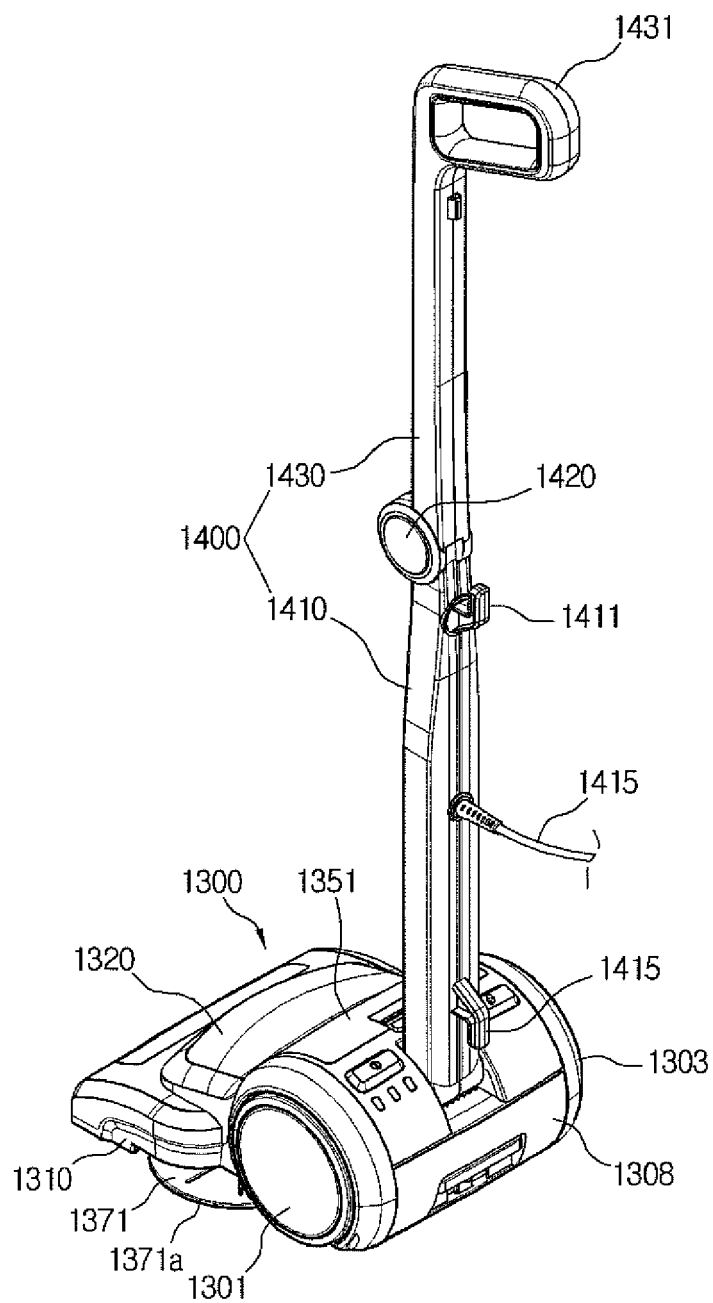


FIG. 15

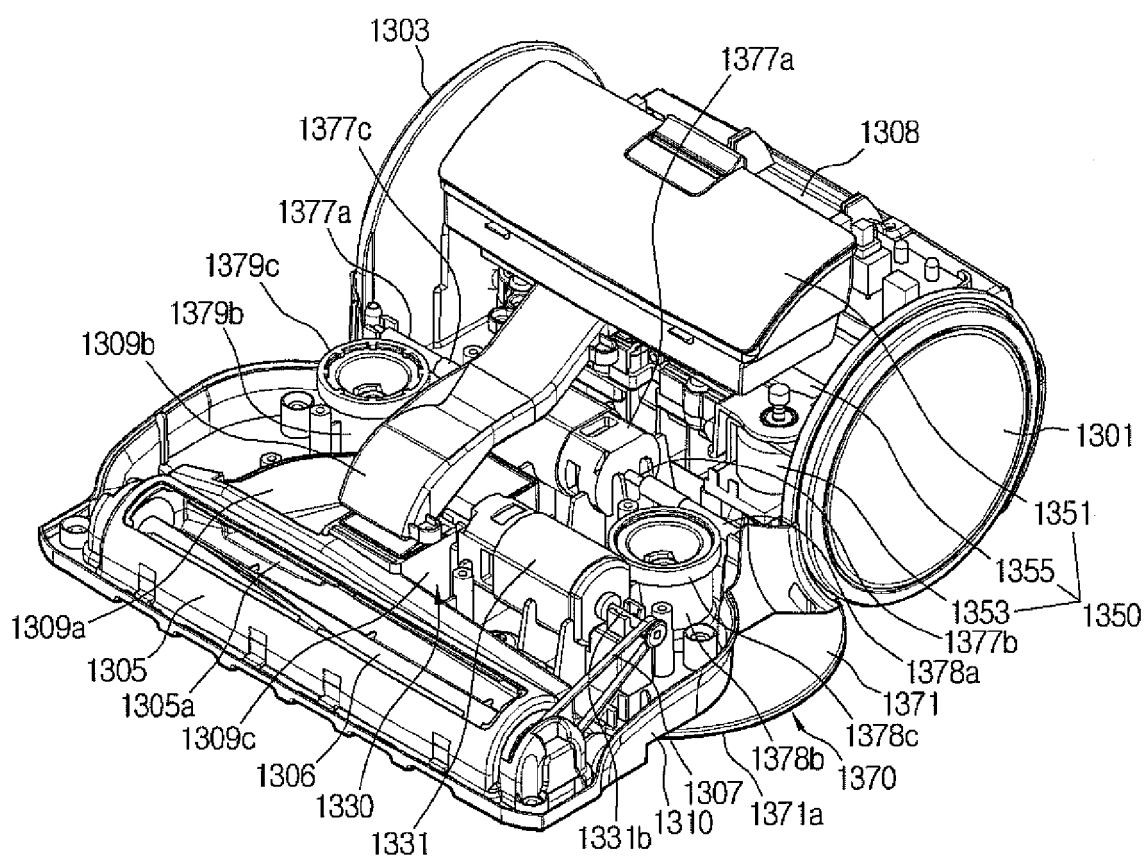


FIG. 16

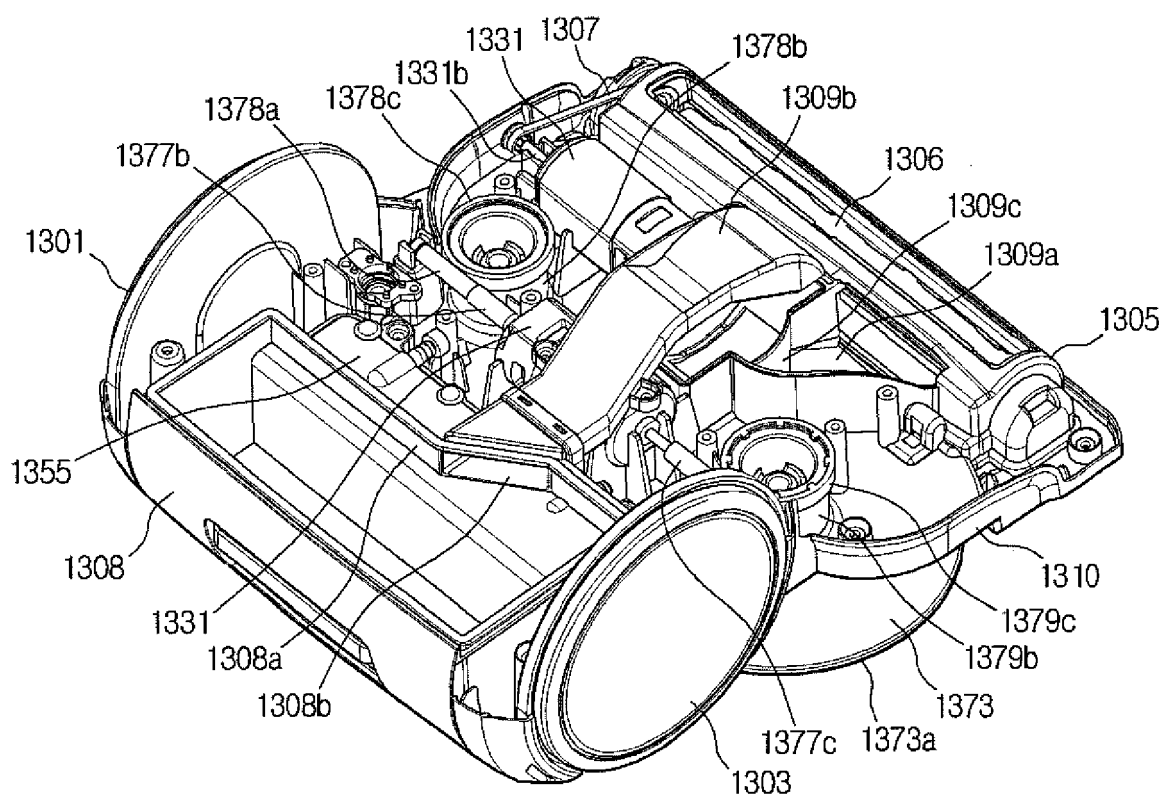


FIG. 17

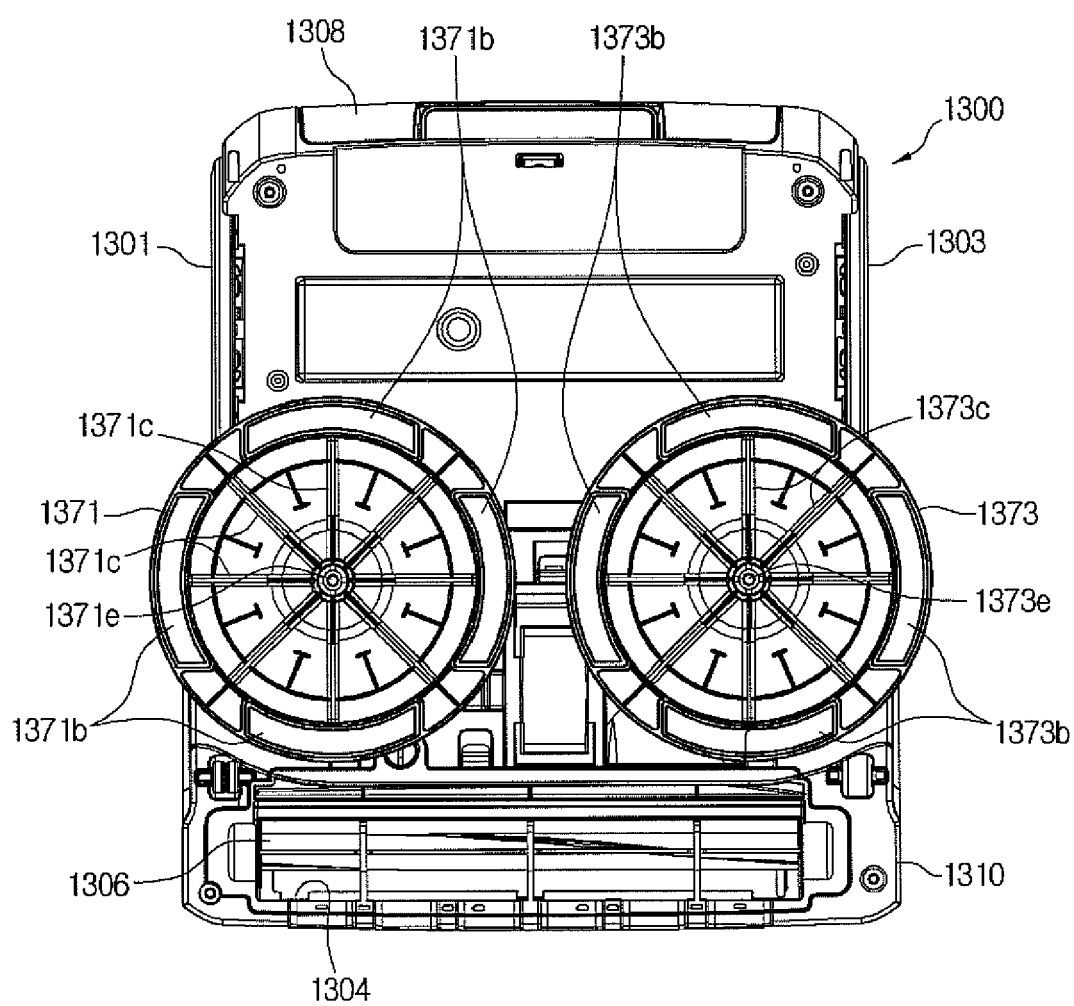


FIG. 18

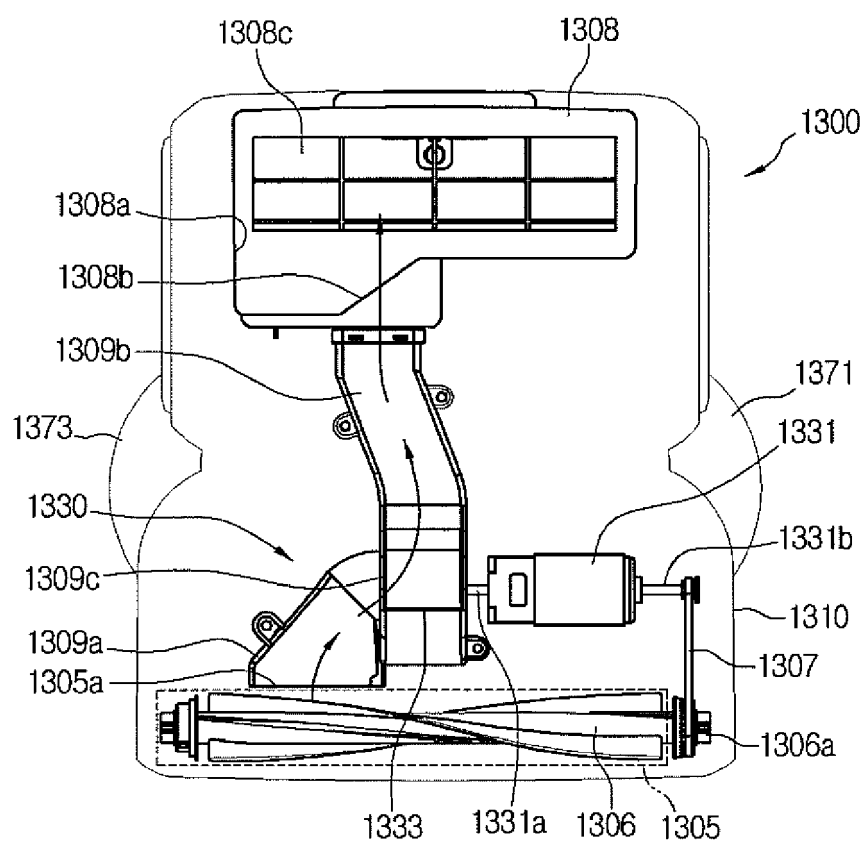


FIG. 19

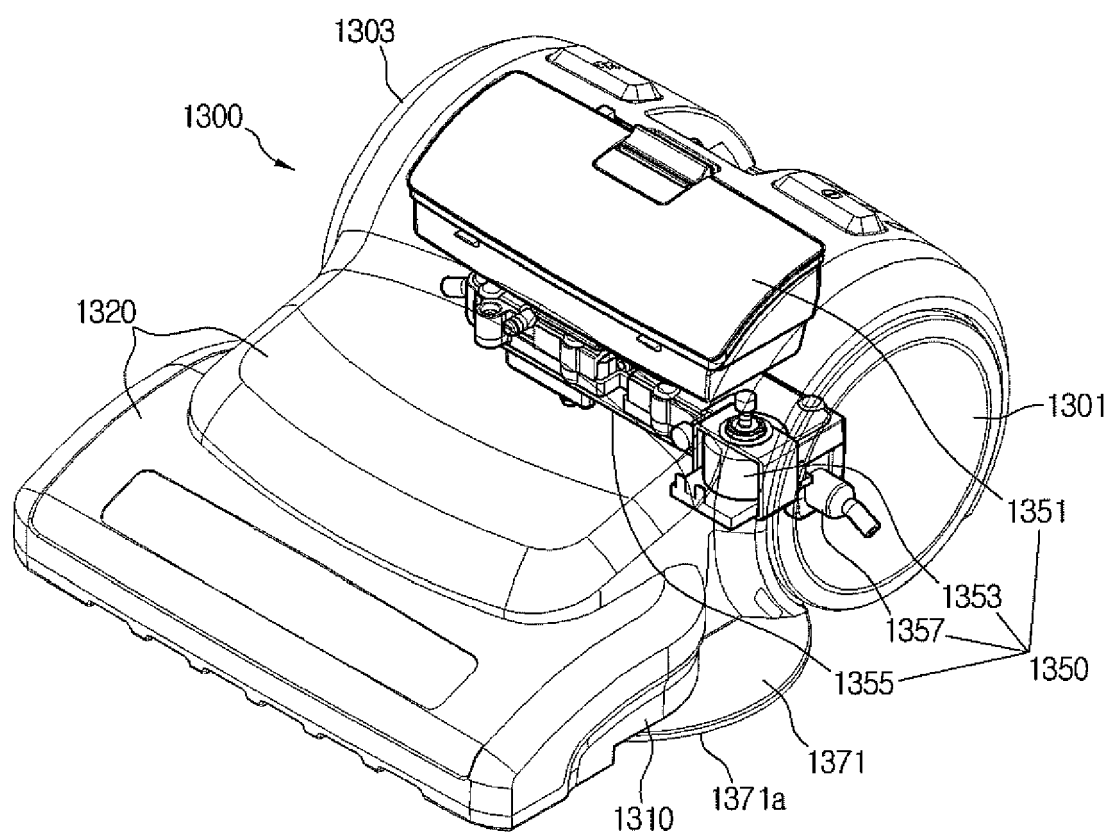


FIG. 20

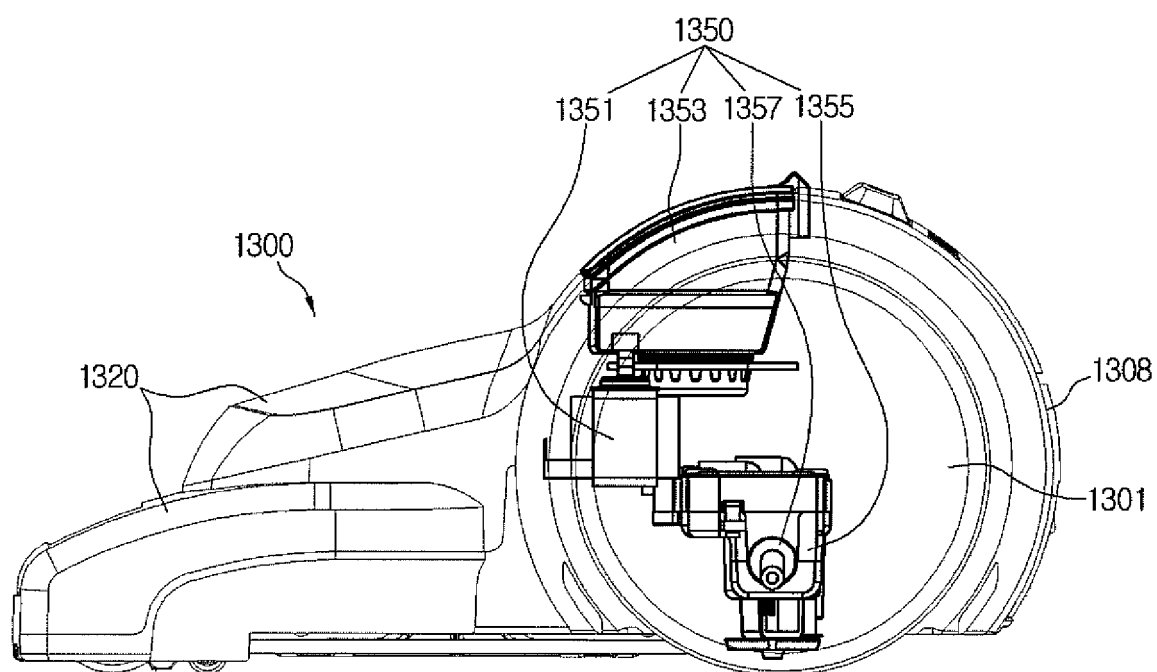


FIG. 21

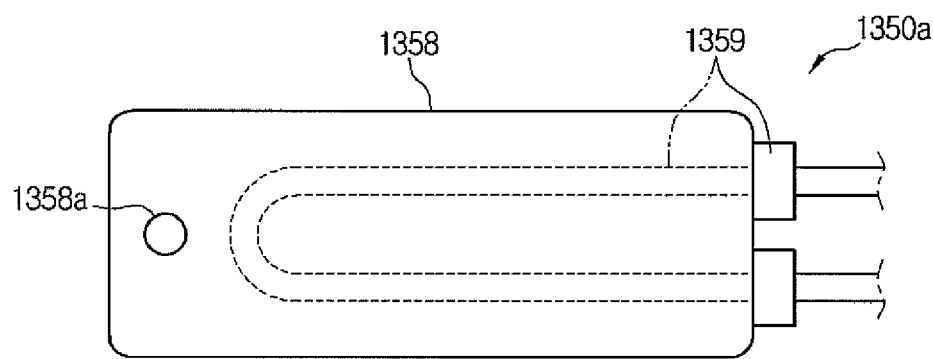


FIG. 22

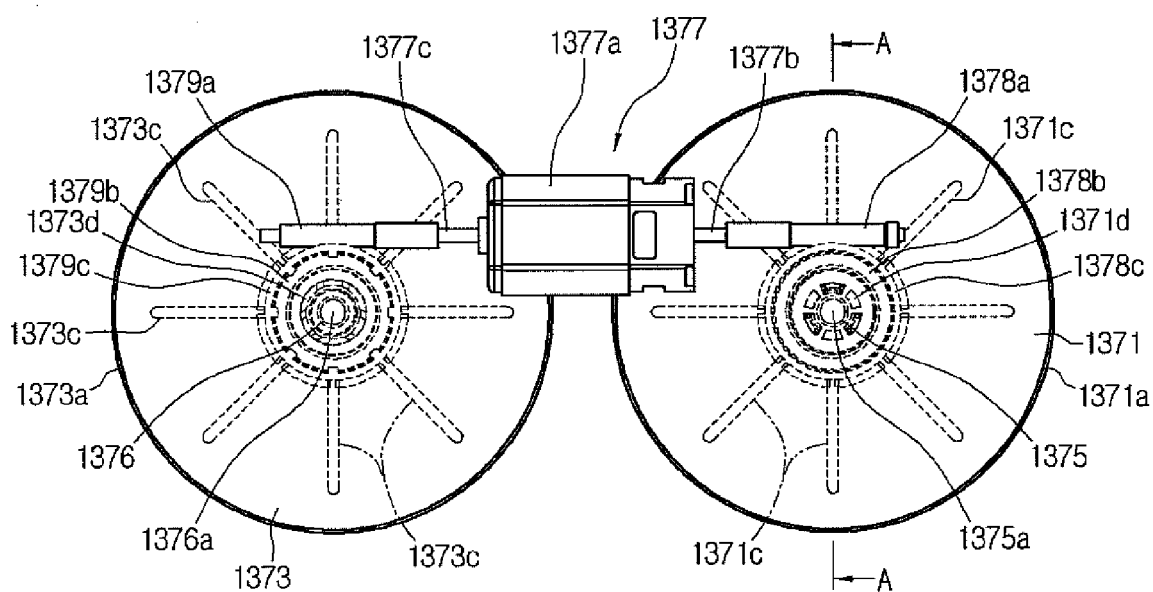


FIG. 23

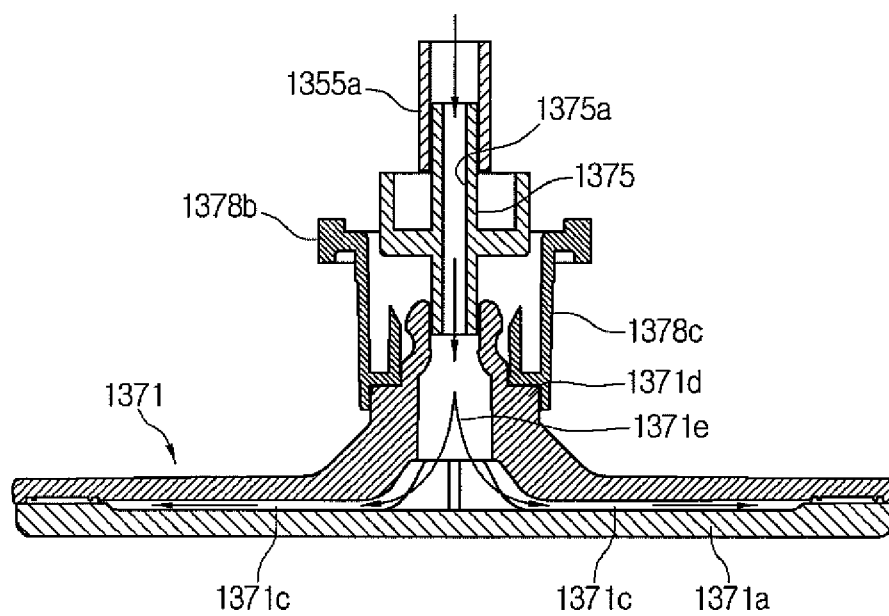
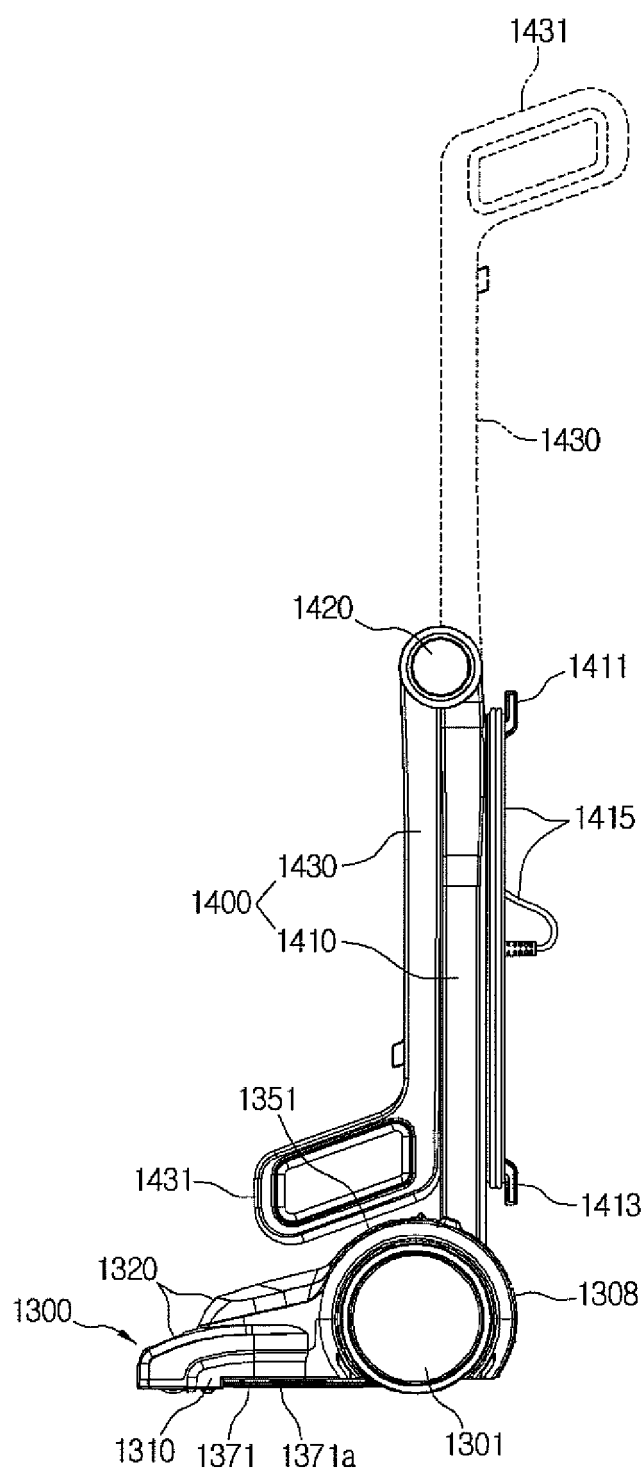


FIG. 24



REFERENCES CITED IN THE DESCRIPTION

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