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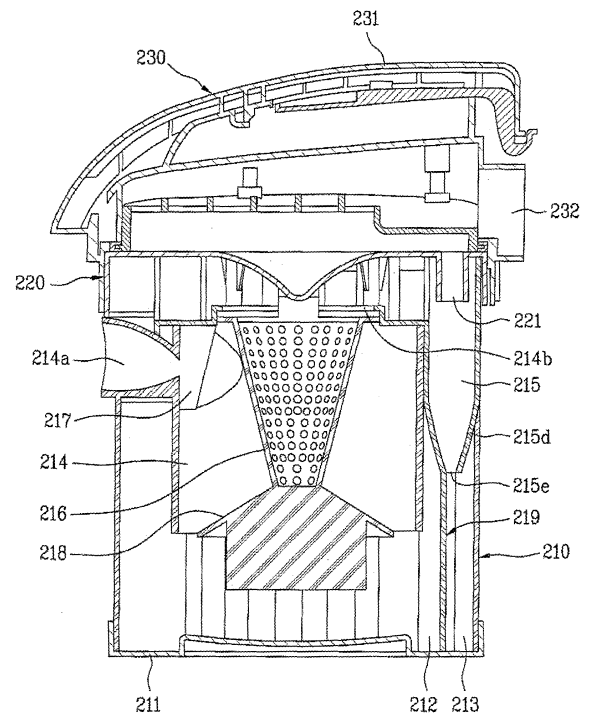
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(54) **APPARATUS FOR COLLECTING DUST AND VACUUM CLEANER HAVING THE SAME**

(57) An apparatus for collecting dust and vacuum cleaner having the same are disclosed, by which dust collecting performance is enhanced. The present invention a cyclone chamber (214) having a substantially cylindrical shape to separate particles from an introduced air and a dust chamber (212) provided under the cyclone chamber to store the dust separated by the cyclone chamber, the dust chamber having an inner circumference indented along a circumferential direction.

FIG. 4



Description

[0001] This application claims the benefit of the Korean Patent Application Nos. P2005-000448 and P2005-000449, filed on January 4, 2005, which are hereby incorporated by reference as if fully set forth herein.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to an apparatus for collecting dust, and more particularly, to an apparatus for collecting dust and vacuum cleaner having the same. Although the present invention is suitable for a wide scope of applications, it is particularly suitable for separating to store dust using a cyclone principle.

Discussion of the Related Art

[0003] Generally, a vacuum cleaner includes an intake nozzle sucking particles such as dust and the like stacked on a room floor, a cleaner body provided with a dust collecting container separating to collect the particles, and a connecting pipe guiding the particles sucked via the intake nozzle to the cleaner body.

[0004] A cyclone is a device for collecting particles contained in air such as dust and the like using a cyclone principle. The cyclone is applicable to various fields. For example, the cyclone is applied to a vacuum cleaner as a home appliance.

[0005] Recently, a dual cyclone collector having a plurality of cyclone parts is used to enhance dust collecting performance.

[0006] A dust collector in a vacuum cleaner according to a related art is explained with reference to FIG. 1 as follows.

[0007] Referring to FIG. 1, a dust collector according to a related art consists of a primary cyclone dust collecting part 10 collecting relatively large dust by sucking polluted air from outside and a secondary cyclone dust collecting part 20 connected to the primary cyclone dust collecting part 10 to collect relatively small dust.

[0008] The primary cyclone dust collecting part 10 is a cylindrical receptacle of which lower end adheres closely to a bottom of the dust collector. In the primary cyclone dust collecting part 10, a first inlet 11 is formed at an upper lateral side to lead the polluted air having particles to be introduced in a tangential direction and a first outlet 12 is provided to a center of an upper end to discharge primarily cleaned air.

[0009] Hence, an upper space of the primary cyclone dust collecting part 10 configures a primary cyclone part 13 that separates particles by a centrifugal force and a lower space of the first cyclone dust collecting part 10 configures a dust chamber 14 storing the particles separated by the centrifugal force.

[0010] The air discharged from the first outlet 12 is in-

troduced into the secondary cyclone dust collecting part 20 and is then discharged upward through a secondary dust-separating process.

[0011] In particular, the secondary cyclone dust collecting part 20 consists of a plurality of small secondary cyclone parts 21 provided to an upper circumference of the primary cyclone dust collecting part 10 in a circumferential direction and a supplementary dust chamber 22 storing dust separated from the secondary cyclone parts 21.

[0012] The supplementary dust chamber 22 is provided under the secondary cyclone parts 21. And, the dust chamber 14 and the supplementary dust chambers 22 are partitioned from each other by a sidewall of the primary cyclone dust collecting part 10.

[0013] However, in the related art dust collector, the dust stored in the dust chamber 14 is scattered by a spiral flow generated from the primary cyclone part 13, whereby dust-collecting performance is degraded.

[0014] And, in the related art dust collector, since a radius of the dust chamber 14 is equal to that of the primary cyclone part 13, a dust-collecting capacity of the dust chamber for separating and storing most of the particles therein is small. Hence, the dust chamber 14 needs to be frequently emptied.

SUMMARY OF THE INVENTION

[0015] Accordingly, the present invention is directed to an apparatus for collecting dust and vacuum cleaner having the same that substantially obviate one or more problems due to limitations and disadvantages of the related art.

[0016] An object of the present invention is to provide an apparatus for collecting dust and vacuum cleaner having the same, by which dust-collecting performance is enhanced.

[0017] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0018] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, an apparatus for collecting dust cleaner according to the present invention includes a cyclone chamber having a substantially cylindrical shape to separate particles from an introduced air and a dust chamber provided under the cyclone chamber to store the dust separated by the cyclone chamber, the dust chamber having an inner circumference indented along a circumferential direction.

[0019] Preferably, a minimal distance of the inner circumference of the dust chamber from an axial line of the

cyclone chamber is greater than a radius of the cyclone chamber and a lower end of the inner circumference of the dust chamber is sealed by a bottom of the dust chamber.

[0020] More preferably, the inner circumference of the dust chamber is parallel to an axial line of the cyclone chamber and is vertical to a bottom of the dust chamber.

[0021] Preferably, the apparatus further includes a supplementary cyclone unit provided under the cyclone chamber to separate the dust from air discharged from the cyclone chamber.

[0022] More preferably, the supplementary cyclone unit includes a plurality of supplementary cyclone chambers provided outside the cyclone chamber in a circumferential direction.

[0023] More preferably, a plurality of the supplementary cyclone chambers are provided to an outer circumference of the cyclone chamber in one body, a dust discharging hole is provided to a lower end of each of the supplementary cyclone chambers.

[0024] More preferably, the apparatus further includes a supplementary dust chamber provided along a circumference of the dust chamber to store the dust discharged downwardly via the dust discharging hole wherein the discharged dust is separated by the corresponding supplementary cyclone chamber.

[0025] More preferably, the dust chamber and the supplementary dust chamber are partitioned from each other by a boundary wall forming the inner circumference of the dust chamber indented in the circumferential direction.

[0026] More preferably, the boundary wall extends from lower ends of the supplementary cyclone chambers.

[0027] More preferably, each of the supplementary cyclone chambers includes a cylindrical chamber provided to the outer circumference of the cyclone chamber in one body, a lower chamber provided to a lower end of the upper chamber to have a diameter decreasing gradually and downwardly.

[0028] More preferably, the dust discharging hole is provided to a lower end of the lower chamber, the boundary wall comprises a plurality of curved portions, an upper end of each of a plurality of the curved portions is connected to the lower end of the corresponding lower chamber, a lower end of each of a plurality of the curved portions is connected to a bottom of the dust chamber, each of a plurality of the curved portions is provided parallel to an axial line of the cyclone chamber, and a cross-section of each of a plurality of the curved portions vertical to the axial line of the cyclone chamber is convex toward an inside of the dust chamber.

[0029] More preferably, the cross-section of each of a plurality of the curved portions vertical to the axial line of the cyclone lower chamber has a same curvature radius of the lower end of the corresponding lower chamber.

[0030] More preferably, the boundary wall further includes a plurality of shield walls shielding gaps between a plurality of the curved portions, respectively.

[0031] More preferably, each of a plurality of the curved portions has a hemi-circular shape and is equally divided by a virtual plane including the axial line of the cyclone chamber and the axial line of the corresponding supplementary cyclone chamber connected to the corresponding curved portion.

[0032] The lower chamber is coaxial with the upper chamber, and an axial line of each of the supplementary cyclone chambers is aligned parallel to that of the cyclone chamber

[0033] More preferably, a maximal distance between an inner lateral side of the boundary wall and the axial line of the cyclone chamber is equal to or smaller than a distance between the axial line of the cyclone chamber and the axial line of one of the supplementary cyclone chambers.

[0034] More preferably, bottoms of the dust chamber and the supplementary dust chamber are formed in one body to configure a bottom of a dust collecting container and the bottom of the dust collecting container can be opened/closed.

[0035] Preferably, the cyclone chamber includes a cylindrical receptacle, a first inlet provided to one side of an upper part of the cylindrical receptacle, a first outlet provided to a center of an upper end of the cylindrical receptacle, a hollow exhaust member detachably provided to the first outlet to communicate with the first outlet, and the exhaust member having a multitude of perforated hole.

[0036] In another aspect of the present invention, a vacuum cleaner includes the above-described apparatus.

[0037] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIG. 1 is a schematic cross-sectional diagram of a dust collector according to a related art;

FIG. 2 is a perspective diagram of a cleaner body of a vacuum cleaner having a dust collector according to one embodiment of the present invention;

FIG. 3 is an exploded perspective diagram of the cleaner body and the dust collector shown in FIG. 2;

FIG. 4 is a cross-sectional diagram of a dust collector according to the present invention;

FIG. 5 is a perspective diagram of a dust collecting container provided to a dust collector according to

one embodiment of the present invention;

FIG. 6 is a perspective diagram of a dust collecting container cover provided to the dust collector according to one embodiment of the present invention shown in FIG. 5; and

FIG. 7 is a perspective diagram of an inside of a dust collector according to the present invention, in which a bottom of the dust collector is disassembled.

DETAILED DESCRIPTION OF THE INVENTION

[0039] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0040] A canister type vacuum cleaner as one embodiment of a vacuum cleaner having a dust collector according to the present invention is explained with reference to FIG. 2 and FIG. 3 as follows.

[0041] FIG. 2 is a perspective diagram of a cleaner body of a vacuum cleaner having a dust collector according to one embodiment of the present invention and FIG. 3 is an exploded perspective diagram of the cleaner body and the dust collector shown in FIG. 2.

[0042] Referring to FIG. 2 and FIG. 3, a vacuum cleaner according to the present invention includes an intake nozzle (not shown in the drawings) moving along a room floor to be cleaned to suck air containing particles, a cleaner body 100 provided separate from the intake nozzle, and a connecting pipe (not shown in the drawings) mutually connecting the intake nozzle to the cleaner body 100 to guide the polluted air sucked via the intake nozzle to the cleaner body 100.

[0043] In this case, a nozzle inlet having a prescribed size is provided to a bottom of the intake nozzle to suck dust piled up on the room floor and the air by an air intake force generated from an air intake device built in the cleaner body 100.

[0044] And, in the cleaner body 100, an electronic part controlling the vacuum cleaner and a motor-fan assembly configuring the air intake device are built.

[0045] In particular, a hose connecting part 110 connected to the connecting pipe is provided to an upper front end of the cleaner body 100, wheels 120 are rotatably provided to both rear sides of the cleaner body 100 to enable the cleaner body 100 to smoothly move on the room floor, respectively, and a caster (not shown in the drawing) as a rotating member for changing a moving direction of the cleaner body 100 is connected to a front bottom of the cleaner body 100.

[0046] A dust collector 200 for collecting dust is detachably provided to a front side of the cleaner body 100. The dust collector 200 plays a role in collecting dust by separating particles from the air introduced into the dust collector 200 via the intake nozzle and the connecting pipe.

[0047] The air discharged from the dust collector 200 is discharged to a rear side of the cleaner body 100 via a prescribed passage configured within the cleaner body 100 and the motor-fan assembly (not shown in the drawing).

[0048] A dust collector 200 according to one embodiment of the present invention is explained with reference to FIGs. 4 to 7 as follows.

[0049] FIG. 4 is a cross-sectional diagram of a dust collector according to the present invention, FIG. 5 is a perspective diagram of a dust collecting container provided to a dust collector according to one embodiment of the present invention, FIG. 6 is a perspective diagram of a dust collecting container cover provided to the dust collector according to one embodiment of the present invention shown in FIG. 5, and FIG. 7 is a perspective diagram of an inside of a dust collector according to the present invention, in which a bottom of the dust collector is disassembled.

[0050] Referring to FIGs. 4 to 7, a dust collector 200 according to one embodiment of the present invention includes a dust collecting container 210 separating to store dust, a dust collecting container cover 220 opening/closing one end of the dust collecting container 210, and more particularly, an upper end of the dust collecting container 210, and an upper cover 230 detachably joined to the dust collecting container cover 220 to have a dust collector grip 231 at its upper surface.

[0051] In this case, a primary dust collecting part and a secondary dust collecting part are provided within the dust collecting container 210 to collect dust by separating particles such as dust and the like. And, a bottom of the dust collecting container 210 includes a lower panel 211 that can be opened/closed.

[0052] The primary dust collecting part includes a cyclone chamber 214 and a dust chamber 212 storing the dust separated from the cyclone chamber 214. And, the cyclone chamber 214 substantially includes a cylindrical receptacle.

[0053] In this case, the cyclone chamber 214 separates dust from the air introduced into the chamber 214 using the cyclone principle. In particular, the cyclone chamber 214 plays a role in separating dust using a difference between centrifugal forces applied to the dust and the air, respectively.

[0054] And, the secondary dust collecting part includes a supplementary cyclone unit provided under the cyclone chamber 214 and a supplementary dust chamber 213 storing the dust separated from the supplementary cyclone unit.

[0055] The supplementary cyclone unit includes a plurality of supplementary cyclone chambers 215 separating dust by the cyclone principle. In the present invention, a plurality of the supplementary cyclone chambers 215 are arranged along an outer circumference of the cyclone chamber 214 in a circumferential direction.

[0056] In particular, the cyclone chamber 214 has a cylindrical receptacle shape of which lower end is open.

A first inlet 214a communicating with the hose connecting part 110 is provided to an upper lateral side of the cyclone chamber 214. And, a first outlet 214b perforated in a vertical direction is formed at a center of an upper end of the cylindrical receptacle.

[0057] In this case, the first inlet 214a guides the polluted air introduced from outside in a tangential direction to an inner wall of the cyclone chamber 214. Hence, the air introduced into the first inlet 214a can flow spirally along the inner wall of the cyclone chamber 214.

[0058] A plurality of the supplementary cyclone chambers 215 are built in one body of an outer wall of the cyclone chamber 214. In particular, a plurality of the supplementary cyclone chambers 215 are arranged on an upper circumference of the cyclone chamber 214 in a circumferential direction. An upper end of each of the supplementary cyclone chambers 215 is projected higher than that of the cyclone chamber 214.

[0059] Meanwhile, a lateral side of each of the supplementary cyclone chambers 215 projected higher than the upper end of the cyclone chamber 214 is vertically cut in part to configure a second inlet 215a communicating with the first outlet 214b. And, an upper end of each of the supplementary cyclone chambers 215 is open to configure a second outlet 215b.

[0060] In particular, to enable the air introduced into the second inlet 215a to flow along an inner wall of the corresponding supplementary cyclone chamber 215, the second inlet 215a guides the air discharged from the first outlet 214b in a tangential direction to the inner wall of the supplementary cyclone chamber 215.

[0061] Preferably, a guide vane 215c is built in one body of an outer sidewall of the second inlet 215a to extend toward the first outlet 214b.

[0062] Meanwhile, it is preferable that each of the supplementary cyclone chambers 215 is vertically provided to the outer circumference of the cyclone chamber 214 to have an axial line parallel to that of the cyclone chamber 214.

[0063] And, a dust discharging hole 215e is provided to a lower end of the supplementary cyclone chamber 215 to discharge dust having been separated by the corresponding supplementary cyclone chamber 215.

[0064] In particular, each of the supplementary cyclone chambers 215 includes a cylindrical upper chamber formed on the outer circumference of the cyclone chamber 214 and a lower chamber 215d built in one body of a lower end of the upper end.

[0065] Preferably, the lower chamber 215 has a decreasing diameter downwardly and is aligned on a same axis of the upper chamber.

[0066] A lower end of the lower chamber 215d configures a lower end of the supplementary cyclone chamber 215. And, the lower end of the lower chamber 215d is vertically perforated by the dust discharging hole 215e so that the dust separated by the supplementary cyclone chamber 215 can be downwardly discharged.

[0067] In this case, the upper chambers of the supplementary cyclone chambers 215 are built in one body to be adjacent to one another. Hence, air is prevented from leaking between the supplementary cyclone chambers 215.

[0068] The dust collecting container cover 220 is mounted on the upper ends of the supplementary cyclone chambers 215.

[0069] Third outlets 221, which are vertically perforated, are provided to a rim of the dust collecting container cover 220 to oppose the second outlets 215b of the supplementary cyclone chambers 215, respectively.

[0070] The upper cover 230 having an open lower end is detachably assembled to an upper part of the dust collecting container cover 220.

[0071] For this, three hanging protrusions 222 are provided to an outer circumference of the dust collecting container cover 220. And, three hanging recesses (not shown in the drawings) are provided to an inner circumference of the upper cover 230 so that the hanging protrusions 222 can be fitted into the hanging recesses, respectively. It is a matter of course that the positions and shapes of the hanging protrusions and recesses can be variously modified.

[0072] A fourth outlet 232 is provided to a rear side of the upper cover 230 to discharge air to a prescribed passage provided to a rear part of the cleaner body 100. And, a prescribed space is provided within the upper cover 230 to communicate with the fourth outlet 232.

[0073] Preferably, a filter accommodating portion is provided to the inner space of the upper cover 230 to accommodate a filter (not shown in the drawing) filtering off micro-dust from the air discharged via the third outlets 221.

[0074] The dust having been separated by the above-configured cyclone chamber 214 and the above-configured supplementary cyclone chambers 215 is preferentially stored in the dust chamber 212 and the supplementary dust chambers 213 and is then discharged outside by gravity if the lower panel 211 forming the bottom of the dust collecting container 210 is open.

[0075] Meanwhile, the dust chamber 212 stores the dust separated by the cyclone chamber 214. And, the supplementary dust chamber 213 is provided along a circumference of the dust chamber 212 to store the dust downwardly discharged via the dust discharging holes 215e.

[0076] Preferably, in addition to the above-explained configuration of the vacuum cleaner according to the present invention, the cyclone chamber 214 further includes a hollow exhaust member 216 having a multitude of perforated holes to communicate with the first outlet 214b and a guide rib 217 provided to the cylindrical receptacle of the cyclone chamber 214 to guide the air introduced via the first inlet 214a.

[0077] In this case, the exhaust member 216 is detachably connected to the first outlet 214b and is vertically provided within the cyclone unit.

[0078] And, the exhaust member 216 preferably has

an approximately conoid shape, of which upper end is open and of which lower end is closed, having a downwardly decreasing diameter.

[0079] This is to prevent the dust descending along the inner wall of the cyclone chamber 214 from being affected by a sucking force of the exhaust member 216 since a speed of a spiral flow tends to decrease toward a lower side of the cyclone chamber 214.

[0080] Preferably, a ring type sealing member is provided to sustain airtightness between an upper end of the exhaust member 216 and the first outlet 214b.

[0081] Preferably, a scatter-preventing member 218 is provided beneath the exhaust member 216 to prevent the dust stored in the dust chamber 212 from being scattered.

[0082] The scatter-preventing member 218 plays a role in preventing the dust collected in the dust chamber 212 from ascending by a spiral flow to be introduced into the supplementary cyclone chambers 215.

[0083] For this, the scatter-preventing member 218 is preferably provided to the lower end of the exhaust member 216 to have a shape extending radially.

[0084] Preferably, an upper surface of the scatter-preventing member 218 is tilted downwardly. In particular, the scatter-preventing member 218 has a conoid shape having a diameter increasing downwardly.

[0085] The guide rib 217 is configured to guide the air introduced into the first inlet 214a in a tangential direction to the inner wall of the cyclone chamber 214 so that the air introduced into the first inlet 214a is prevented from being directly introduced into the exhaust member 216.

[0086] Meanwhile, the dust chamber 212 is provided under the cyclone chamber 214 and an inner circumference of the dust chamber 212 is preferably curved in a circumferential direction.

[0087] Preferably, a distance of the inner circumference of the dust chamber 212 from an axial line of the cyclone chamber 24 is greater than a radius of the cyclone chamber 214.

[0088] As mentioned in the foregoing description, if a minimal distance between the inner circumference of the dust chamber 212 and the axial line of the cyclone chamber 214 is greater than the radius of the cyclone chamber 214, the dust spirally flowing along the inner wall of the cyclone chamber 214 passes through the lower end of the cyclone chamber 214 and then radially spreads. So, the influence of the discharged air flow via the exhaust member is minimized. Hence, the inner circumference of the dust chamber 212 can be configured not to have a curved shape.

[0089] Yet, to maximize the dust collecting performance of the dust collector according to the present invention, the inner circumference of the dust chamber 212 is preferably configured to have a curved shape.

[0090] And, the inner circumference of the dust chamber 212 is aligned parallel to the axial line of the cyclone chamber 214 and is preferably configured vertical to the bottom of the dust chamber 212, i.e., an upper surface

of the lower panel 211 configuring the bottom of the dust collector.

[0091] Meanwhile, the dust chamber 212 and the supplementary dust chamber 213 are partitioned by a boundary wall 219 provided within the dust collecting container 210.

[0092] In this case, the supplementary dust chamber 213 is configured by the boundary wall 219 and an outer wall of the dust collecting container 210.

[0093] A radius of the boundary wall 219 is smaller than that of the outer wall of the dust collecting container 210 and is curved in a circumferential direction. Hence, an inner lateral side of the boundary wall 219 configures the inner circumference of the dust chamber 212.

[0094] Preferably, the boundary wall 219 is provided under the supplementary cyclone chambers 215 in one body. More preferably, the boundary wall 219 extends from each lower end of the supplementary cyclone chambers 215.

[0095] In particular, the boundary wall 219 includes a plurality of curved portions 219b.

[0096] In this case, upper ends of a plurality of the curved portions 219b are connected to lower ends of the lower chambers 215d, respectively and lower ends of a plurality of the curved portions 219b are connected to the lower panel 211 configuring the bottom of the dust chamber 212.

[0097] As mentioned in the foregoing description, the lower panel 211 configures the bottoms of the dust chamber 212 and the supplementary dust chamber 213.

[0098] The plurality of the curved portions 219b are provided parallel to axial lines of the cyclone 214. And, a cross-section, which is vertical to the axial line of the cyclone chamber 214, of each of the curved portions 219b is configured convex toward an inside of the dust chamber 212.

[0099] In case that the axial line of the cyclone chamber is parallel to axial lines of the supplementary cyclone chambers 215 as described above, the plurality of the curved portions 219b are provided parallel to axial lines of the lower chambers 215, respectively.

[0100] Preferably, each of the curved portions 219b has a cross-section that is vertical to the axial line of the corresponding lower chamber 215d to have an arc shape of which curvature radius is equal to that of the lower end of the corresponding lower chamber 215d.

[0101] In particular, each of the curved portions 219b has a curvature radius approximately equal to that of the rim of the dust discharging hole 215e provided to the lower end of the corresponding supplementary cyclone chamber 215.

[0102] In this case, a maximal distance between the inner lateral side of the boundary wall 219 and the axial line of the cyclone chamber 214, i.e., a distance between the axial line of the cyclone chamber 214 and each recess 219a between the curved portions 219b is preferably equal to or smaller than the distance between the axial line of the cyclone chamber 214 and the axial line of the

corresponding supplementary cyclone chamber 215.

[0103] Preferably, each of the curved portions 219b has a hemi-circular shape that is equally divided by a virtual plane including the axial line of the cyclone chamber 214 and the axial line of the corresponding supplementary cyclone chamber 215.

[0104] So, the maximal distance between the inner lateral side of the boundary wall and the axial line of the cyclone chamber 214 becomes approximately equal to the distance between the axial line of the cyclone chamber 214 and the axial line of the supplementary cyclone chamber 215.

[0105] In the present invention, the boundary wall 219 is formed in one body of the lower end of the supplementary cyclone chamber 215 and the supplementary cyclone chamber 215 includes the lower chamber 215d having the approximately conoid shape. Hence, gaps exist between the curved portions 215b.

[0106] In the present embodiment, the boundary wall 219 further includes a plurality of shield walls 219c shielding the gaps between a plurality of the curved portions 219b, respectively.

[0107] So, the shield walls 219c configure inner walls of the recesses 219a formed on the inner circumference of the boundary wall 219. The boundary wall 219 is curved in a circumferential direction and the recesses 219a are arranged in the circumferential direction to vertically extend long.

[0108] By the above-explained configuration, a dust accommodating space of the dust chamber 212 storing most of the particles and large-size particles can be maximized.

[0109] Namely, the boundary wall 219 increases the dust storing space of the dust chamber 212 as well as prevents the dust chamber 212 from communicating with the supplementary dust chamber 213.

[0110] And, the boundary wall 219 prevents the dust stored in the dust chamber 212 from being scattered by the spiral flow generated from the cyclone chamber 214.

[0111] In the present embodiment, the boundary wall 219 is approximately configured to be connected to the lower ends of the conoid lower chambers 215d. Alternatively, the boundary wall 219 can be configured to be connected to the lower ends of the cylindrical supplementary cyclone chambers overall.

[0112] An operation of the vacuum cleaner having the dust collector according to one embodiment of the present invention is explained as follows.

[0113] First of all, once the vacuum cleaner is driven, external polluted air is introduced into the cyclone chamber 214 via the intake nozzle and the connecting pipe.

[0114] The air introduced into the cyclone chamber 214 is not directly introduced into the exhaust member 216 by the first inlet 214a and the guide rib 217 but is guided in the direction tangential to the inner wall of the cyclone chamber 214 to form the spiral flow.

[0115] According to the cyclone principle, the relatively large and heavy dust is separated and falls to be stored

in the dust chamber 212. The dust stored in the dust chamber 212 is prevented from being scattered by the scatter-preventing member 218 and the boundary wall 219 having the curved inner circumference.

[0116] The air, from which the relatively large dust was separated, is discharged to the first outlet 214b communicating with a multitude of the perforated holes provided to the lateral side of the exhaust member 218 and is then introduced into a plurality of the supplementary cyclone chambers 215 for dust separation.

[0117] The air, from which the relatively small dust was separated by the supplementary cyclone chambers 215, is introduced into the upper cover 230 via the second outlets 215b and the third outlets 221.

[0118] The air introduced into the upper cover 230 is filtered by the filter and is then discharged to a rear side via the fourth outlet 232. The air discharged from the fourth outlet 232 passes through the prescribed passage provided to the rear part of the cleaner body and is then discharged outside the cleaner body.

[0119] Meanwhile, the above-explained dust collector according to the present invention is applicable to a canister type vacuum cleaner or a stand type cleaner.

[0120] Accordingly, the present invention provides the following effects or advantages.

[0121] First of all, in the dust collector of the vacuum cleaner according to the present invention, since the sidewall of the dust chamber is curved in the circumferential direction, the spiral flow is prevented from occurring in the dust storing part. Hence, it is able to prevent the stored particles from being scattered.

[0122] Secondly, by the dust collector of the vacuum cleaner according to the present invention, the dust collecting space of the dust chamber storing most of the particles is maximized to increase the dust collecting capacity.

[0123] Thirdly, in the dust collector of the vacuum cleaner according to the present invention, since a plurality of the supplementary cyclone chambers are provided to the circumference of the cyclone chamber, the dust collector can have a compact configuration and dust collecting performance is enhanced.

[0124] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

Claims

1. An apparatus for collecting dust, comprising:

a cyclone chamber (214) having a substantially cylindrical shape to separate particles from an introduced air; and

- a dust chamber (212) provided under the cyclone chamber (214) to store the dust separated by the cyclone chamber (214), the dust chamber (212) having an inner circumference indented along a circumferential direction.
2. The apparatus of claim 1, wherein a minimal distance of the inner circumference of the dust chamber (212) from an axial line of the cyclone chamber (214) is greater than a radius of the cyclone chamber (214) and wherein a lower end of the inner circumference of the dust chamber (212) is sealed by a bottom of the dust chamber (212).
 3. The apparatus of claim 2, wherein the inner circumference of the dust chamber (212) is parallel to an axial line of the cyclone chamber (214) and is vertical to a bottom of the dust chamber (212).
 4. The apparatus of any one of claims 1 to 3, further comprising a supplementary cyclone unit provided outside the cyclone chamber (214) to separate the dust from air discharged from the cyclone chamber (214).
 5. The apparatus of claim 4, the supplementary cyclone unit comprising a plurality of supplementary cyclone chambers (215) provided outside the cyclone chamber (214) in a circumferential direction.
 6. The apparatus of claim 5, wherein a plurality of the supplementary cyclone chambers (215) are provided to an outer circumference of the cyclone chamber (214) in one body, wherein a dust discharging hole (215e) is provided to a lower end of each of the supplementary cyclone chambers (215).
 7. The apparatus of claim 6, further comprising a supplementary dust chamber (213) provided along a circumference of the dust chamber (212) to store the dust discharged downwardly via the dust discharging hole (215e) wherein the discharged dust is separated by the corresponding supplementary cyclone chamber (215).
 8. The apparatus of claim 7, wherein bottoms of the dust chamber (212) and the supplementary dust chamber (213) are formed in one body to configure a bottom of a dust collecting container and wherein the bottom of the dust collecting container can be opened/closed.
 9. The apparatus of claim 7 or 8, wherein the dust chamber (212) and the supplementary dust chamber (213) are partitioned from each other by a boundary wall (219) forming the inner circumference of the dust chamber (212) indented in the circumferential direction.
 10. The apparatus of claim 9, wherein a maximal distance between an inner lateral side of the boundary wall (219) and the axial line of the cyclone chamber (214) is equal to or smaller than a distance between the axial line of the cyclone chamber (214) and the center of the lower end of one of the supplementary cyclone chambers (215).
 11. The apparatus of claim 9 or 10, wherein the boundary wall (219) extends from lower ends of the supplementary cyclone chambers (215).
 12. The apparatus of any one of claims 4 to 11, each of the supplementary cyclone chambers (215) comprising:
 - a cylindrical chamber provided to the outer circumference of the cyclone chamber (214) in one body; and
 - a lower chamber (215d) provided to a lower end of the upper chamber to have a diameter decreasing gradually and downwardly.
 13. The apparatus of claim 12 in combination with claims 6, 7, 9 and 11, wherein the dust discharging hole (215e) is provided to a lower end of the lower chamber (215d), wherein the boundary wall (219) comprises a plurality of curved portions (219b), wherein an upper end of each of a plurality of the curved portions (219b) is connected to the lower end of the corresponding lower chamber (215d), wherein a lower end of each of a plurality of the curved portions (219b) is connected to a bottom of the dust chamber (212), wherein each of a plurality of the curved portions (219b) is provided parallel to an axial line of the cyclone chamber (214), and wherein a cross-section of each of a plurality of the curved portions (219b) vertical to the axial line of the cyclone chamber (214) is convex toward an inside of the dust chamber (212).
 14. The apparatus of claim 13, wherein the cross-section of each of a plurality of the curved portions (219b) vertical to the axial line of the cyclone chamber (214) has a same curvature radius of the lower end of the lower chamber (215d).
 15. The apparatus of claim 14, the boundary wall (219) further comprising a plurality of shield walls (219c) shielding gaps between a plurality of the curved portions (219b), respectively.
 16. The apparatus of claim 13, 14 or 15, wherein the cross-section of each of the curved portions (219b) has a hemi-circular shape and is equally divided by a virtual plane including the axial line of the cyclone chamber (214) and the axial line of the corresponding supplementary cyclone chamber (215) connected to the corresponding curved portion (219b).

17. The apparatus of any one of claims 12 to 16, wherein the lower chamber (215d) is coaxial with the upper chamber, and wherein an axial line of each of the supplementary cyclone chambers (215) is aligned parallel to that of the cyclone chamber (214). 5
18. The apparatus of any one of claims 1 to 17, the cyclone chamber (214) comprising:
- a cylindrical receptacle; 10
 - a first inlet (214a) provided to one side of an upper part of the cylindrical receptacle;
 - a first outlet (214b) provided to a center of an upper end of the cylindrical receptacle; and
 - a hollow exhaust member (216) detachably provided to the first outlet (214b) to communicate with the first outlet (214b), the exhaust member (216) having a multitude of perforated holes. 15
19. A vacuum cleaner including the apparatus for collecting dust of any one of claims 1 to 18. 20

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FIG. 1

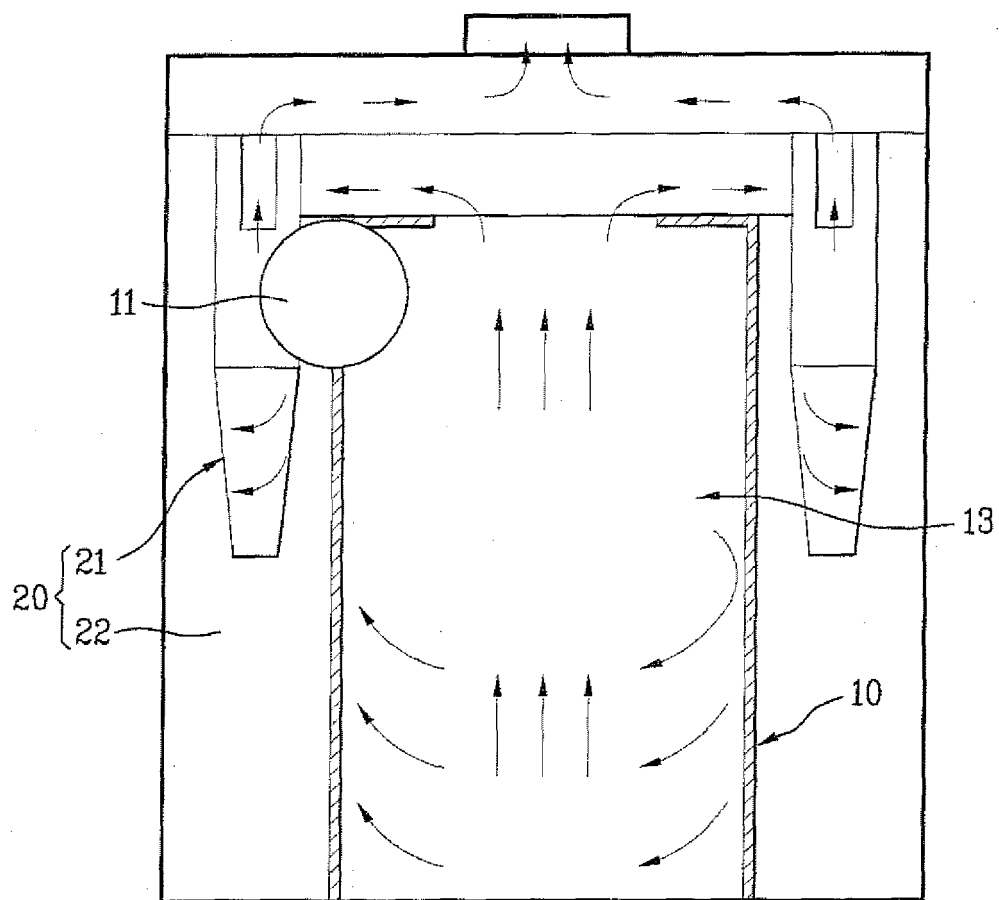


FIG. 2

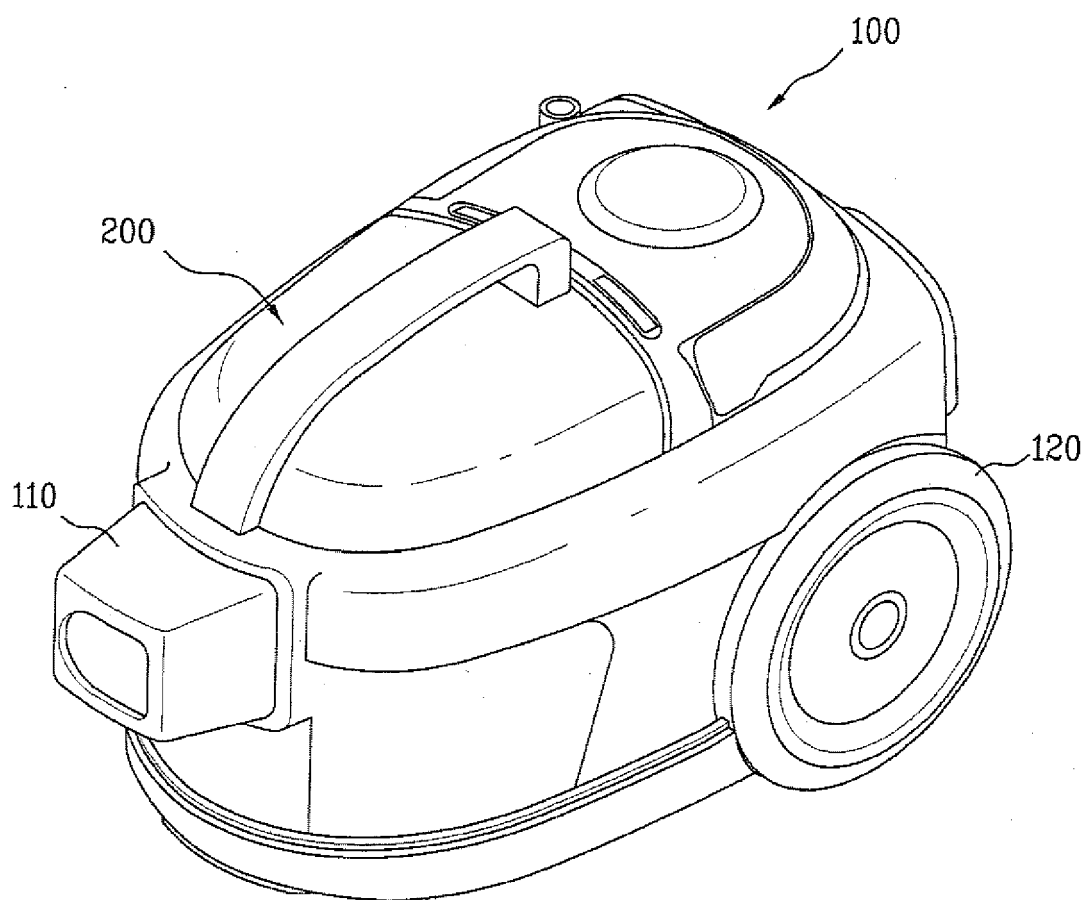


FIG. 3

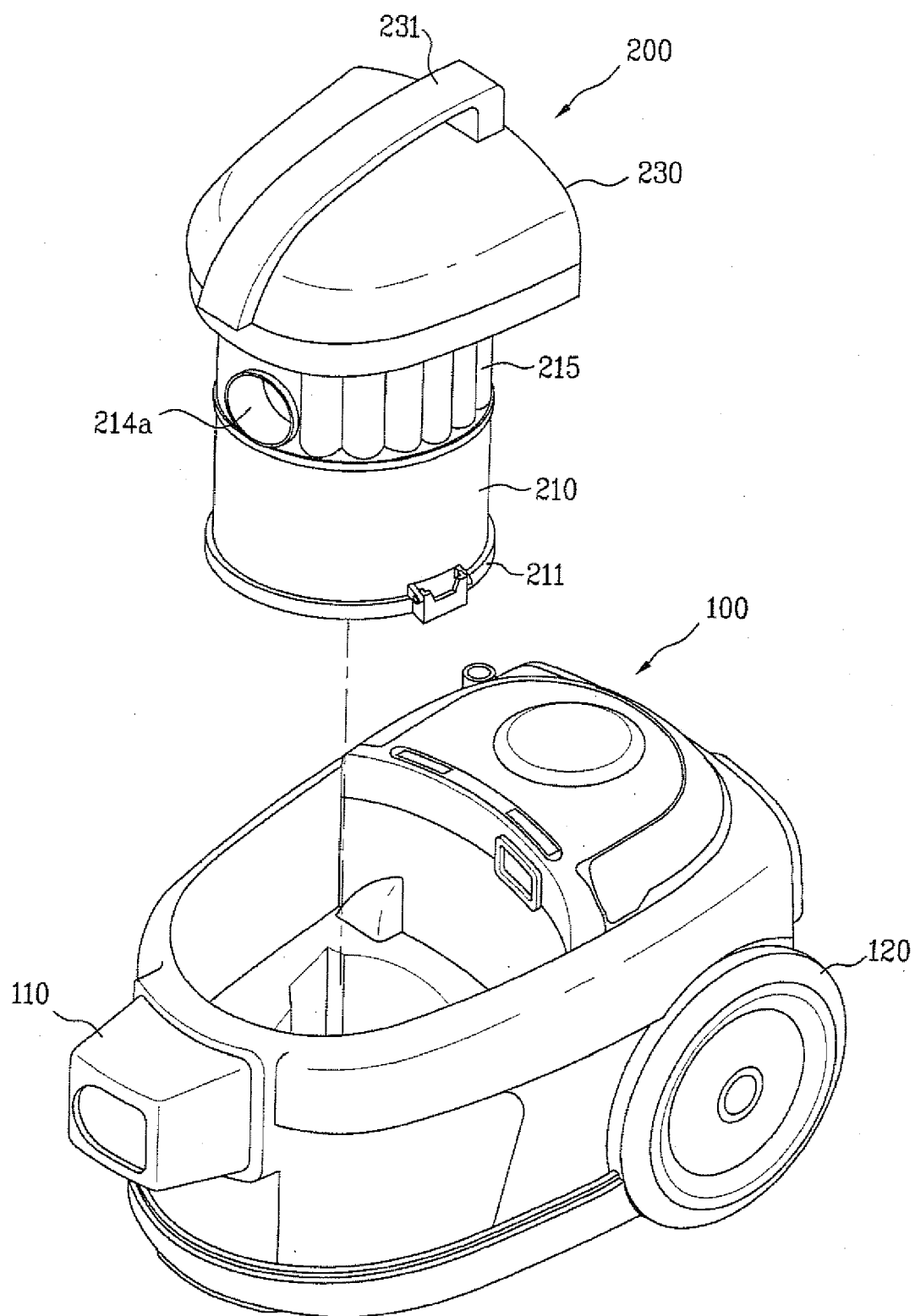


FIG. 4

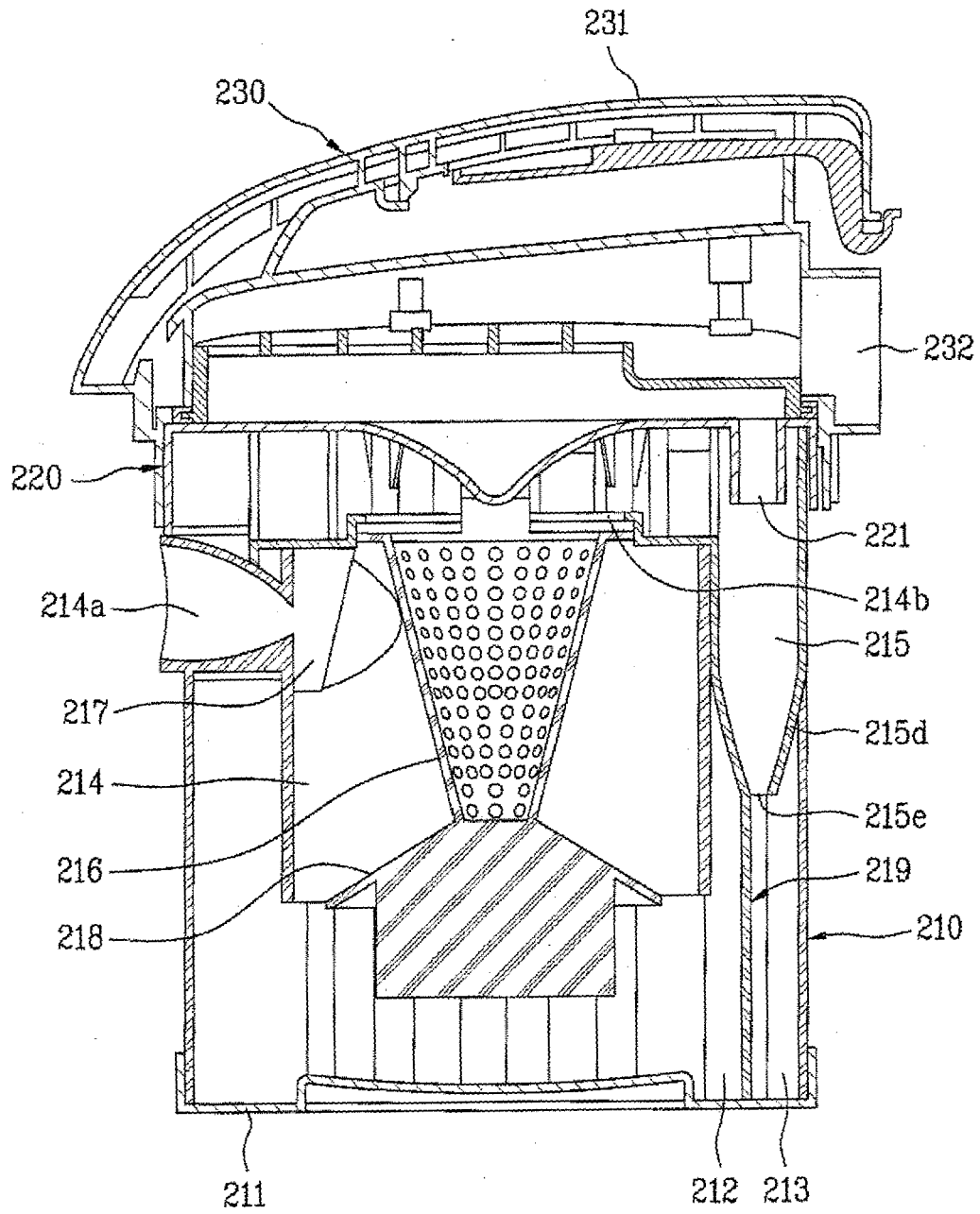


FIG. 5

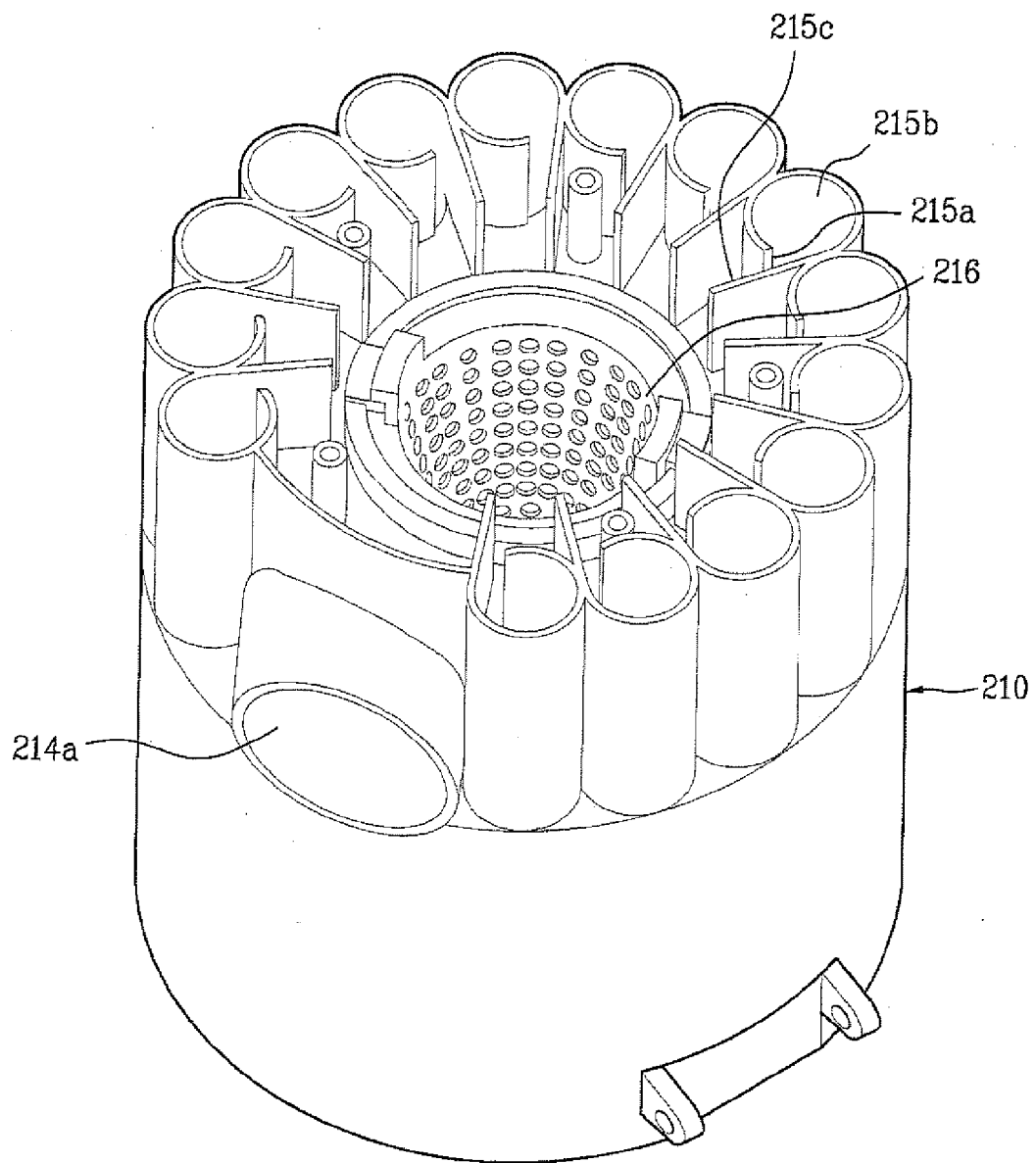


FIG. 6

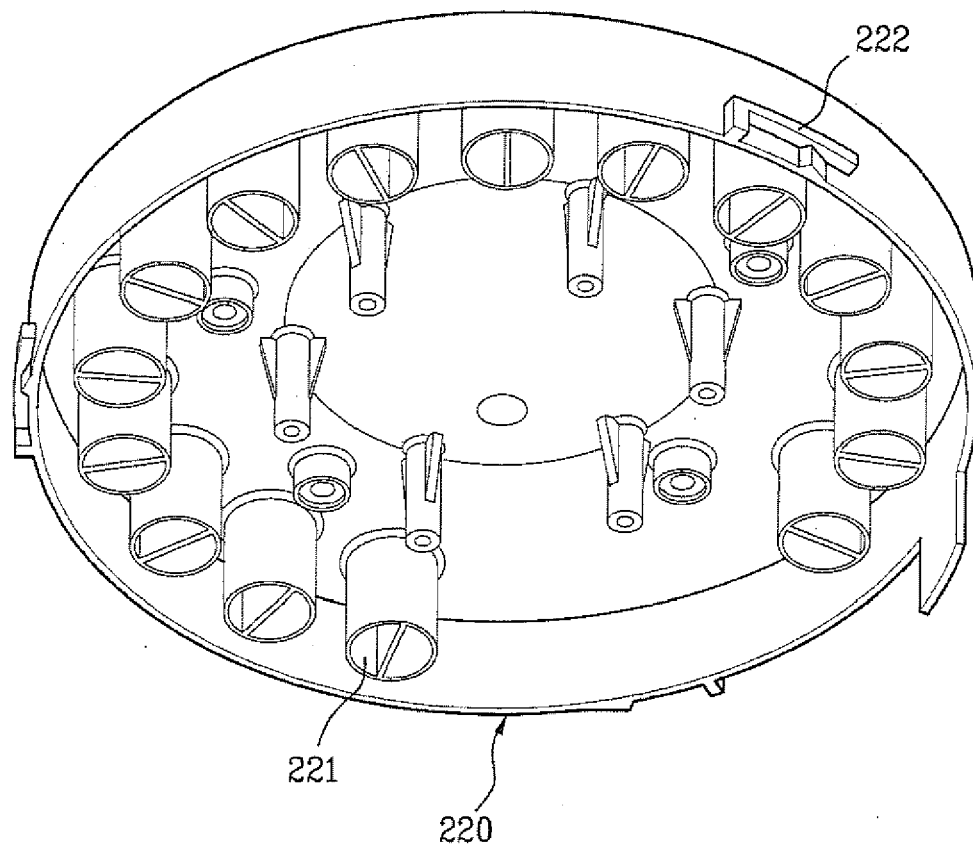


FIG. 7

