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(54) **Cyclone unit and contaminants-collecting apparatus having the same**

Zykloneneinheit und Schadstoffsammelvorrichtung dieselbe enthaltend

Unité cyclonique et collecteur de poussière comprenant la même

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a vacuum cleaner. More particularly, the present invention relates to a cyclone unit that separates and collects contaminants from outside air and then discharges clean air and a contaminants-collecting apparatus having the same.

2. Description of the Related Art

[0002] Generally, a vacuum cleaner employs a dust-collecting receptacle that separates contaminants from outside air entered through a suction nozzle, collects separated contaminants, and then, discharges clean air to the outside.

[0003] The dust-collecting receptacle described in document US 2002/0011053 is formed in a substantially cylindrical shape. Contaminants-laden air enters into the dust collecting receptacle in a substantially tangential direction to the dust collecting receptacle, and then, rises up along an inside surface of the dust collecting receptacle. Contaminants are separated from the contaminants-laden air by centrifugal force, and then, fall to a lower portion of the dust collecting receptacle by their own weight. Air separated from contaminants is discharged outside through an air-discharging pipe formed on an upper portion of the dust-collecting receptacle.

[0004] However, the conventional dust-collecting receptacle has less dust collecting performance than a dust-collecting receptacle having a cyclone structure formed integrally therein. Therefore, when users having the conventional vacuum cleaner employing no cyclone structure want excellent cleaning effect, the users are required to buy a vacuum cleaner having a cyclone structure leaving the conventional vacuum cleaner alone. As a result, an enormous burden of cost will be imposed on the users.

SUMMARY OF THE INVENTION

[0005] The present invention has been developed in order to overcome the above drawbacks and other problems associated with the conventional arrangement. An aspect of the present invention is to provide a cyclone unit that can be easily disposed in the conventional dust-collecting receptacle and a contaminants-collecting apparatus having the same. The above aspect and/or other feature of the present invention can substantially be achieved by providing a cyclone unit for separating contaminants from contaminants-laden air drawn through an air inlet port of a dust-collecting receptacle via a suction nozzle of a vacuum cleaner and for discharging air having contaminants separated to an air-discharging pipe, which comprises a cylindrical body disposed inside the dust-collecting receptacle; at least one supporting bracket extending from an outer circumferential surface of the cylindrical body to an inner circumferential surface of the dust collecting receptacle to support the cylindrical body and to separate the cylindrical body from the inner circumferential surface of the dust-collecting receptacle; and an air inlet pipe having one end in fluid communication with the air inlet port of the dust-collecting receptacle and the other end in fluid communication with the cylindrical body in a tangential direction.

[0006] According to an embodiment of the present invention, an end of the at least one supporting bracket may be bonded on the inner circumferential surface of the dust-collecting receptacle by thermal fusion bonding.

[0007] The air inlet pipe may be extended to wrap around some outer circumferential surface of the cylindrical body to increase the whirling degree of the contaminants-laden air.

[0008] The cyclone unit may further comprise a helical guide disposed inside the cylindrical body to whirl the contaminants-laden air entered inside the cylindrical body through the air inlet pipe and to guide the contaminants-laden air to the air-discharging pipe formed at an upper side of the cylindrical body.

[0009] A width of the at least one supporting bracket may have the same dimension as a dimension of an outer diameter of the air inlet pipe.

[0010] The cylindrical body may further comprise a center shaft disposed at a center thereof for the contaminants-laden air to whirl smoothly therein.

[0011] According to another aspect of the present invention, a contaminants collecting apparatus for a vacuum cleaner comprises: a body having an air inlet through which contaminants-laden air entered via a suction nozzle of the vacuum cleaner passes, collecting and discharging contaminants; and a cyclone unit comprising: a cylindrical body disposed inside the body; at least one supporting bracket extending from an outer circumferential surface of the cylindrical body to an inner circumferential surface of the body to support the cylindrical body and to separate the cylindrical body from the inner circumferential surface of the body; an air inlet pipe having one end in fluid communication with the air inlet port of the body and the other end in fluid communication with the cylindrical body in a tangential direction; and a helical guide disposed inside the cylindrical body to whirl the contaminants-laden air entered inside the cylindrical body through the air inlet pipe and to guide the contaminants-laden air to the air-discharging pipe formed at an upper side of the cylindrical body.

[0012] According to an embodiment of the present invention, the body further comprises an upper cover opening or closing a top end of the body, wherein the upper cover is integrally formed with an air-discharging pipe to guide air discharged from the body to the outside.

[0013] The body may further comprise a lower cover disposed at a bottom end of the body by a hinge connection to open or close the bottom end of the body.

[0014] The body may be made of transparent material or semitransparent material.

[0015] A top end of the cyclone unit may be spaced apart from a bottom end of the upper cover so that contaminants centrifugally separated in the cyclone unit are discharged to the body.

[0016] A contaminants discharging pathway may be formed between an outer circumferential surface of the cyclone unit and an inner circumferential surface of the body, and a contaminants collecting chamber may be formed between a bottom surface of the cyclone unit and a lower cover.

[0017] The air-discharging pipe may be extended downwardly from the upper cover inside the cylindrical body of the cyclone unit.

[0018] An end of the at least one supporting bracket may be bonded on the inner circumferential surface of the body by thermal fusion bonding. Alternately, the at least one supporting bracket may be fixed to the body by at least one screw. Also, the cyclone unit comprises a plurality of supporting brackets, wherein the width of each of the plurality of supporting brackets is wider than a gap between an outer circumferential surface of the cylindrical body and an inner circumferential surface of the body so that a side end of each of the plurality of supporting brackets presses the inner circumferential surface of the body to fix the cylindrical body into the body.

[0019] The air inlet pipe may be disposed to be in contact with the inner circumferential surface of the body so that the air inlet pipe separates the cylindrical body from the inner circumferential surface of the body and supports the cylindrical body.

[0020] The air inlet pipe is bonded on the inner circumferential surface of the body by thermal fusion bonding.

[0021] An outer diameter of the air inlet pipe may be larger than a gap between an outer circumferential surface of the cylindrical body and an inner circumferential surface of the body so that the air inlet pipe presses the inner circumferential surface of the body with at least one of the plurality of supporting brackets to fix the cylindrical body into the body.

[0022] Other objects, advantages and salient features of the invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWING

[0023] 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:

Fig. 1 is a perspective view illustrating a contaminants collecting apparatus having a cyclone unit according to an embodiment of the present invention disposed in a main body of a vacuum cleaner;

Fig. 2 is a perspective view illustrating the cyclone unit of Fig. 1;

Fig. 3 is an exploded perspective view illustrating the cyclone unit of Fig. 2;

Fig. 4A is a plain view illustrating the cyclone unit of Fig. 2 without an upper cover;

Fig. 4B is a partial enlarging view illustrating a cyclone unit fixed inside a cylindrical body by at least one screw;

Fig. 5 is a partial enlarged perspective view illustrating A area of Fig. 2;

Fig. 6 is a sectional view of Fig. 2 taken along a line X-X in Fig. 2; and

Fig. 7 is a partial sectional side view illustrating the cyclone unit of Fig. 4A viewing in a direction of arrow B in Fig. 4A.

[0024] Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0025] Hereinafter, certain exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0026] 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.

[0027] Fig. 1 is a perspective view illustrating a contaminants-collecting apparatus according to an embodiment of the present invention disposed in a vacuum cleaner. Referring to Fig. 1, the contaminants-collecting apparatus 100 according to the present invention is detachably disposed in a main body 11 of the vacuum cleaner 10. A suction nozzle 15 is pivotally connected at a bottom portion of the main body 11 of the vacuum cleaner 10, and a handle 13 is formed on a top end of the main body 11. In this embodiment of the present invention, an upright type vacuum cleaner is used as an example of vacuum cleaners employing the contaminants-collecting apparatus 100 according to an embodiment of the present invention; however, this should not be considered as limiting. Various types of vacuum cleansers such as a canister type vacuum cleaner may employ the contaminants-collecting apparatus 100 according to an embodiment of the present invention. Reference numeral 17 of Fig. 1 denotes wheels. Reference numeral 117 of Fig. 1 denotes a handle.

[0028] Referring to Figs. 2 and 3, the contaminants-collecting apparatus 100 includes a body 110, an upper

cover 130, a lower cover 150, and a cyclone unit 170.

[0029] The body 110 is formed in a substantially cylindrical shape with opposite opened ends. An air inlet port 111 is formed at a middle portion of the body 110 in a tangential direction to the body 110 so that contaminants-laden air enters inside the body 110 from outside. At this time, the body 110 of this embodiment has a cylindrical shape, however, this should not be considered as limiting. The body 110 may have various shapes such as a conical shape or a reversed conical shape corresponding to a part of the main body 11 of the vacuum cleaner 10 0 into which the contaminants collecting apparatus 100 is inserted. Also, the body 110 may be made of transparent material or semitransparent material. As a result, users can easily know the amount of contaminants collected in the body 110 without opening the upper cover 130. The body 110 corresponds to the conventional dust-collecting receptacle as described above.

[0030] The upper cover 130 is detachably disposed on a top end of the body 110 to open or close the opened top end of the body 110. The upper cover 130 has an air-discharging pipe 131 to discharge clean air to the outside of the body 110. The air-discharging pipe 131 penetrates a center of the upper cover 130 and expends downwardly from a bottom surface of the upper cover 130 inside the body 110. Therefore, the air-discharging pipe 131 is inside the cyclone unit 170. A backflow preventing claim 133 (see Fig. 6) is disposed in a ring shape on the bottom surface of the upper cover 130 to face a top end of a cylindrical body 171 (see Fig. 6). The backflow preventing dam 133 has a larger diameter than the cylindrical body 171. The backflow preventing dam 133 prevents contaminants discharging through a below-described contaminants discharging opening 114 (see Fig. 6) by centrifugal force from flowing back to the cylindrical body 171 through the contaminants discharging opening 114.

[0031] The lower cover 150 is disposed at a bottom end of the body 110 by a hinge connection to open or close the opened bottom end of the body 110. The hinge connection of the lower cover 150 has a general hinge connection structure. For an example, the hinge connection has a pair of fixing brackets 113a (see Fig. 5) formed adjacent to the bottom end of the body 110, a hinge part 151 (see Fig. 5) formed one side of the lower cover 150 and inserted between the pair of fixing brackets 113a, and a hinge shaft 115 (see Fig. 5) connecting through the fixing brackets 113a and the hinge part 151. Also, the other side of the lower cover 150 is bound by a locking lever 118 (see Fig. 7) disposed adjacent to the bottom end of the body 110. When emptying contaminants collected in the body 110, the locking lever 118 is operated so that the lower cover 150 is released from the locking lever 118. As a result, the lower cover 150 is pivoted downwardly based on the hinge shaft 115, and then, contaminants collected on the lower cover 150 are discharged outside through the bottom end of the body 110 by the gravity.

[0032] Referring to Fig. 3, the cyclone unit 170 includes a cylindrical body 171, an air inlet pipe 173, a plurality of supporting brackets 175a, 175b, and 175c, a center shaft 177 (see Fig 4A), and a helical guide 179 (see Fig. 4A).

[0033] The cylindrical body 171 has a less diameter than the body 110 to be inserted inside the body 1 to. The cylindrical body 171 is disposed inside the body 110 so that a space of the body 110 in which contaminants are collected is isolated from the air-discharging pipe 131 (see Fig. 6). As a result, the cylindrical body 171 prevents contaminants collected in the body 110 from re-scattering and discharging outside through the air-discharging pipe 131.

[0034] Furthermore, the cylindrical body 171 is disposed inside the body 110 so that a contaminants discharging opening 114, a contaminants discharging pathway 116, and a contaminants collecting chamber 110b are formed in the space 113 (see Fig. 3) of the body 110. Referring to Fig. 6, the contaminants discharging opening 114 is formed between the top end of the cylindrical body 171 and the bottom end of the upper cover 130 so that contaminants whirled upwardly along an inner circumferential surface of the cylindrical body 171a are discharged inside the body 110 through the contaminants discharging opening 114 by centrifugal force. The contaminants discharging pathway 116 is a space between an outer circumferential surface of the cylindrical body 171 and the inner circumferential surface of the body 110 to guide the contaminants passed through the contaminants discharging opening 114 downwardly. The contaminants collecting chamber 110b is a space between a bottom end of the cylindrical body 171 and the lower cover 150 to collect contaminants falling through the contaminants discharging pathway 116 by gravity.

[0035] Furthermore, the air inlet pipe 173 is in fluid communication with the air inlet port 111 of the body 110 so as to guide contaminants-laden air entering through the air inlet port 111 from the outside into the cylindrical body 171. The air inlet pipe 173 is formed in the tangential direction to the lower side of the cylindrical body 171 so that the contaminants-laden air is whirled inside the cylindrical body 171. At this time, the air inlet pipe 173 is preferably formed to wrap around some part of the outer circumferential surface of the cylindrical body 171 to increase the whirling degree of the contaminants-laden air.

[0036] The helical guide 179 (see Fig. 6) is formed between the inner circumferential surface of the cylindrical body 171 and the center shaft 177 formed in a vertical direction on a center of the cylindrical body 171. The helical guide 179 increases the whirling degree of the contaminants-laden air entered inside the cylindrical body 171, through the air inlet pipe 173. In other words, the entering contaminants-laden air is whirled more strongly due to a helical air path formed by the center shaft 177, the helical guide 179, and the cylindrical body 171.

[0037] The plurality of supporting brackets 175a, 175b, and 175c are formed at predetermined intervals on the outer circumferential surface of the cylindrical body 171. Each of the plurality of supporting brackets 175a, 175b,

and 175c has a predetermined width to separate the cylindrical body 171 from the inner circumferential surface of the body 110. At least one of the plurality of supporting brackets 175a, 175b, and 175c is bonded on the inner circumferential surface 110a of the body 110 by thermal fusion bonding to securely fix the cylindrical body 171 into the body 110. For fixing the cylindrical body 171 to the body 110, various other suitable methods may be used in addition to the thermal fusion bonding. In one embodiment, each of the plurality of supporting brackets 175 can have a thickness (t) sufficient so that the supporting brackets 175 can be fixed on the body 110 by at least one screw 271 as shown in Fig. 4B. Another example is that the width (W) of each of the plurality of supporting brackets 175a, 175b, and 175c is wider than a gap between the outer circumferential surface of the cylindrical body 171 and the inner circumferential surface of the body 110 so that a side end of each of the plurality of supporting brackets 175a, 175b, and 175c presses the inner circumferential surface of the body 110 to fix the cylindrical body 171 into the body 110. On the other hand, each of the plurality of supporting brackets 175a, 175b, and 175c is formed to have the same width as a dimension of an outer diameter of the air inlet pipe 173 so that the cylindrical body 171 could be disposed in a center of the body 110.

[0038] With an embodiment of the present invention, the cyclone unit 170 is disposed in the conventional dust-collecting receptacle employing no cyclone structure and having the upper and lower cover, thereby maximizing contaminants collecting efficiency of the conventional dust collecting receptacle. Also, the cyclone unit 170 according to an embodiment of the present invention can be easily disposed into the conventional dust-collecting receptacle without substantially, structural change so that the conventional dust-collecting receptacle is recyclable.

[0039] Hereinafter, operation of the contaminants collecting apparatus 100 having the cyclone unit 170 according to an embodiment of the present invention with the above-described structure will be described.

[0040] Contaminants-laden air entered into the air inlet pipe 173 via the suction nozzle 15 (see Fig. 1) from the outside enters inside the cylindrical body 171, and then, rises up to the upper cover 130 whirling along the inner circumferential surface of the cylindrical body 171. Contaminants separated from the whirling upwardly contaminants-laden air by centrifugal force are collected in the contaminants collecting chamber 110b passing through the contaminants discharging opening 114 and the contaminants discharging pathway 116 in order. Here, the backflow preventing dam 133 prevents the contaminants collected in the contaminants collecting chamber 110b from flowing back through the contaminants discharging opening 114. On the other hand, air having contaminants removed is discharged outside the contaminants collecting apparatus 100 through the air-discharging pipe 131 formed to penetrate the upper cover 130.

[0041] As described above, because the contaminants collecting apparatus 100 according to an embodiment of the present invention can use the conventional dust-collecting receptacle having no cyclonic structure without structural change as the body 110 to dispose the cyclone unit 170, it causes the conventional dust-collecting receptacle to be recycled. As a result, a burden of cost imposed on users is decreased.

[0042] According to the present invention, because the cyclone unit 170 is disposed inside the body 110 of the contaminants collecting apparatus 100, that is, inside the conventional dust-collecting receptacle, the air-discharging pipe 131 is isolated from the contaminants collecting chamber 110b. As a result contaminants collected in the contaminants collecting chamber 110b is not re-scattered. Also, when the contaminants collecting apparatus 100 is inclined, contaminants collected in the contaminants collecting chamber 110b is prevented from entering the air-discharging pipe 131.

[0043] Furthermore, because air passed through the air inlet pipe 173 is discharged through the air-discharging pipe 131 without change of a flowing direction, interference between air entering the cyclone unit 170 and air discharging outside is minimized. As a result, loss of suction force is decreased. Also, the air inlet pipe 173 is extended to wrap around the outer circumferential surface of the cylindrical body 171 so that air entered from outside rotates along some part of the outer circumferential surface of the cylindrical body 171, and then, to enter inside the cylindrical body 171. Therefor, whirling degree of air entering the cylindrical body 171 is increase.

Claims

1. A cyclone unit (170) for separating contaminants from contaminants-laden air drawn through an air inlet port (111) of dust-collecting receptacle via a suction nozzle (15) of a vacuum cleaner (10) and for discharging air having contaminants separated to an air-discharging pipe (131) the cyclone unit (170) comprising:

   a cylindrical body (171) adapted to be disposed inside the dust-collecting receptacle; and
   an air inlet pipe (173) having one end adapted to be in fluid communication with the air inlet port (111) of the dust-collecting receptacle and the other end in fluid communication with the cylindrical body (171) in a tangential direction, **characterised in that** the cyclone unit (170) comprises at least one supporting bracket (175a, 175b, 175c) extending from an outer circumferential surface of the cylindrical body (171) and adapted to extend to an inner circumferential surface of the dust-collecting receptacle when the cylindrical body (171) is disposed inside the dust collecting receptacle to support the cylin-

drical body (171) and to separate the cylindrical body (171) from the inner circumferential surface of the dust-collecting (receptacle.

2. The cyclone unit (170) of claim 1, wherein the air inlet pipe (173) wraps around some outer circumferential surface of the cylindrical body (171) to increase the whirling degree of the contaminants-laden air.

3. The cyclone unit (170) of any of claims 1 and 2, further comprising:

a helical guide (179) disposed inside the cylindrical body (171) to whirl the contaminants-laden air entering the cylindrical body (171) through the air inlet pipe (173) and to guide the contaminants-laden air to the air-discharging pipe (131) formed at an upper side of the cylindrical body (171).

4. The cyclone unit (170) of any of claims 1 to 3, wherein the at least one supporting bracket (175a, 175b, 175c) has a width that is the same dimension as a dimension of an outer diameter of the air inlet pipe (173).

5. The cyclone unit (170) of any of claims 1 to 4, wherein the cylindrical body (171) further comprises a center shaft (177) disposed at a center thereof for the contaminants-laden air to whirl smoothly therein.

6. A contaminants collecting apparatus (100) for a vacuum cleaner (10) comprising:

a body (110) having an air inlet (111) through which contaminants-laden air entering via a suction nozzle (15) of the vacuum cleaner (10) can pass, in which contaminants separated from the contaminants-laden air can be collected, and from which clean air can be discharged; and
a cyclone unit (170) comprising:

a cylindrical body (171) disposed inside the body (110);
an air inlet pipe (173) having one end in fluid communication with the air inlet of the body and the other end in fluid communication with the cylindrical body (171) in a tangential direction, **characterised in that** the cyclone unit (170) further comprises:
at least one supporting bracker (175a, 175b, 175c) extending from an outer circumferential surface of the cylindrical body (171) to an inner circumferential surface of the body (110) to support the cylindrical body (171) and to separate the cylindrical body (171) from the inner circumferential surface of the body (110), and

a helical guide (179) disposed inside the cylindrical body (171) to whirl the contaminants-laden air entering the cylindrical body (171) through the air inlet pipe (173) and to guide the contaminants-laden air to the air-discharging pipe (131) formed at an upper side of the cylindrical body (171).

7. The contaminants collecting apparatus (100) of claim 6, wherein the body (110) further comprises an upper cover (130) opening or closing a top end of the body (110),
wherein the upper cover (130) is integrally formed with the air-discharging pipe to guide (131) the clean air discharged from the body (110) to the outside.

8. The contaminants collecting apparatus (100) of any of claims 6 and 7, wherein the body (110) further comprises a lower cover (150) disposed at a bottom end of the body (110) by a hinge connection to open or close the bottom end of the body (110).

9. The contaminants collecting apparatus (100) of any of claims 6 to 8, wherein the body (110) is made of transparent material or semitransparent material.

10. The contaminants collecting apparatus (100) of any of claims 7 to 9, wherein the cyclone unit (170) has a top end that is spaced apart from a bottom end of the upper cover (130) so that contaminants centrifugally separated in the cyclone unit (170) are discharged to the body (110).

11. The contaminants collecting apparatus (100) of any of claims 6 to 10, further comprising a contaminants discharging pathway (116) formed between an outer circumferential surface of the cyclone unit (170) and an inner circumferential surface of the body (110) a contaminants collecting chamber (110b) formed between a bottom surface of the cyclone unit (170) and a lower cover (150).

12. The contaminants collecting apparatus (100) of any of claims 6 to 11, wherein the air-discharging pipe (131) extends downwardly from the upper cover (130) inside the cylindrical body (171) of the cyclone unit (170).

13. The contaminants collecting apparatus (100) of any of claims 6 to 12, wherein the at least one supporting bracket (175a, 175b, 175c) has an end that is bonded on the inner circumferential surface of the body (110) by thermal fusion bonding.

14. The contaminants collecting apparatus (100) of any of claims 6 to 13, wherein the at least one supporting bracket (175a, 175b, 175c) is fixed to the body by at least one screw.

15. The contaminants collecting apparatus (100) of any of claims 6 to 14, wherein the cyclone unit (170) comprises a plurality of supporting brackets (175a, 175b, 175c)
wherein the width of each of the plurality of supporting brackets (175a, 175b, 175c) is wider than a gap between an outer circumferential surface of the cylindrical body (171) and an inner circumferential surface of the body (110) so that a side end of each of the plurality of supporting brackets (175a, 175b, 175c) presses the inner circumferential surface of the body (110) to fix the cylindrical body (171) into the body (110)

16. The contaminants collecting apparatus (100) of any of claims 6 to 15, wherein the air inlet pipe (173) is in contact with the inner circumferential surface of the body (110) so that the air inlet pipe (173) separates the cylindrical body (171) from the inner circumferential surface of the body (110) and supports the cylindrical body (171).

17. The contaminants collecting apparatus (100) of any of claims 6 to 16, wherein the air inlet pipe (173) is bonded on the inner circumferential surface of the body (110) by thermal fusion bonding.

18. The contaminants collecting apparatus (100) of any of claims 6 to 17, the air inlet pipe (173) has an outer diameter that is larger than a gap between an outer circumferential surface of the cylindrical body (171) and an inner circumferential surface of the body (110) so that the air inlet pipe (173) presses the inner circumferential surface of the body (110) with at least one of the plurality of supporting brackets (175a, 175b, 175c) to fix the cylindrical body (171) into the body (110).

Patentansprüche

1. Zykloneinheit (170) zum Trennen von Schmutzstoffen von schmutzstoffbeladener Luft, die durch einen Lufteinlasskanal (111) eines Staubsammelbehältnisses über eine Saugdüse (15) eines Vakuumreinigers (10) gezogen wird, und zum Austragen von Luft, deren Schmutzstoffe getrennt worden sind, an ein Luftaustragsrohr (131),
wobei die Zykloneinheit (170) umfasst:

einen zylindrischen Körper (171), der derart ausgebildet ist, dass er innerhalb des Staubsammelbehältnisses angeordnet ist; und
ein Lufteinlassrohr (173), von dem ein Ende derart ausgebildet ist, dass es in Fluidverbindung mit dem Lufteinlasskanal (111) des Staubsammelbehältnisses steht, und ein anderes Ende mit dem zylindrischen Körper (171) in einer tangentialen Richtung in Fluidverbindung steht,

dadurch gekennzeichnet, dass
die Zykloneinheit (170) zumindest eine Stützhalterung (175a, 175b, 175c) umfasst, die von einer äußeren Umfangsfläche des zylindrischen Körpers (171) wegführt und derart ausgebildet ist, so dass sie sich zu einer inneren Umfangsfläche des Staubsammelbehältnisses erstreckt, wenn der zylindrische Körper (171) innerhalb des Staubsammelbehältnisses angeordnet ist, um den zylindrischen Körper (171) zu stützen und den zylindrischen Körper (171) von der inneren Umfangsfläche des Staubsammelbehältnisses zu trennen.

2. Zykloneinheit (170) nach Anspruch 1,
wobei das Lufteinlassrohr (173) um einen Teil der äußeren Umfangsfläche des zylindrischen Körpers (171) geschlungen ist, um den Verwirbelungsgrad der mit Schmutzstoff beladenen Luft zu erhöhen.

3. Zykloneinheit (170) nach einem der Ansprüche 1 oder 2, ferner mit: einer spiralförmigen Führung (179), die innerhalb des zylindrischen Körpers (171) angeordnet, um die schmutzstoffbeladene Luft, die in den zylindrischen Körper (171) durch das Lufteinlassrohr (173) eintritt, zu verwirbeln und die schmutzstoffbeladene Luft an das Luftaustragsrohr (131) zu führen, das an einer Oberseite des zylindrischen Körpers (171) ausgebildet ist.

4. Zykloneinheit (170) nach einem der Ansprüche 1 bis 3,
wobei die zumindest eine Stützhalterung (175a, 175b, 175c) eine Breite besitzt, die die gleiche Dimension besitzt, wie eine Dimension eines Außendurchmessers des Lufteinlassrohres (173).

5. Zykloneinheit (170) nach einem der Ansprüche 1 bis 4,
wobei der zylindrische Körper (171) ferner einen Zentralschaft (177) umfasst, der an einem Zentrum desselben angeordnet ist, um die schmutzstoffbeladene Luft darin sanft zu verwirbeln.

6. Schmutzstoffsammelvorrichtung (100) für einen Vakuumreiniger (10) mit:

einem Körper (110), der einen Lufteinlass (111) besitzt, durch den schmutzstoffbeladene Luft, die über eine Saugdüse (15) des Vakuumreinigers (10) eintritt, strömen kann, in dem von der schmutzstoffbeladenen Luft getrennte Schmutzstoffe gesammelt werden können und von dem gereinigte Luft ausgetragen werden kann; und
einer Zykloneinheit (170), mit:

einem zylindrischen Körper (171), der innerhalb des Körpers (110) angeordnet ist, einem Lufteinlassrohr (173), von dem ein Ende in Fluidverbindung mit dem Lufteinlass des Körpers steht und ein anderes Ende in einer tangentialen Richtung in Fluidverbindung mit dem zylindrischen Körper (171) steht,

dadurch gekennzeichnet, dass
die Zykloneinheit (170) ferner umfasst:

zumindest eine Stützhalterung (175a, 175b, 175c), die von einer äußeren Umfangsfläche des zylindrischen Körpers (171) zu einer inneren Umfangsfläche des Körpers (110) führt, um den zylindrischen Körper (171) zu stützen und den zylindrischen Körper (171) von der inneren Umfangsfläche des Körpers (110) zu trennen; und eine spiralförmige Führung (179), die innerhalb des zylindrischen Körpers (171) angeordnet ist, um die schmutzstoffbeladene Luft, die in den zylindrischen Körper (171) durch das Lufteinlassrohr (173) eintritt, zu verwirbeln und die schmutzstoffbeladene Luft zu dem Luftaustragsrohr (131) zu führen, das an einer Oberseite des zylindrischen Körpers (171) ausgebildet ist.

7. Schmutzstoffsammelvorrichtung (100) nach Anspruch 6,
wobei der Körper (110) ferner eine obere Abdeckung (130) umfasst, die ein Kopfende des Körpers (110) öffnet oder schließt,
wobei die obere Abdeckung (130) mit dem Luftaustragsrohr einteilig ausgebildet ist, um die von dem Körper (110) ausgetragene, gereinigte Luft an die Außenseite zu führen (131).

8. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 oder 7,
wobei der Körper (110) ferner eine untere Abdekkung (150) umfasst, die an einem Bodenende des Körpers (110) durch eine Gelenkverbindung angeordnet ist, um das Bodenende des Körpers (110) zu öffnen oder zu schließen.

9. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 8,
wobei der Körper (110) aus einem transparenten Material oder einem semitransparenten Material besteht.

10. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 7 bis 9,
wobei die Zykloneinheit (170) ein Kopfende besitzt, das von einem Bodenende der oberen Abdeckung (130) beabstandet ist, so dass Schmutzstoffe, die in der Zykloneinheit (170) zentrifugal getrennt werden, an den Körper (110) ausgetragen werden.

11. Schmutzstoffsammeivorrichtung (100) nach einem der Ansprüche 6 bis 10,
ferner mit einem Schmutzstoffaustragspfad (116), der zwischen einer äußeren Umfangsfläche der Zykloneinheit (170) und einer inneren Umfangsfläche des Körpers (110) ausgebildet ist, und einer Schmutzstoffsammelkammer (110b), die zwischen einer Bodenfläche der Zykloneinheit (170) und einer unteren Abdeckung (150) ausgebildet ist.

12. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 11,
wobei das Luftaustragsrohr (131) von der oberen Abdeckung (130) innerhalb des zylindrischen Körpers (171) der Zykloneinheit (170) abwärts führt.

13. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 12,
wobei die zumindest eine Stützhalterung (175a, 175b, 175c) ein Ende besitzt, das an die innere Umfangsfläche des Körpers (110) durch Thermoschmelzanbindung angebunden ist.

14. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 13,
wobei die zumindest eine Stützhalterung (175a, 175b, 175c) durch zumindest eine Schraube an dem Körper fixiert ist.

15. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 14,
wobei die Zykloneinheit (170) mehrere Stützhalterungen (175a, 175b, 175c) umfasst,
wobei die Breite von jeder der mehreren Stützhalterungen (175a, 175b, 175c) breiter als ein Spalt zwischen einer äußeren Umfangsfläche des zylindrischen Körpers (171) und einer inneren Umfangsfläche des Körpers (110) ist, so dass ein Seitenende von jeder der mehreren Stützhalterungen (175a, 175b, 175c) die innere Umfangsfläche des Körpers (110) presst, um den zylindrischen Körper (171) in dem Körper (110) zu fixieren.

16. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 15,
wobei das Lufteinlassrohr (173) in Kontakt mit der inneren Umfangsfläche des Körpers (110) steht, so dass das Lufteinlassrohr (173) den zylindrischen Körper (171) von der inneren Umfangsfläche des Körpers (110) trennt und den zylindrischen Körper (171) stützt.

17. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 16,
wobei das Lufteinlassrohr (173) an der inneren Umfangsfläche des Körpers (110) durch Thermoschmelzanbindung angebunden ist.

18. Schmutzstoffsammelvorrichtung (100) nach einem der Ansprüche 6 bis 17,
wobei das Lufteinlassrohr (173) einen Außendurchmesser besitzt, der größer als ein Spalt zwischen einer äußeren Umfangsfläche des zylindrischen Körpers (171) und einer inneren Umfangsfläche des Körpers (110) ist, so dass das Lufteinlassrohr (173) die innere Umfangsfläche des Körpers (110) mit zumindest einer der mehreren Stützhalterungen (175a, 175b, 175c) presst, um den zylindrischen Körper (171) in dem Körper (110) zu fixieren.

Revendications

1. Unité cyclonique (170) permettant de séparer des contaminants de l'air chargé de contaminants aspiré à travers un orifice d'entrée d'air (111) d'un récipient collecteur de poussière via une buse d'aspiration (15) d'un aspirateur (10) et permettant d'évacuer l'air à contaminants séparés vers un conduit d'évacuation d'air (131), l'unité cyclonique (170) comprenant :

un corps cylindrique (171) adapté pour être dispose à l'intérieur du récipient collecteur de poussière ; et
un conduit d'entrée d'air (173) présentant une extrémité adaptée pour être en communication fluidique avec l'orifice d'entrée d'air (111) du récipient collecteur de poussière et l'autre extrémité en communication fluidique avec le corps cylindrique (171) dans une direction tangentielle, **caractérisée en ce que** l'unité cyclonique (170) comprend au moins un support (175a, 175b, 175c) partant d'une surface circonférentielle extérieure du corps cylindrique (171) et adapté pour s'étendre jusqu'à une surface circonférentielle intérieure du récipient collecteur de poussière lorsque le corps cylindrique (171) est agencé à l'intérieur du récipient collecteur de poussière pour supporter le corps cylindrique (171) et pour séparer le corps cylindrique (171) de la surface circonférentielle intérieure du récipient collecteur de poussière.

2. Unité cyclonique (170) selon la revendication 1, dans laquelle le conduit d'entrée d'air (173) s'enroule autour d'une partie de la surface circonférentielle extérieure du corps cylindrique (171) pour augmenter le degré de tourbillonnement de l'air chargé de contaminants,

3. Unité cyclonique (170) selon l'une quelconque des revendications 1 et 2, comprenant en outre :

un guide hélicoïdal (179) agencé à l'intérieur du corps cylindrique (171) pour faire tourbillonner l'air chargé de contaminants entrant dans le corps cylindrique (171) à travers le conduit d'entrée d'air (173) et pour guider l'air chargé de contaminants vers le conduit d'évacuation d'air (131) formé au niveau d'un côté supérieur du corps cylindrique (171).

4. Unité cyclonique (170) selon l'une quelconque des revendications 1 à 3, dans laquelle l'au moins un support (175a, 175b, 175c) a une largeur de même dimension qu'un diamètre extérieur du conduit d'entrée d'air (173).

5. Unité cyclonique (170) selon l'une quelconque des revendications 1 à 4, dans laquelle le corps cylindrique (171) comprend en outre un arbre central (177) agencé au centre de celui-ci pour permettre à l'air chargé de contaminants de tourbillonner doucement à l'intérieur.

6. Appareil collecteur de contaminants (100) pour un aspirateur (10) comprenant :

un corps (110) présentant une entrée d'air (111) par laquelle peut passer de l'air chargé de contaminants entrant via une buse d'aspiration (15) de l'aspirateur (10), dans lequel les contaminants séparés de l'air chargé de contaminants peuvent être recueillis et duquel de l'air propre peut être évacué ; et
une unité cyclonique (170), comprenant :

un corps cylindrique (171) disposé à l'intérieur du corps (110) ;
un conduit d'entrée d'air (173) présentant une extrémité en communication fluidique avec l'entrée d'air du corps et l'autre extrémité en communication fluidique avec le corps cylindrique (171) dans une direction tangentielle, **caractérisée en ce que** l'unité cyclonique (170) comprend en outre :

au moins un support (175a, 175b, 175c) s'étendant d'une surface circonférentielle extérieure du corps cylindrique (171) à une surface circonférentielle intérieure du corps (110) pour supporter le corps cylindrique (171) et pour séparer le corps cylindrique (171) de la surface circonférentielle intérieure du corps (110), et
un guide hélicoïdal (179) agencé à l'intérieur du corps cylindrique (171) pour

faire tourbillonner l'air chargé de contaminants entrant dans le corps cylindrique (171) à travers le conduit d'entrée d'air (173) et pour guider l'air chargé de contaminants vers le conduit d'évacuation d'air (131) formé au niveau d'un côté supérieur du corps cylindrique (171).

7. Appareil collecteur de contaminants (100) selon la revendication 6, dans lequel le corps (110) comprend en outre un recouvrement supérieur (130) ouvrant ou fermant une extrémité supérieure du corps (110),
dans lequel le recouvrement supérieur (130) est formé d'un seul tenant avec le conduit d'évacuation d'air (131) pour guider l'air propre évacué du corps (110) vers l'extérieur.

8. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 et 7, dans lequel le corps (110) comprend en outre un recouvrement inférieur (150) agencé au niveau d'une extrémité inférieure du corps (110) par une articulation à charnière pour ouvrir ou fermer l'extrémité inférieure du corps (110).

9. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 8, dans lequel le corps (110) est réalisé en un matériau transparent ou un matériau semi-transparent.

10. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 7 à 9, dans lequel l'unité cyclonique (170) présente une extrémité supérieure qui est espacée d'une extrémité inférieure du recouvrement supérieur (130) de sorte que les contaminants séparés par centrifugation dans l'unité cyclonique (170) sont évacués vers le corps (110).

11. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 10, comprenant en outre une voie d'évacuation des contaminants (116) formée entre une surface circonférentielle extérieure de l'unité cyclonique (170) et une surface circonférentielle intérieure du corps (110) et une chambre collectrice de contaminants (110b) formée entre une surface inférieure de l'unité cyclonique (170) et un recouvrement inférieur (150).

12. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 11, dans lequel le conduit d'évacuation d'air (131) s'étend vers le bas depuis le recouvrement supérieur (130) à l'intérieur du corps cylindrique (171) de l'unité cyclonique (170).

13. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 12, dans lequel l'au moins un support (175a, 175b, 175c) a une extrémité qui est assemblée sur la surface circonférentielle intérieure du corps (110) par assemblage par thermofusion.

14. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 13, dans lequel l'au moins un support (175a, 175b, 175c) est fixé au corps par au moins une vis.

15. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 14, dans lequel l'unité cyclonique (170) comprend une pluralité de supports (175a, 175b, 175c),
dans lequel la largeur de chacun de la pluralité de supports (175a, 175b, 175c) est plus grande qu'un espace entre une surface circonférentielle extérieure du corps cylindrique (171) et une surface circonférentielle intérieure du corps (110) de sorte qu'une extrémité latérale de chacun de la pluralité de supports (175a, 175b, 175c) exerce une pression sur la surface circonférentielle intérieure du corps (110) pour fixer le corps cylindrique (171) dans le corps (110).

16. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 15, dans lequel le conduit d'entrée d'air (173) est en contact avec la surface circonférentielle intérieure du corps (110) de sorte que le conduit d'entrée d'air (173) sépare le corps cylindrique (171) de la surface circonférentielle intérieure du corps (110) et supporte le corps cylindrique (171).

17. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 16, dans lequel le conduit d'entrée d'air (173) est assemblé sur la surface circonférentielle intérieure du corps (110) par assemblage par thermofusion.

18. Appareil collecteur de contaminants (100) selon l'une quelconque des revendications 6 à 17, le conduit d'entrée d'air (173) a un diamètre extérieur qui est plus grand qu'un espace entre une surface circonférentielle extérieure du corps cylindrique (171) et une surface circonférentielle intérieure du corps (110) de sorte que le conduit d'entrée d'air (173) exerce une pression sur la surface circonférentielle intérieure du corps (110) avec au moins un de la pluralité de supports (175a, 175b, 175c) pour fixer le corps cylindrique (171) dans le corps (110).

FIG. 1

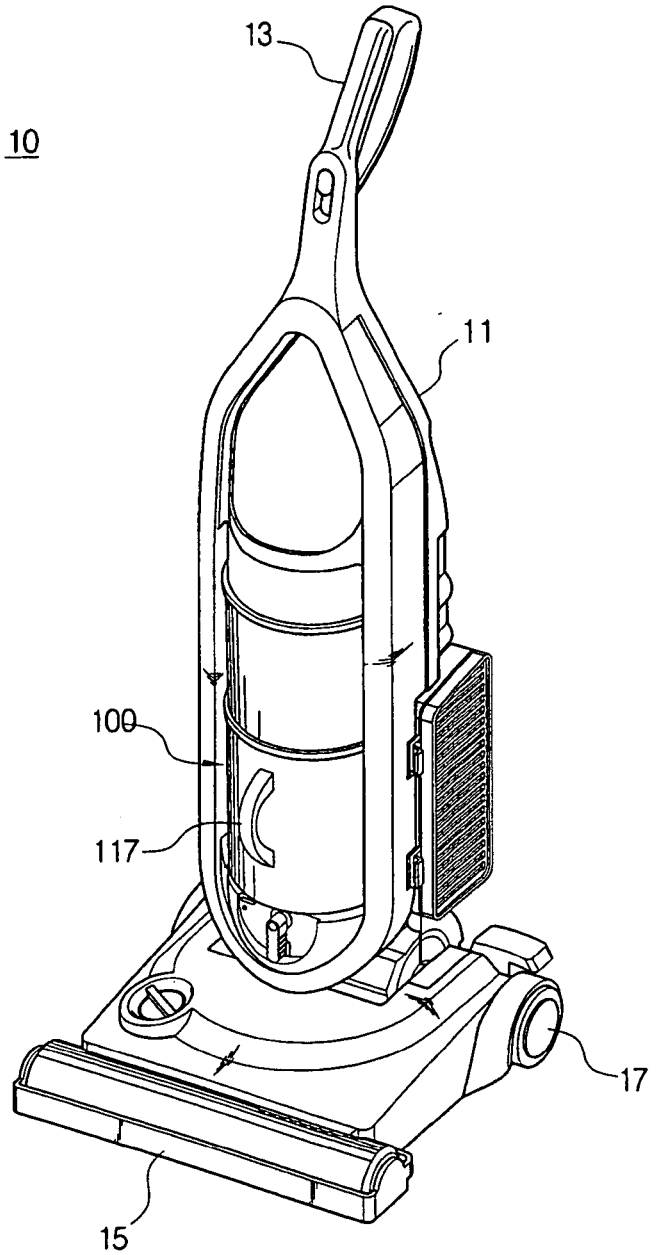


FIG. 2

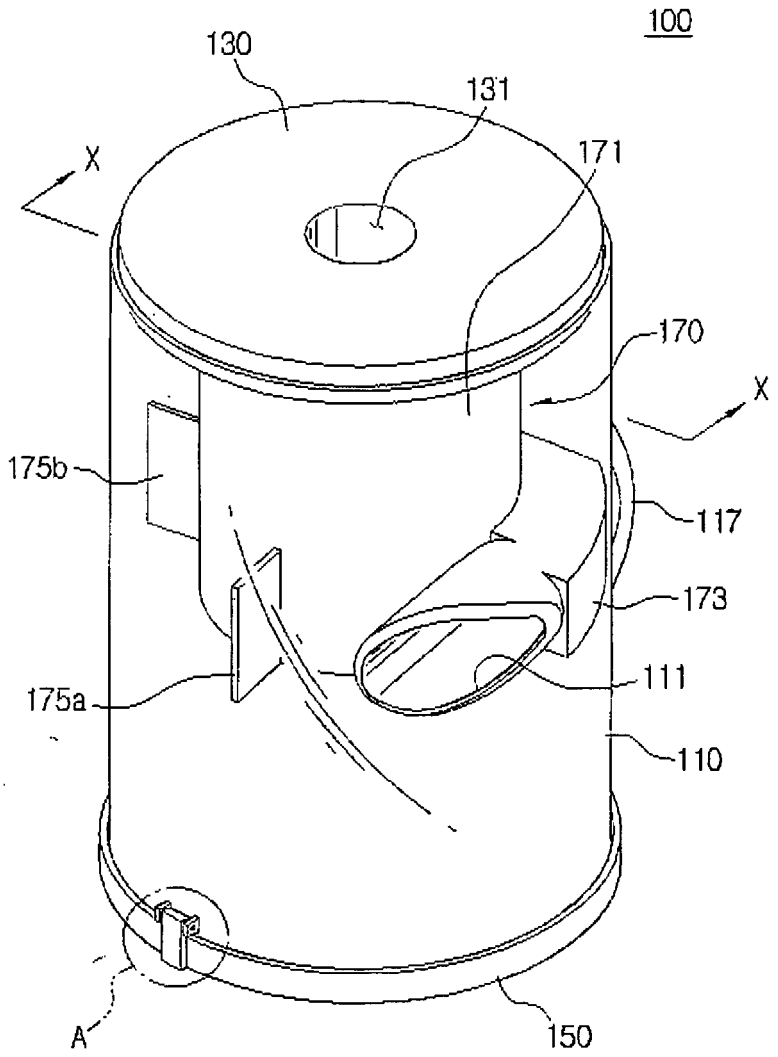


FIG. 3

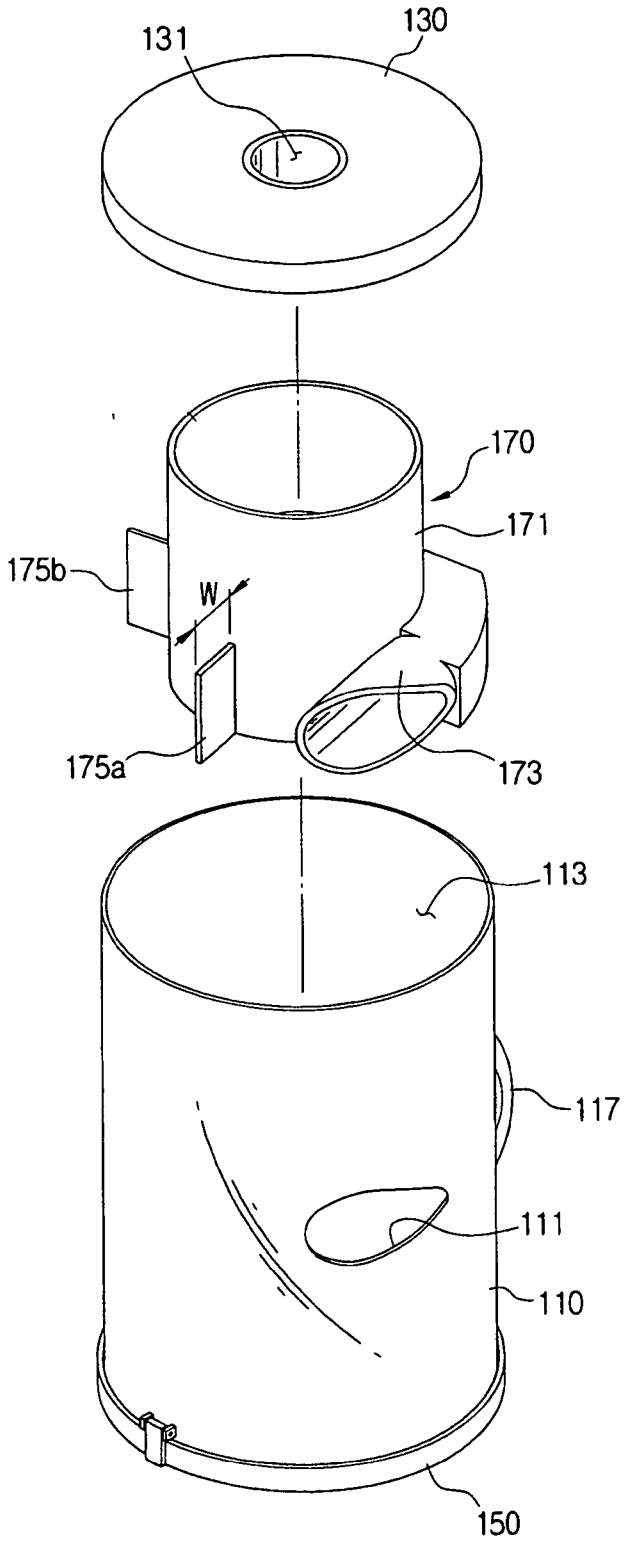


FIG. 4A

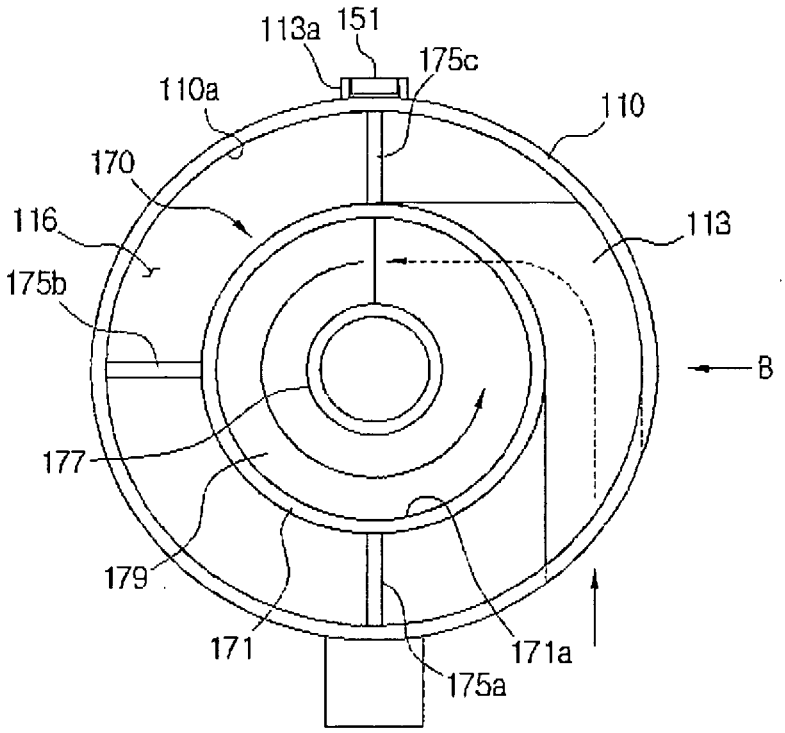

113a
151
175c
110a
110
170
116
113
175b
B
177
179
171
171a
175a

FIG. 4B

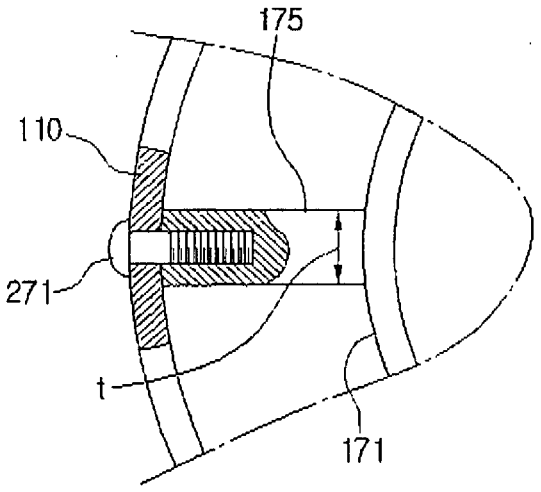

175
110
271
t
171

FIG. 5

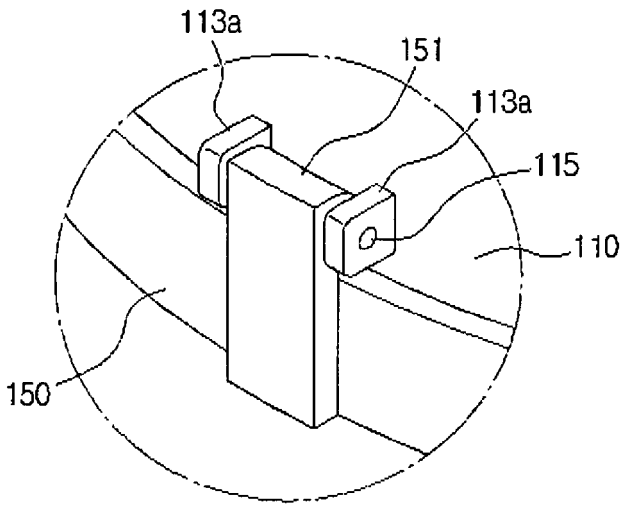


FIG. 6

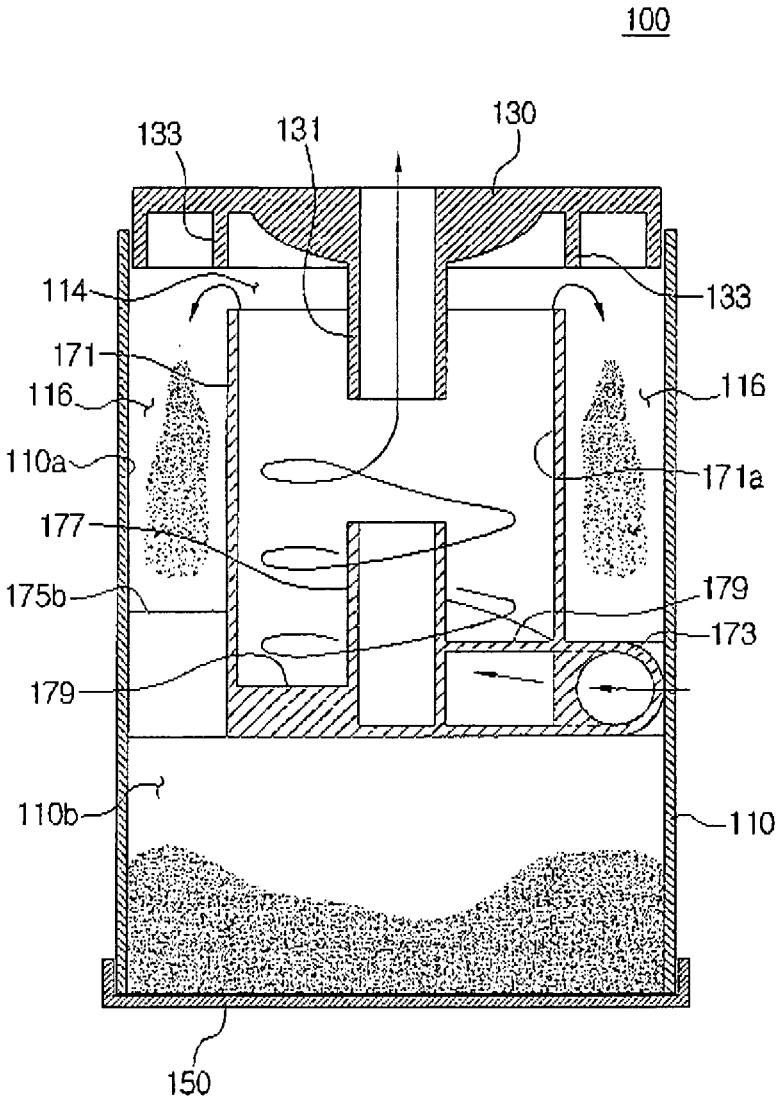
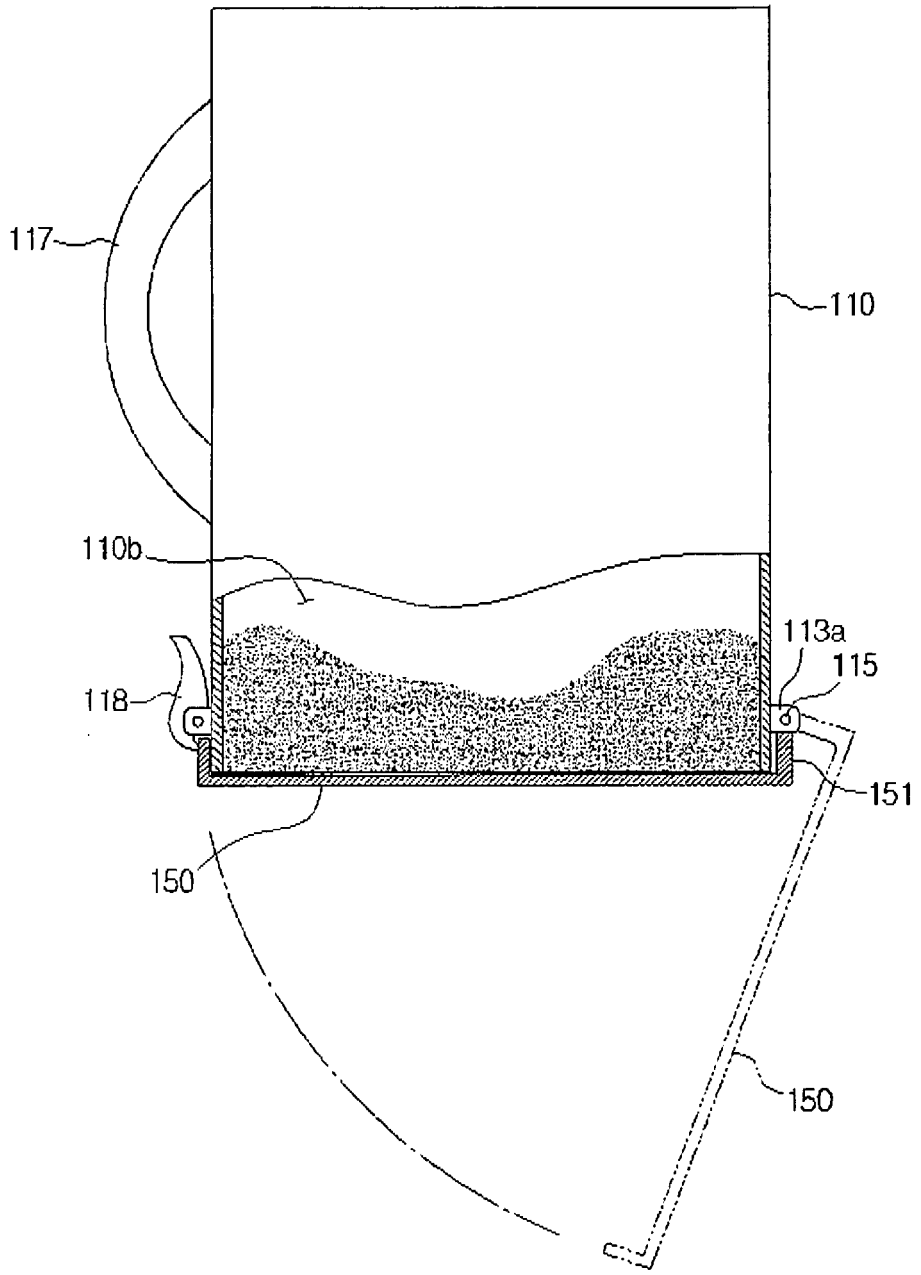

100
133
131
130
114
133
171
116
116
110a
171a
177
175b
179
173
179
110b
110
150

FIG. 7



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