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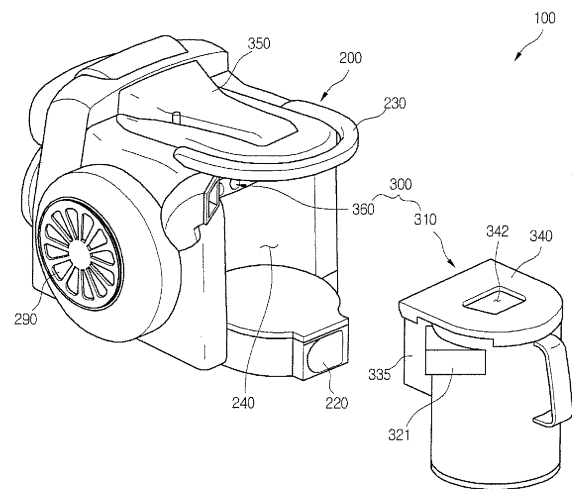
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Vacuum cleaner with mounting unit for dust storage chamber

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A vacuum cleaner is provided. The vacuum cleaner (100) includes a main body unit (200) having a driving unit (210) for generation suction; a main body; a dust separation unit (300) that is provided in the main body to separate dusts from air and provided with a dust exhaust portion (290) through which the separated dusts are exhausted; a dust storage chamber (310) that is provided with a dust inflow portion through which the dusts exhausted from the dust exhaust portion is introduced; and a mounting unit (240) that is formed on the main body (200) and on which the dust storage chamber (310) is mounted, wherein the dust exhaust portion and the dust inflow portion contact each other by a pressing force by which the dust storage chamber (310) is mounted on the mounting unit (240), thereby preventing the air from leaking.

Fig.1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a vacuum cleaner, and more particularly, to a vacuum cleaner having a dust collection unit that is improved in a structure so that a user can more conveniently use thereof.

Description of the Related Art

[0002] Generally, a vacuum cleaner is a device that can suck air containing dusts using suction generated by a motor mounted in a main body and filter off the dusts in a dust filtering unit.

[0003] The vacuum cleaner is classified into a canister type and an upright type. The canister type vacuum cleaner includes a main body and a suction nozzle connected to the main body by a connection pipe. The canister type vacuum cleaner includes a main body and a suction nozzle integrally formed with the main body.

[0004] Meanwhile, a conventional cyclone type vacuum cleaner includes a suction nozzle for sucking air containing dusts, a main body unit communicating with the suction nozzle, a dust collection unit for filtering off the dusts contained in the air and reserving the dusts, an extension pipe for guiding the air sucked through the suction nozzle toward the main body unit, a connection hose having a first end connected to the extension pipe and a second end connected to the main body unit.

[0005] The dust collection unit includes a dust collection body defining an outer appearance, a main cyclone unit for separating relatively large-sized dusts contained in the air, a sub-cyclone unit disposed downstream of the main cyclone unit to separate relatively small-sized dusts, a main chamber for reserving the dusts separated at the main cyclone unit, and a sub-chamber disposed around the main chamber in the dust collection body to reserve the dusts separated at the sub-cyclone unit.

[0006] The conventional dust collection unit includes both of the main cyclone unit and the sub-cyclone unit.

[0007] However, the conventional dust collection unit has the following problems.

[0008] First, in order to minimize the space taken by the vacuum cleaner and more easily carry the vacuum cleaner, it is preferable that the vacuum cleaner is designed as compact as possible while providing the same dust collection performance.

[0009] However, since the conventional dust collection unit includes both of the main cyclone unit and the sub-cyclone unit, the volume and weight of the vacuum cleaner increase. Therefore, it is difficult to handle the vacuum cleaner. This problem becomes more severe in the case a large amount of dusts is reserved in the dust collection unit.

[0010] Second, since the conventional dust collection

unit includes both of the main cyclone unit and the sub-cyclone unit, a space for the main chamber is structurally reduced due to the sub-chamber. Therefore, the dust collection volume of the main chamber is reduced and thus the user must more frequently empty the dust collection unit.

[0011] Third, since the conventional dust collection unit includes both of the main cyclone unit and the sub-cyclone unit, the internal structure of the dust collection unit is complicated and thus it is difficult to clean or wash the inside of the dust collection unit.

[0012] Fourth, since the conventional dust collection unit includes both of the main cyclone unit and the sub-cyclone unit, it is costly to prepare a mold for manufacturing the dust collection unit. Furthermore, when the dust collection unit leaks or is damaged, the overall body of the dust collection unit must be replaced.

[0013] Fifth, since the sub-chamber is disposed around the main body, it is difficult for the user to identify the amount of the dusts reserved in the main chamber using the naked eyes.

[0014] Sixth, the interior room may be contaminated again during the process for separating the dust collection unit from the main body empty the dust collection unit or dumping the dusts out of the dust collection unit. Thus, there is a need to clean the room again.

SUMMARY OF THE INVENTION

[0015] Accordingly, the present invention is directed to a vacuum cleaner that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0016] An object of the present invention is to provide a vacuum cleaner having a dust collection unit that is simple in a structure and lightweight.

[0017] Another object of the present invention is to provide a vacuum cleaner having a dust collection unit that can be easily emptied or cleaned.

[0018] Still another object of the present invention is to provide a vacuum cleaner that is designed such that the user can easily identify an amount of the dusts collected in the dust collection unit.

[0019] 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.

[0020] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a vacuum cleaner including: a main body unit having a driving unit for generation suction; a main body; a dust separation unit that is provided in the main body to sep-

arate dusts from air and provided with a dust exhaust portion through which the separated dusts are exhausted; a dust storage chamber that is provided with a dust inflow portion through which the dusts exhausted from the dust exhaust portion is introduced; and a mounting unit that is formed on the main body and on which the dust storage chamber is mounted, wherein the dust exhaust portion and the dust inflow portion contact each other by a pressing force by which the dust storage chamber is mounted on the mounting unit, thereby preventing the air from leaking.

[0021] In another aspect of the present invention, there is provided a vacuum cleaner including: a main body; a cyclone unit that is provided in the main body to separate dusts from air that is being introduced therein and in which a plurality of sub-cyclones are arranged in parallel; and a dust collection unit that is detachably mounted on the main body, stores the dusts separated by the cyclone unit, communicates with the cyclone unit when it is mounted on the main body..

[0022] The above-described vacuum cleaner has the following advantages.

[0023] First, since the main cyclone unit is provided on the dust collection unit while the sub-cyclone unit is separated from the dust collection unit and provided on the main body unit, the structure of the dust collection unit is simplified and light-weighted. Therefore, the use can more conveniently handle the dust collection unit.

[0024] Second, although the sub-cyclone unit is separated from the dust collection unit, the dusts separated from the sub-cyclone unit are still reserved in the dust collection unit. Therefore, only the dust collection unit is separated from the main body unit and emptied.

[0025] Third, since the dusts discharge unit through which the dusts separated by the sub-cyclone unit closely contacts the dust sucking unit by force for mounting the dust collection unit on the main body unit, the tight seal between the dust discharge unit and the dust sucking unit is improved and thus the air suction loss is reduced to improve the dust collection performance of the vacuum cleaner.

[0026] Fourth, since the outer wall of the main chamber for reserving the most of the dusts is formed of a transparent material, the user can easily identify the amount of the dusts reserved in the main chamber and thus determine the appropriate empty timing.

[0027] 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

[0028] 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 togeth-

er with the description serve to explain the principle of the invention. In the drawings:

[0029] Fig. 1 is a perspective view of a vacuum cleaner according to an embodiment of the present invention, when a dust separation device is separated from the vacuum cleaner;

[0030] Fig. 2 is a perspective view of the vacuum cleaner Fig. 1, when a dust collection unit is assembled with the vacuum cleaner;

[0031] Fig. 3 is a sectional view taken along line I-I of Fig. 2;

[0032] Fig. 4 is a perspective view of a dust separation device of the vacuum cleaner of Figs. 1 and 2;

[0033] Fig. 5 is a perspective view of a connection between a sub-cyclone unit and a connection duct of the vacuum cleaner of Figs. 1 and 2;

[0034] Fig. 6 is a front perspective view of the dust collection unit of Fig. 4;

[0035] Fig. 7 is a perspective view of the sub-cyclone unit;

[0036] Fig. 8 is a sectional view taken along line II-II' of Fig. 7;

[0037] Fig. 9 is a sectional view of a modified example of Fig. 8;

[0038] Fig. 10 is a perspective view of a vacuum cleaner according to another embodiment of the present invention;

[0039] Fig. 11 is a perspective view of a connection between a dust separation device and a driving unit of a vacuum cleaner according to still another embodiment of the present invention; and

[0040] Fig. 12 is a perspective view of a connection between a dust separation device unit and a driving unit of a vacuum cleaner according to still yet another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0041] 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.

[0042] Fig. 1 is a perspective view of a vacuum cleaner according to an embodiment of the present invention, when a dust collection unit is separated from the vacuum cleaner, Fig. 2 is a perspective view of the vacuum cleaner Fig. 1, when the dust collection unit is assembled with the vacuum cleaner, and Fig. 3 is a sectional view taken along line I-I of Fig. 2.

[0043] Referring to Figs. 1 through 3, a vacuum cleaner 100 includes a main body unit 200, a driving unit disposed in the main body unit 200 generate suction for sucking air containing dusts, a suction nozzle (not shown) for sucking the air containing the dusts into the main body unit 200, a dust collection unit 300

[0044] A main body suction portion 220 communica-

tion with the suction nozzle is formed on a front-lower portion of the main body unit 200. A main body discharge portion 290 through which the air whose dusts are separated in the dust separation device 300 is formed on a side of the main body unit 200.

[0045] The driving unit 210 includes a fan motor assembly 211 for generating suction for sucking outer air to the suction nozzle. The fan motor assembly 211 is received in the fan-motor chamber 213 formed in the main body unit 200.

[0046] A motor pre-filter 215 may be provided in the main body unit 200 at an upstream of the fan-motor assembly 211 to filter off fine particles contained in the air flowing toward the fan-motor assembly 211.

[0047] Since the motor pre-filter 215 functions to protect the motor and collect the fine dusts, there is a need to periodically clean or replace the same to prevent the dust collection performance from being deteriorated.

[0048] Therefore, in the present embodiment, a filter receiving portion 216 in which the motor pre-filter 215 is detachably received is formed in the main body unit. The filter receiving portion 216 is opened and closed by a filter cover 253 detachably coupled to the main body unit 200.

[0049] The dust separation device 300 includes a cyclone unit 360 provided in the main body unit 200 to separate the dust using a cyclone principle and a dust collection unit 310 for reserving the separated dusts in the cyclone unit 360.

[0050] The dust collection unit 310 is detachably mounted in the main body unit 200. When the dust collection unit 310 is mounted in the main body unit 200, it is connected to the cyclone unit 360 to receive and reserve the dusts separated by the cyclone unit 360.

[0051] That is, when the user separates the dust collection unit 310 from the main body unit 200 to empty the dust collection unit 310, the dust collection unit 310 is separated from the cyclone unit 360. When the dust collection unit 310 is mounted again in the main body unit 200, the dust collection unit 310 is connected to the cyclone unit 360.

[0052] Here, in order to improve the dust separation performance, the dust separation device 300 may further include a dust separation unit 320 for further separating the dusts.

[0053] Therefore, in the present embodiment, the dust separation unit 320 is disposed upstream of the cyclone unit 360.

[0054] That is, the main body unit 200 is designed to primarily separate the dust using the dust separation unit 320 before the introduced air is directed to the cyclone unit 360, thereby improving the dust separation performance of the dust separation device 300.

[0055] Here, the dust separation unit 320 is integrally formed with the dust collection unit 310 is preferably designed to separate the dust using the cyclone principle. However, the present invention is not limited to this embodiment.

[0056] For descriptive convenience, in the following

description, the dust separation unit 210 will be called a main cyclone unit 320 and the cyclone unit 360 provided in the main body unit 200 will be called a cyclone unit 360.

[0057] The main cyclone unit 320 is integrally formed with an upper portion of the dust collection unit 310. The main cyclone unit 320 is provided with a first sucking portion 321 formed in a tangent direction.

[0058] That is, the first sucking portion 321 allows the air containing the dusts to be introduced in the tangent direction of the main cyclone unit 320 to generate the cyclone in the main cyclone unit 320.

[0059] A discharge member 323 provided at an outer circumference with a plurality of holes 324 is provided on a shaft of the cyclone unit 320. The discharge member 323 allows the air whose dusts are primarily separated in the cyclone unit 320 to be discharged.

[0060] Meanwhile, the dust collection unit 310 reserves the dusts separated from the main cyclone unit 320 and sub-cyclone unit.

[0061] That is, the dust collection unit 310 includes a main chamber 331 for reserving the dusts separated by the main cyclone unit 320 and a sub-chamber 335 for reserving the dusts separated from the sub-cyclone unit 360.

[0062] That is, the main chamber 331 is formed on a lower portion of the main cyclone unit 320 and the sub-chamber 335 is formed at an outer side of the dust collection unit 310.

[0063] In the present embodiment, the sub-chamber 335 is integrally formed with the dust collection unit 310. However, the sub-chamber 335 may be detachably mounted in the dust collection unit 310. In this case, the surface of the sub-chamber, which faces the dust collection unit 310, may be formed to correspond to the shape of the dust collection unit 310.

[0064] As the dust collection unit 310 is mounted in the main body unit 200, the sub-chamber 335 is connected to the sub-cyclone unit 360 and thus the dusts separated by the sub-cyclone unit is reserved in the sub-chamber 335.

[0065] That is, the sub-chamber 335 is not integrally formed with the sub-cyclone unit 360 but structure to be separable and selectively connected to the sub-cyclone unit 360.

[0066] Meanwhile, in order for the user to empty the dust collection unit 310 by turning the dust collection unit 310 over, an upper cover 340 that can be detachably coupled to an upper portion of the main cyclone unit 320 to open and close the upper portion of the main cyclone unit 320.

[0067] The upper cover 340 is provided at a center portion with a first discharge portion 342 through which the air passing through the discharge member 323 is discharged out of the main cyclone unit 320.

[0068] Meanwhile, the sub-cyclone unit 360 is provided in the main body unit 200 to further separate the dusts contained in the air that has passed through the main cyclone unit 320.

[0069] At this point, the sub-cyclone unit 360 may be disposed in a state where it lies on the main body unit 200.

[0070] That is, when the sub-cyclone unit 360 lies on the main body unit 200, the space efficiency of the vacuum cleaner may be improved considering the arrangement with the driving unit 210.

[0071] The connection structure of the main cyclone unit and the sub-cyclone unit will be described hereinafter.

[0072] Fig. 4 is a perspective view of the dust separation device and Fig. 5 is a perspective view of a coupling structure of the sub-cyclone unit and a connection duct.

[0073] Referring to Figs. 4 and 5, the main cyclone unit 320 and the sub-cyclone unit 360 are interconnected by a connection duct 350.

[0074] The connection duct 350 has a first side connected to the upper cover 340 disposed on an upper portion of the main cyclone unit 320 and a second side connected to a coupling hole 364 formed on an upper portion of the sub-cyclone unit 360.

[0075] The connection duct 350 has a passage section that gradually increases toward the coupling hole 364. Therefore, the flow rate of the air is gradually reduced toward the coupling hole 364 of the sub-cyclone unit 360 and thus the flow resistance of the air is reduced near the coupling hole 364 of the sub-cyclone unit 360.

[0076] In addition, a sealing member 352 may be provided between the connection duct 350 and the upper cover 340 and between the connection duct 350 and the coupling hole 364.

[0077] Fig. 6 is a perspective view of the dust collection unit.

[0078] Referring to Figs. 5 and 6, the main body unit 200 is provided with a dust collection unit mounting portion 240 on which the dust collection unit is mounted.

[0079] The sub-chamber 335 is provided with a dust sucking portion 336 through which the dusts separated from the sub-cyclone unit 360 are introduced.

[0080] The sub-cyclone unit 360 is provided with a dust discharge portion 365 through which the dusts separated from the sub-cyclone unit 360 is discharged to the dust sucking portion 336.

[0081] Therefore, the dust discharge portion 365 is connected to the dust sucking portion as the dust collection unit 310 is mounted on the dust collection unit mounting portion 240 by the user.

[0082] At this point, the dust discharge portion 365 and dust sucking portion 336 closely contact each other by force for mounting the dust collection unit 310.

[0083] That is, as the dust collection unit 310 is mounted on the dust collection unit mounting portion 240 by the force applied by the user, the dust sucking portion 336 contacts the dust discharge portion 365 to gradually press the dust discharge portion 365 and the dust discharge portion 365 provides a repulsive force for the force for mounting the dust collection unit 310. Therefore, the dust discharge portion 365 and dust sucking portion 336 closely contact each other by the force for mounting the

dust collection unit 310.

[0084] The dust sucking portion 336 has a first contact surface 337 provided with one or more dust sucking holes 338 through which the dusts separated from the sub-cyclone unit 360 are introduced.

[0085] The dust discharge portion 365 has a second contact surface 366 provided with one or more dust discharge holes 367 through which the dusts are discharged. The second contact surface 366 closely contacts the first contact surface 337 such that the dust sucking hole 338 communicates with the dust discharge hole 367.

[0086] Here, the number of the dust sucking holes 338 is same as that of the dust discharge holes 367. Alternatively, the plurality of dust discharge holes 367 may communicate with one dust sucking hole 338.

[0087] Here, the first and second contact surfaces 337 and 366 may contact each other as the dust collection unit 310 is mounted on the dust collection unit mounting portion 240.

[0088] Therefore, the second contact surface 366 is inclined at a predetermined angle with respect to a direction where the dust collection unit 310 is separated. However, the second contact surface 366 may be curved.

[0089] That is, the second contact surface 366 is inclined at a predetermined angle, preferably at a right angle, with respect to the direction where the dust collection unit 310 is separated so as to provide a repulse force against the force for mounting the dust collection unit 310 when the dust collection unit 310 is mounted on the dust collection unit mounting portion 240. Therefore, the airtightness between the dust sucking portion 336 and the dust discharge portion 365.

[0090] Here, when the second contact surface 366 is inclined at the predetermined angle with respect to the direction where the dust collection unit 310 is separated, the predetermined angle may be within a range of 45-135°. It is preferably that the predetermined angle is substantially perpendicular to the direction in which the dust collection unit 310 is separated. The "substantially perpendicular" means that the angle between the second contact surface 366 and the direction where the dust collection unit 310 is separated is within a range of 75-105°.

[0091] In this embodiment, the second contact surface 366 is formed to be oriented toward the inlet of the dust collection unit mounting portion 240.

[0092] When the second contact surface 366 is substantially perpendicular to the direction in which the dust collection unit 310 is mounted or dismounted and the dust collection unit 310 is mounted on the dust collection unit mounting portion 240 through a horizontal sliding motion, the first contact surface 337 of the dust sucking portion 336 is disposed in front of the dust collection unit with reference to the mounting direction of the dust collection unit 310 such that the first contact surface 337 faces the second contact surface 366.

[0093] That is, when the dust collection unit 310 is mounted toward the front portion of the main body unit

200, the first contact surface 337 may be formed on an approximately rear surface side of the dust collection unit 310. When the dust collection unit 310 is mounted toward the rear portion of the main body unit 200, the first contact surface 337 may be formed on an approximately front surface side of the dust collection unit 310.

[0094] Then, the contact ratio between the dust discharge portion 365 and the dust sucking portion 336 increases and the air-tightness between the dust discharge portion 365 and the dust sucking portion 336 is improved, thereby improving the dust collection performance.

[0095] Meanwhile, unlike the above, as the dust collection unit 310 is mounted, one of the dust discharge portion 365 and the dust sucking portion 336 may be inserted into the other in a direction in which the dust collection unit 310 is mounted.

[0096] In this embodiment, the dust discharge portion 365 is inserted in the dust sucking portion 336.

[0097] That is, the dust sucking portion 336 is provided with a frame 339 for enclosing the dust discharge portion 365. The frame 339 extends in a perpendicular direction from the sub-chamber.

[0098] Therefore, the frame 339 closely contacts the circumference of the dust discharge portion 365 to prevent the air from leaking between the dust discharge portion 365 and the dust sucking portion 336.

[0099] Meanwhile, in order to prevent the dusts reserved in the main chamber 331 from scattering toward the main cyclone unit 320 by the spiral motion of the air, a scattering preventing portion 327 separating the main cyclone unit 320 from the main chamber 331 is horizontally formed in the dust collection unit 310.

[0100] Here, the dusts separated by the main cyclone unit 320 move downward through an opening 329 formed at an edge of the scattering preventing portion 327 and is reserved in the main chamber 331.

[0101] As described above, unlike the conventional art, the sub-cyclone unit 360 is provided in the main body unit 200 and the sub-chamber 335 for reserving the dusts separated by the sub-cyclone unit 320 is integrally formed with the dust collection unit 310.

[0102] Therefore, since the sub-cyclone unit 360 that is repeatedly mounted and dismounted to discharge the dusts is not integrally formed with the dust collection unit 310, the structure of the dust collection unit 310 is simplified and light-weighted.

[0103] In addition, the user simply separates only the dust collection unit 310 from the main body unit 200, then separates the upper cover 340 from the upper portion of the dust collection unit 310, and discharges the dusts from the dust collection unit 310 by turning the dust collection unit over.

[0104] At this point, the main chamber 331 may be formed of a transparent material so that the user can identify an amount of the dust collected in the main chamber 331.

[0105] Accordingly, since the user can easily identify the internal state of the main chamber 331, the user can

timely empty the main chamber 331.

[0106] Fig. 7 is a perspective view of the sub-cyclone unit and Fig. 8 is a sectional view taken along line II-II' of Fig. 7.

5 [0107] Referring to Figs. 7 and 8, the sub-cyclone unit 360 is comprised of a plurality of small cyclones 363. In the present embodiment, four small cyclones 363 are arranged on an identical plan in parallel.

10 [0108] That is, the air containing the dusts is introduced into the sub-cyclone unit 360 via the dust collection unit 310 and thus it can be noted that the dust collection unit 310 is connected to the sub-cyclone unit 360 in series.

[0109] On the contrary, the air exhausted from the dust collection unit 310 is directed to the sub-cyclone unit 360 through the connection passage 350 and divided into two at the inlet of the sub-cyclone unit 360 to be introduced into the small cyclones 363. The dusts contained in the air are separated in each small cyclone 363.

20 [0110] That is, the air exhausted from the dust collection unit 310 does not sequentially pass through the small cyclones 363 but simultaneously pass through the small cyclones 363.

25 [0111] Therefore, in the present embodiment, it can be apparently noted that the sub-cyclone unit 360 has the plurality of small cyclones 363 that are arranged in parallel.

[0112] In addition, the longitudinal axes of the respective small cyclones 363 are disposed on an identical plan so that the structure can be more compact. Here, the axis is a center line passing the center of each small cyclone 363. That is distances between the axes of the respective small cyclones 363 are gradually reduced from the second sucking portion 361 toward the dust discharge hole 367.

35 [0113] Therefore, the small cyclones disposed on the identical plan and converged to each other are arranged fanwise.

[0114] Here, axes of at least two small cyclones 363 are preferably converged. In Fig. 7, longitudinal axes of all of small cyclones 363 are converged to each other so as to make the sub-cyclone unit 360 compact.

[0115] Alternatively, two central small cyclones 363 may have the respective longitudinal axes that are in parallel with each other while left and right small cyclones 363 may have the respective longitudinal axes converged to each other.

[0116] The disposition angles of the small cyclones 363 for the convergence of the longitudinal axes thereof may be determined according to their sizes or the volume of the sub-chamber 335 connected to the small cyclones 363.

50 [0117] The distances between the small cyclones 363 gradually increase toward the dust discharge portion 365. Alternatively, the adjacent small cyclones 363 may contact each other to minimize the gaps between the dust discharge holes 367.

55 [0118] As described above, as the small cyclones 363 are disposed to be converged to each other, the space

taken by the sub-cyclone unit 360 can be reduced, thereby reducing the size of the vacuum cleaner.

[0119] Furthermore, by reducing the gaps between the dust discharge holes 367 formed at an end of the sub-cyclone unit 360, the dust sucking portion 336 of the sub-chamber 335 coupled to the sub-cyclone unit 360 can be reduced in a size. As a result, the size of the sub-chamber is not excessively increased.

[0120] Here, the longitudinal axes of the small cyclones 363 are formed on the same plan so as to make the sub-cyclone unit 360 compact. However, the present invention is not limited to this.

[0121] In addition, the small cyclones 363 are formed in a variety of shapes.

[0122] In addition, although each small cyclone 363 may be formed in a variety of shapes, it is preferable that the small cyclone 363 is formed in a rotational body that can effectively separate the dusts contained in the air using centrifugal force. In the present embodiment, the small cyclone 363 is formed in a structure including a cone-shaped body.

[0123] Meanwhile, Each small cyclones 363 of the sub-cyclone unit 360 is provided with a second sucking portion 361 through which the air is introduced. A guide 362 is provided on the second sucking portion 361 for guiding the air in the tangent direction of the second sucking portion 361.

[0124] The guide portion 362 functions to divide the second sucking portion 361 into two sections that are surface-symmetrical. As shown in Fig. 8, one guide 362 is provided at a center of the second sucking portion 361 so that the left and right sides with reference to the guide 363 can be symmetrical.

[0125] In order to direct the air in the tangent direction of each small cyclone 363, the second sucking portion 361 adjacent to the guide 362 is opened at a portion near the guide. The second sucking portion 361 of the small cyclones disposed at the side edges are opened toward the guide 362.

[0126] Here, the guide 362 may extend inside of the connection duct 350. In this embodiment, since the guide 362 is disposed at the center of the second sucking portion 361, the inside of the connection duct 350 is divided into left and right sections.

[0127] Generally, an amount of air flowing through the central portion of the sub-cyclone unit 360 is greater than an amount of air flowing through side edges of the sub-cyclone unit 360.

[0128] Therefore, since the guide 362 dividing the second sucking portion 361 into two sections extends inside of the connection duct 350, the flow of the air is divided into left and right flows. Therefore, the air is not concentrically sucked through the second sucking portion 361 disposed at the central portion but uniformly sucked.

[0129] Here, since the portion of the guide 362, which is disposed inside of the connection duct 350, functions to divide the inside passage of the connection duct 350 into two passages, the guide 362 may be called a parti-

tion.

[0130] In this embodiment, the guide 362 is designed to divide the inside of the connection duct 350 into two sections. However, the present invention is not limited to this. For example, a separate partition may be formed in the connection duct 350 to divide the passage into two passages. In this case, the partition is formed to correspond to the guide 362.

[0131] Fig. 9 is a sectional view of a modified example of Fig. 8.

[0132] Referring Fig. 9, as in the foregoing embodiment, the guide 462 is disposed to divide the second sucking portion 461 into two sections. The second sucking portion 461 adjacent to the guide 462 is opened at a portion near the guide 462.

[0133] The second sucking portion 461 of the small cyclones at the side edges are opened at their outer portions so that the air can be sucked in the tangent direction.

[0134] The following will describe the operation of the above-described vacuum cleaner 100.

[0135] First, when electric power is applied to the driving unit 210 of the vacuum cleaner 100, suction is generated by the driving unit 210 and thus the air containing the dusts is sucked into the suction nozzle by the generated suction.

[0136] The air introduced into the suction nozzle is directed into the main cyclone unit 320 through the main sucking portion 220 and the first sucking portion 321. That is, the air sucked through the first sucking portion 321 is guided in a tangent direction on the inner wall of the main cyclone unit 320 to form a spiral current. Therefore, the dusts contained in the air are separated by a centrifugal force difference between the dust and the air.

[0137] In addition, the separated dusts is reserved in the main chamber 331 through the opening 329. At this point, the scattering of the dusts stored in the main chamber 331 can be prevented by the scattering preventing portion 327.

[0138] On the contrary, the air whose dusts are primarily separated by the main cyclone unit 320 moves upward while passing consecutively through the discharge member 323 and the first discharge portion 342. Then, the air moving upward is directed into the sub-cyclone unit 360 along the connection duct 350.

[0139] Here, the air flowing along the connection duct 350 is directed toward inner walls of the small cyclones 363 in tangent directions. In addition, the air direction in the tangent direction of each small cyclone 363 is further separated from the dusts by the centrifugal force. The separated dusts are discharged through the dust discharge hole 368 and reserved in the sub-chamber 335.

[0140] The air that is further separated from the dusts is directed to a discharge duct (390 of Fig. 3) by being discharged from the sub-cyclone unit 360 through a second discharge portion (362 of Fig. 3) formed at a rear end of each small cyclone 363. Then, the air directed to a discharge duct (290 of Fig. 3) is directed toward the driving unit 210 after passing through a motor pre-filter

215 and then to the main body unit 200 through the discharge duct 290.

[0141] Fig. 10 is a perspective view of a vacuum cleaner according to another embodiment of the present invention.

[0142] A vacuum cleaner of this embodiment is substantially identical to that of the foregoing embodiment of Figs. 1 through 8 except for a separation structure of the sub-chamber from the dust collection unit. Therefore, the following will describe the different portion.

[0143] Referring to Fig. 10, in the present embodiment, a sub-chamber 435 in which the dusts separated by the sub-cyclone unit 360 are reserved is separated from the main chamber 431 and detachably provided on the dust collection unit 410.

[0144] That is, as shown in Fig. 10, the dust collection unit 410 is separated in the main body unit 200 and the sub-chamber 435 separated from the dust collection unit 410 is detachably mounted on the main body unit.

[0145] Therefore, in the present embodiment, only the dust collection unit 410 is separated from the main body unit 200 and the main chamber 431 is emptied.

[0146] In addition, if required, the dust collection unit 410 is separated and the sub-chamber 435 mounted in the main body unit 200 is separated. Therefore, the sub-chamber 435 can be emptied.

[0147] Generally, when comparing the main cyclone unit with the sub-cyclone unit 360, the dusts separated by the main cyclone unit have a relatively larger volume and a larger amount. Therefore, the main chamber for reserving the dusts separated from the main cyclone unit must be more frequently emptied than the sub-chamber 435.

[0148] Considering the above, the sub-chamber 435 that is less frequently emptied is designed to be separated from the main body unit 200 so that only the dust collection unit 410 is designed to be separated from the main body unit 200 so as to empty the main chamber 431.

[0149] Fig. 11 is a partly broken, perspective view of a connection state of a dust separation device with a driving unit of a vacuum cleaner according to another embodiment of the present invention.

[0150] A vacuum cleaner of this embodiment is substantially identical to that of the foregoing embodiment of Figs. 1 through 8 except for an arrangement of the sub-cyclone unit. Therefore, the following will describe the different portion.

[0151] Referring to Fig. 11, a sub-cyclone unit 560 of this embodiment is not horizontally disposed on the main body unit 200 but disposed in a vertical direction or to be inclined at a predetermined angle with respect to the vertical direction.

[0152] In addition, the sub-chamber 535 is connected to a lower end of the sub-cyclone unit 560 at the lower portion of the main chamber 531.

[0153] Meanwhile, the bottoms of the main chamber 531 and the sub-chamber 535 are formed to be opened and closed.

[0154] That is, the bottoms of the main chamber 531 and the sub-chamber 535 are provided with opening/closing members 533 that are integrally formed.

[0155] The opening/closing member 533 is hingedly coupled to the hinge portion 537 formed on a first lower side of the dust collection unit 510. The opening/closing member 533 is opened by pressing a coupling hook 539 formed on a second lower side of the dust collection unit 510.

[0156] The following will describe the operation of the vacuum cleaner according to this embodiment.

[0157] When the driving unit is driven, the air containing the dusts is introduced into the suction nozzle. The dusts contained in the air are primarily separated while the air passes through the main cyclone unit 520. The separated dusts move downward to be reserved in the main chamber 531.

[0158] In addition, the air whose dusts are primarily separated by the main cyclone unit 520 passes through the discharge member 523 and then moves upward. Then, the air flows along the connection passage 550. Then, the air is guided to the inner walls of the small cyclones in the tangent direction through the second sucking portion 561. In addition, the air introduced into the sub-cyclone unit 560 is further separated from the dusts by the centrifugal force. The separated dusts are reserved in the sub-chamber 535 connected to an end of the sub-cyclone unit 560.

[0159] Meanwhile, the air further separated from the dusts is discharged from the sub-cyclone unit 560 through a second discharge portion and is then directed downward a discharge duct 590. Fine particles contained in the air being directed downward are finally separated by the motor pre-filter 215 and introduced in an axial direction of the fan/motor assembly.

[0160] The air directed to the fan/motor assembly 211 is directed in a radial direction and is then finally discharged from the main body unit 200 through the main body discharge portion 290 provided on a side of the main body unit 200.

[0161] Fig. 12 is a partly broken, perspective view of a connecting state of a dust separation device with a driving unit of a vacuum cleaner according to another embodiment of the present invention.

[0162] A vacuum cleaner of this embodiment is substantially identical to that of the foregoing embodiment of Figs. 1 through 8 except that the main cyclone unit that primarily filters off the dusts before the air is introduced into the sub-cyclone unit is replaced with a filter unit 620.

[0163] Referring to Fig. 12, in the present embodiment, a filter unit 620 for primarily filtering off the dusts before the air is introduced into the sub-cyclone unit is provided on the dust collection unit.

[0164] The filter unit 620 includes a dust collection filter 621 and a filter mounting unit 623 for mounting the dust collection filter 621.

[0165] That is, the filter mounting unit 623 is provided on a lower portion of an upper cover 640 to receive the

dust collection filter 623.

[0166] The dust collection filter 621 is separately received in the filter mounting unit 623. The dust collection filter 621 may be formed of sponge or non-woven fabric.

[0167] Meanwhile, since the dusts are fixed on the dust collection filter 621, the dust collection filter 621 is required to be periodically cleaned or replaced to prevent the suction of the vacuum cleaner from being deteriorated. Therefore, the dust collection filter 621 must be easily separated from the main body.

[0168] In the present embodiment, after the upper cover 640 is separated, the dust collection filter 621 is separated. Alternatively, the dust collection filter 621 may be inserted in the filter mounting unit 623 through a sliding motion so that the dust collection filter 621 can be separated from the dust collection filter 621 through the sliding motion.

[0169] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. 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. A vacuum cleaner comprising:

a main body;
a dust separation unit that is provided in the main body to separate dusts from air and provided with a dust exhaust portion through which the separated dusts are exhausted;
a dust storage chamber that is provided with a dust inflow portion through which the dusts exhausted from the dust exhaust portion are introduced; and
a mounting unit that is formed on the main body and on which the dust storage chamber is mounted,

wherein the dust exhaust portion and the dust inflow portion contact each other by a pressing force by which the dust storage chamber is mounted on the mounting unit, thereby preventing the air from leaking.

2. The vacuum cleaner according to claim 1, wherein the dust inflow portion includes a first contact surface provided with at least one dust inflow hole through which the dusts are introduced; and the dust exhaust portion includes a second contact surface provided with at least one dust exhaust hole that is connected to the dust inflow hole to exhaust the dusts.

3. The vacuum cleaner according to claim 2, wherein

the second contact surface of the dust exhaust portion is disposed at a predetermined angle with respect to a direction in which the dust storage chamber is separated.

4. The vacuum cleaner according to claim 3, wherein the second contact surface of the dust exhaust portion is vertical to a direction in which the dust storage chamber is separated.

5. The vacuum cleaner according to claim 2, wherein the second contact surface of the dust exhaust portion is oriented toward an inlet of the mounting unit.

6. The vacuum cleaner according to claim 1, further comprising a dust collection unit that is mountable on the mounting unit and in which a main dust separation unit for separating dusts from the air introduced into the dust separation unit.

7. The vacuum cleaner according to claim 6, wherein the dust collection unit is provided with a main chamber in which the separated dusts by the dust separation unit are stored; and
The dust storage chamber is integrally formed with the dust collection unit.

8. The vacuum cleaner according to claim 7, wherein the dust collection unit further comprises an upper cover for simultaneously opening and closing tops of the main chamber and the dust storage chamber.

9. The vacuum cleaner according to claim 7, wherein the dust collection unit further comprises an opening/closing member for simultaneously opening and closing bottoms of the main chamber and the dust storage chamber.

10. The vacuum cleaner according to claim 6, wherein the dust collection unit is mounted on the mounting unit after the dust storage chamber is mounted on the mounting unit.

11. The vacuum cleaner according to claim 6, wherein the main dust separation unit is configured to separate the dusts from the air using a cyclone method.

12. The vacuum cleaner according to claim 6, wherein the main dust separation unit is a dust collection filter.

13. The vacuum cleaner according to claim 1, wherein the dust separation unit is horizontally disposed on the main body.

14. The vacuum cleaner according to claim 1, wherein the dust separation unit is vertically disposed on the main body.

15. The vacuum cleaner according to claim 1, wherein the dust separation unit includes a plurality of sub-cyclones. a sub-chamber for string the dusts separated in the cyclone unit.
16. A vacuum cleaner comprising: 5
- a main body;
 - a cyclone unit that is provided in the main body to separate dusts from air that is being introduced therein and in which a plurality of sub-cyclones are arranged in parallel; and 10
 - a dust collection unit that is detachably mounted on the main body, stores the dusts separated by the cyclone unit, communicates with the cyclone unit when it is mounted on the main body. 15
17. The vacuum cleaner according to claim 16, wherein longitudinal axes of the sub-cyclones are located on a common plan. 20
18. The vacuum cleaner according to claim 16, wherein at least a pair of longitudinal axes among the longitudinal axes of the sub-cyclones are converged.
19. The vacuum cleaner according to claim 16, wherein a suction portion formed in each sub-cyclone is divided into two sections that are surface-symmetrical and the vacuum cleaner further comprises a guide unit for guiding the airflow from the suction portion. 25 30
20. The vacuum cleaner according to claim 16, further comprising:
- a dust separation unit that is provided in the dust collection unit to primarily separate the dusts from the air directed to the cyclone unit; and 35
 - a connection dust that connects the dust separation unit to the cyclone unit.
21. The vacuum cleaner according to claim 20, wherein the connection dust has a section area that is gradually reduced as it goes from the dust separation unit toward the cyclone unit. 40
22. The vacuum cleaner according to claim 20, wherein the connection duct is provided with a partition for allowing the airflow to be realized through a plurality of passages. 45
23. The vacuum cleaner according to claim 22, wherein the partition extends from the guide unit for guiding the air from the sub-cyclones to the connection duct. 50
24. The vacuum cleaner according to claim 20, wherein the dust collection unit comprises: 55
- a main chamber in which the separated dusts by the dust separation unit is stored; and

Fig.1

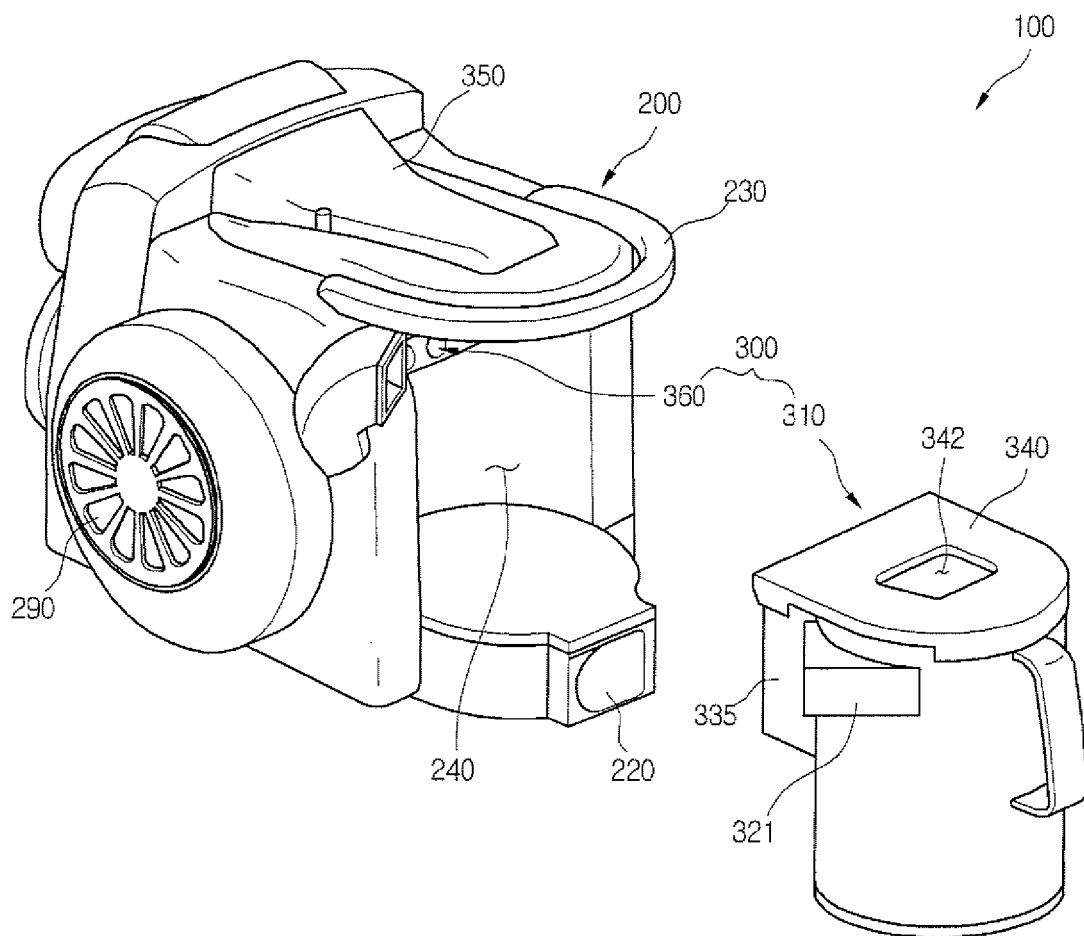


Fig.2

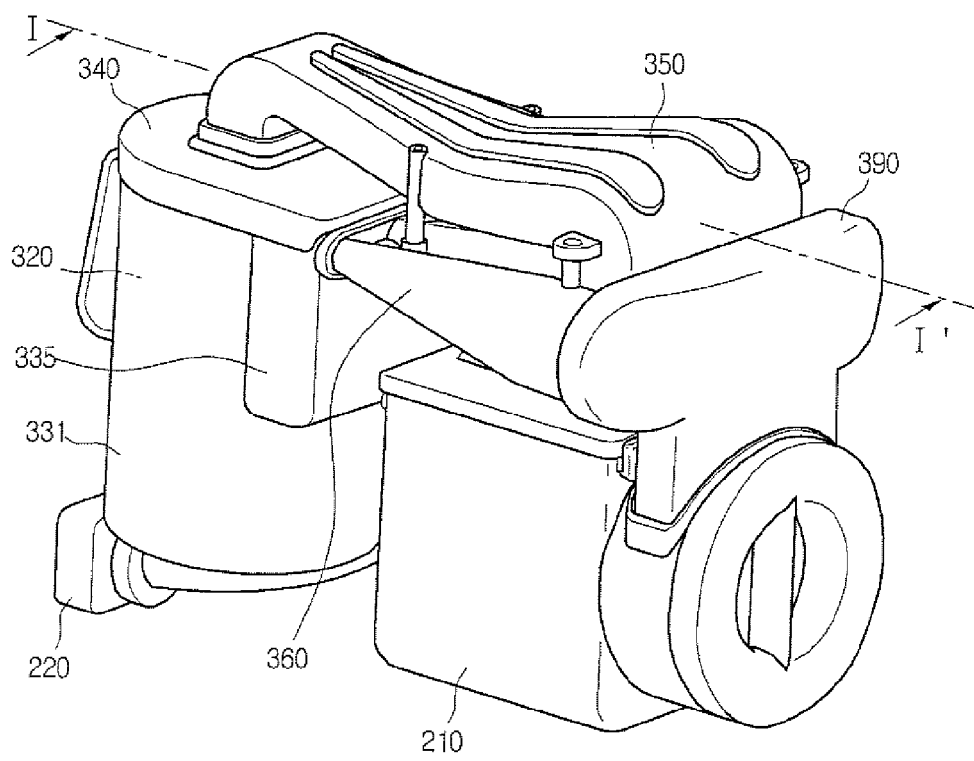


Fig. 3

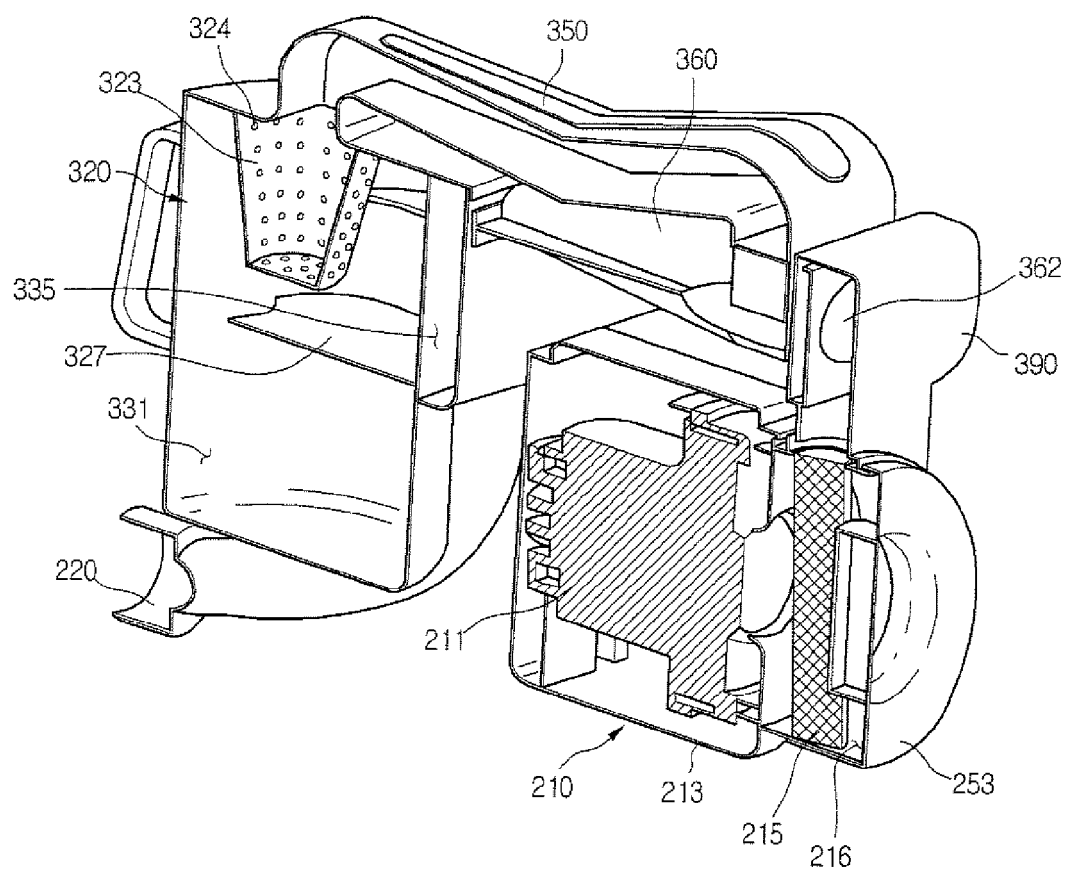


Fig. 4

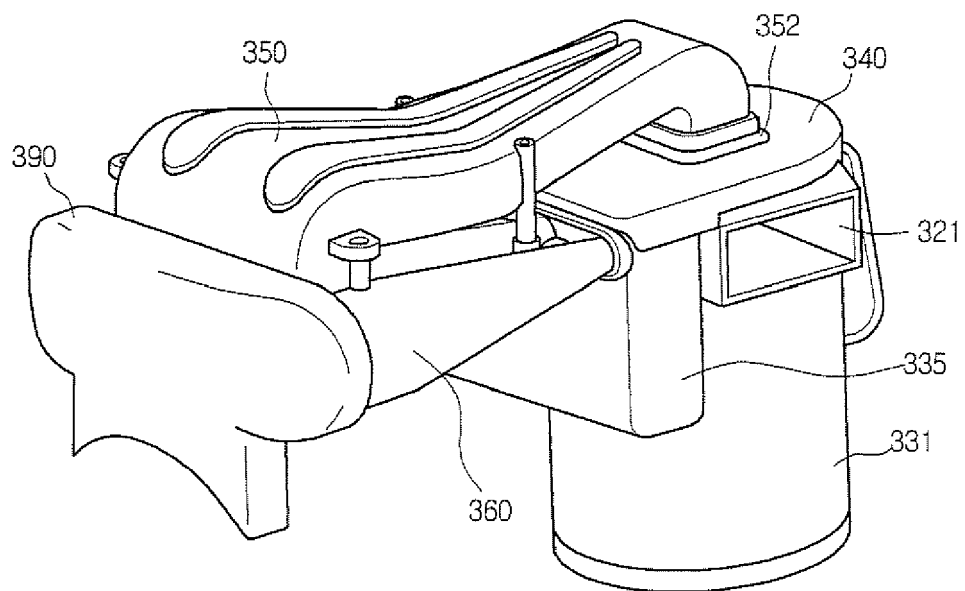


Fig.5

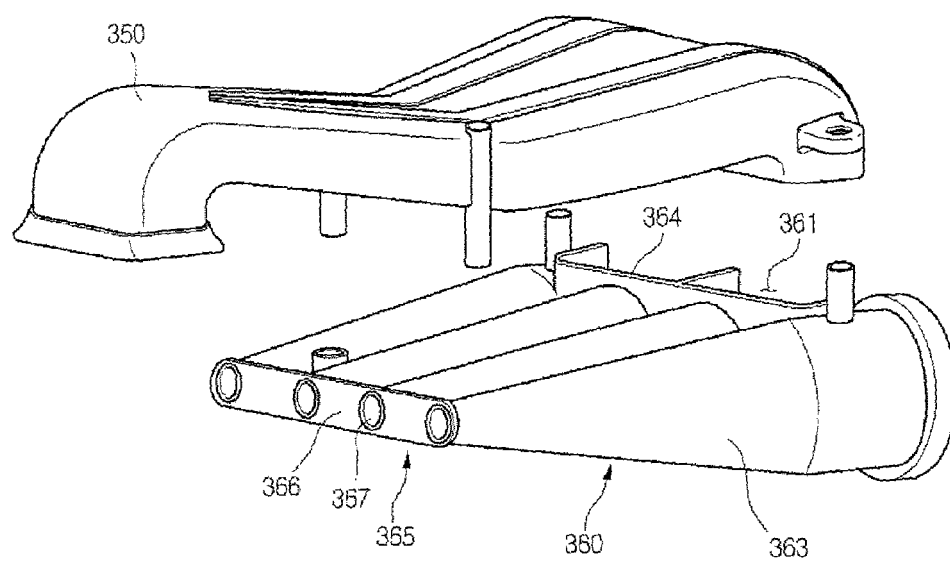


Fig. 6

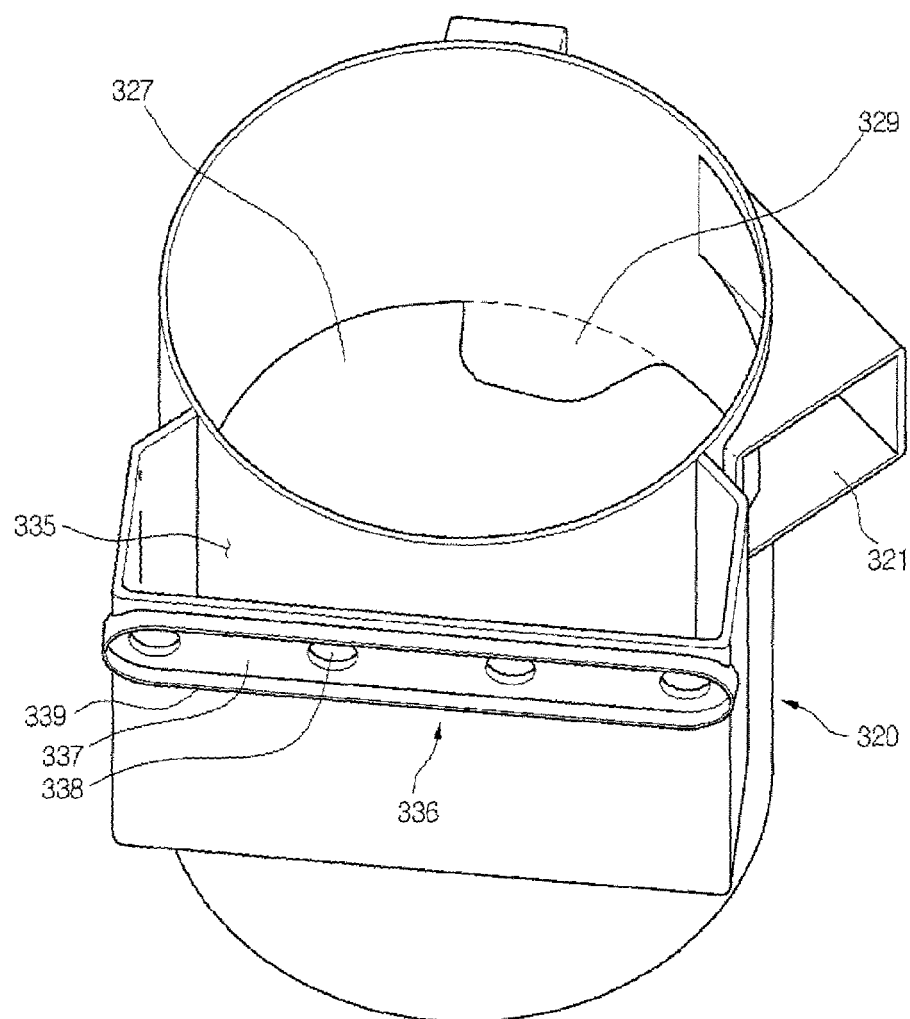


Fig.7

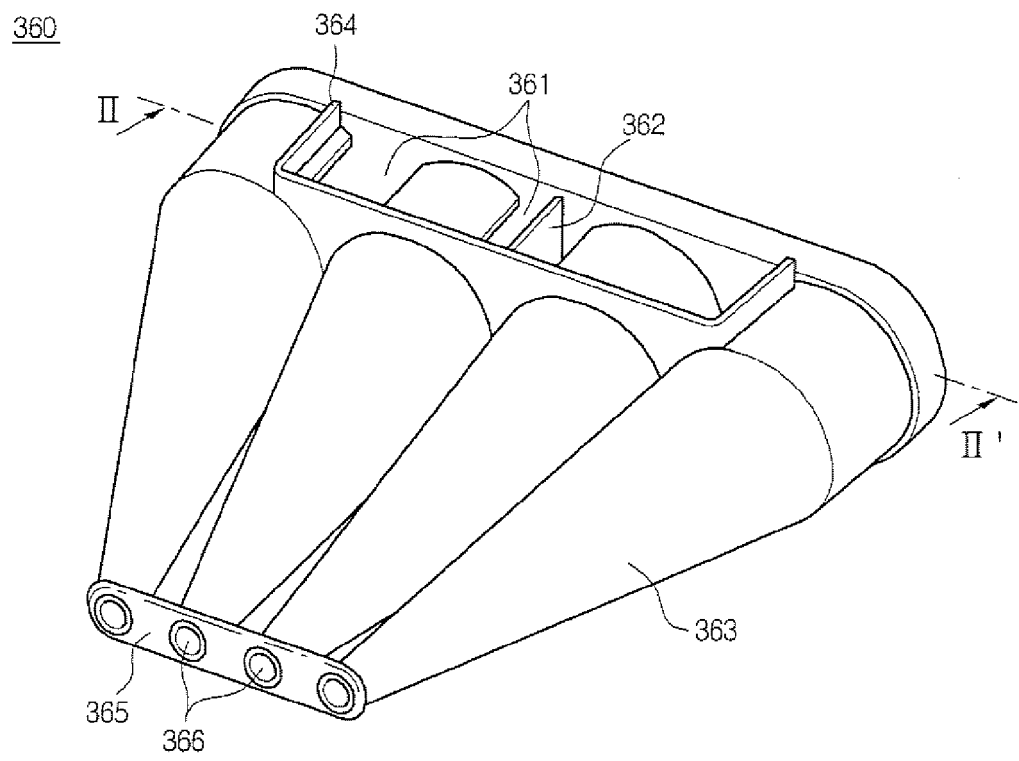


Fig.8

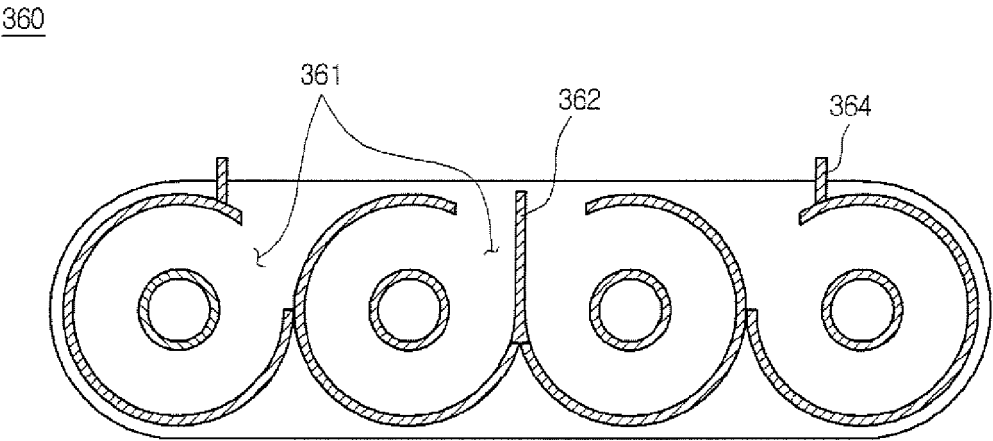


Fig. 9

460

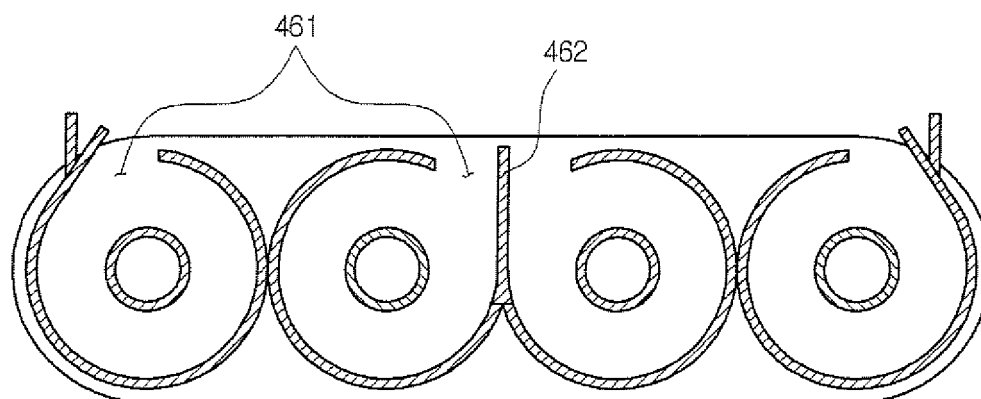


Fig.10

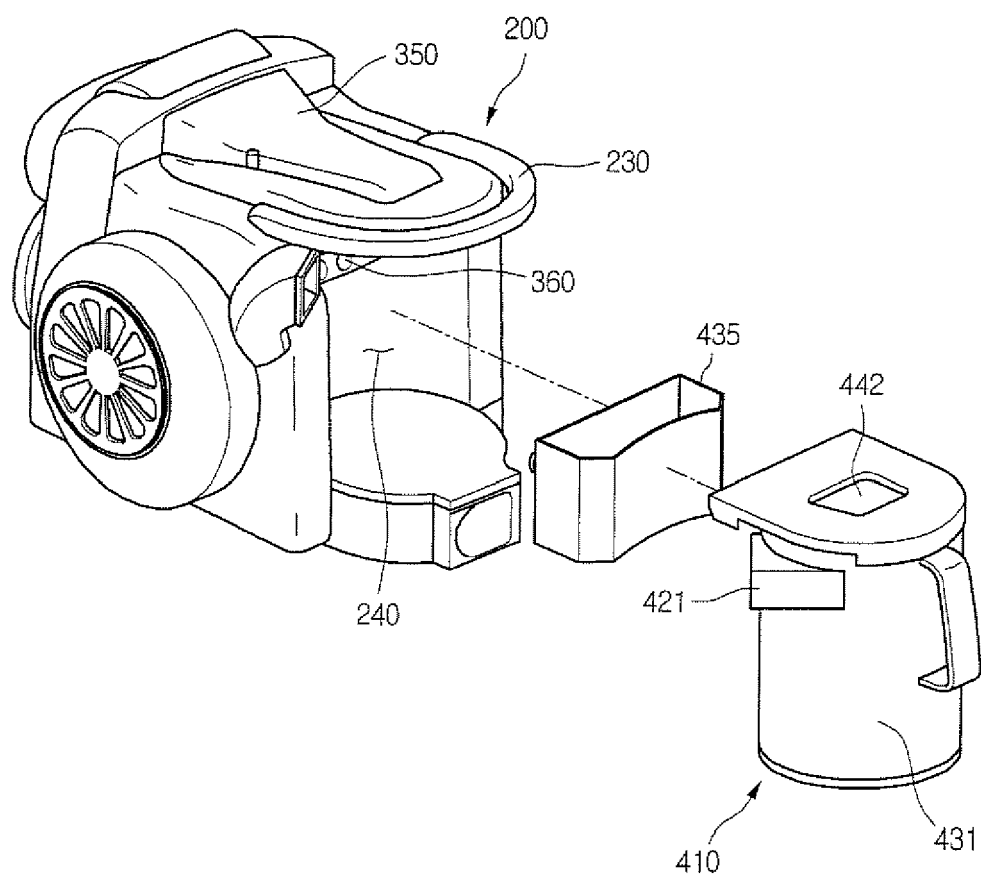


Fig.11

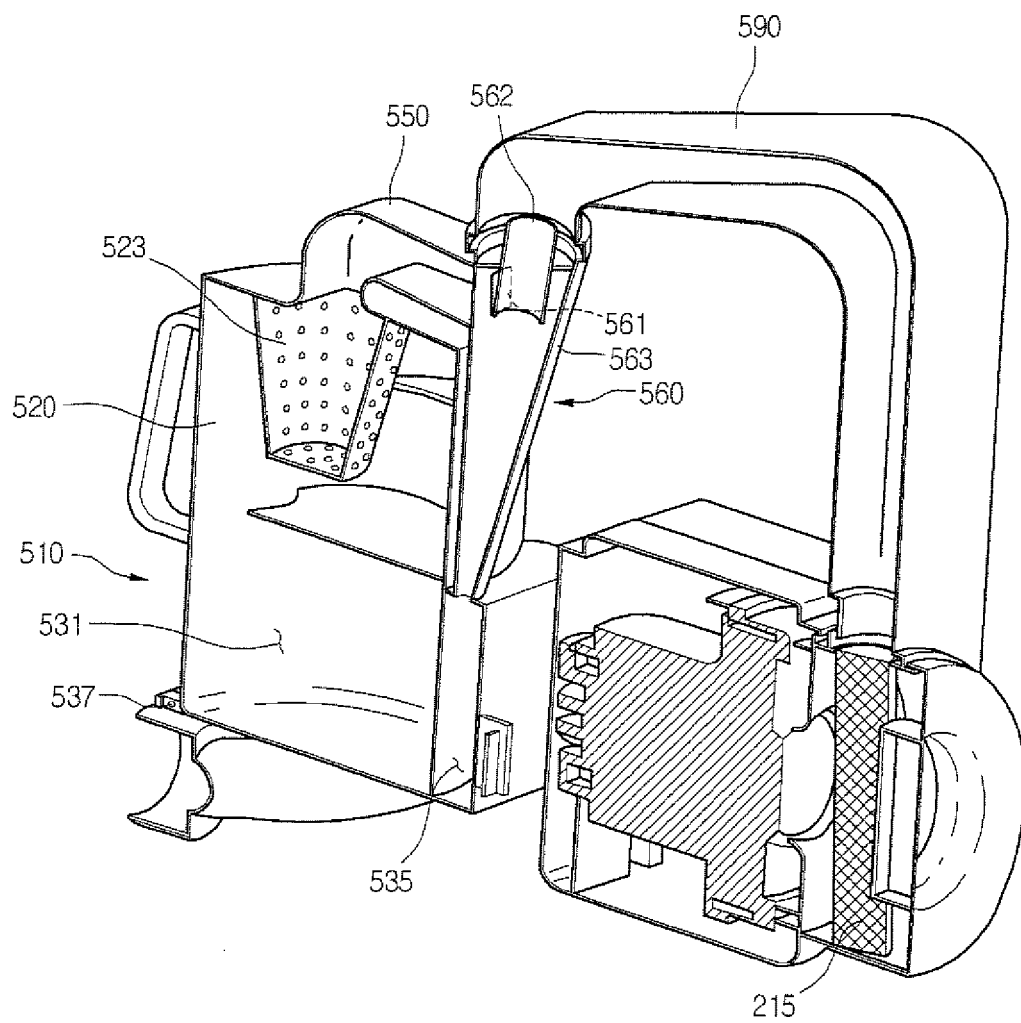


Fig.12

