



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
22.04.2020 Bulletin 2020/17

(51) Int Cl.:
A47L 5/24 (2006.01) A47L 9/16 (2006.01)

(21) Application number: **18844477.2**

(86) International application number:
PCT/KR2018/008630

(22) Date of filing: **30.07.2018**

(87) International publication number:
WO 2019/031749 (14.02.2019 Gazette 2019/07)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

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(30) Priority: **07.08.2017 KR 20170099853**

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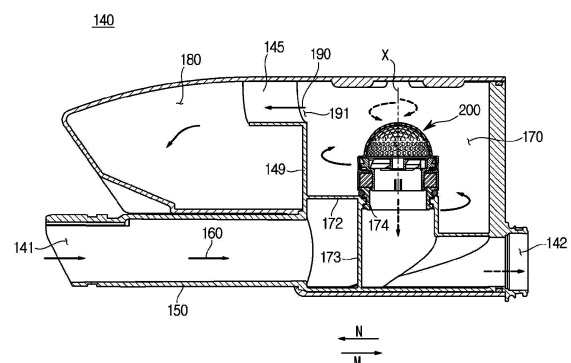
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(54) **CYCLONE DUST COLLECTION DEVICE, AND VACUUM CLEANER AND HANDY-STICK TYPE VACUUM CLEANER WHICH INCLUDE SAME**

(57) Provided is a cyclone dust collector with improved usability, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone dust collector. The handy-stick type vacuum cleaner includes the cyclone dust collector. The cyclone dust collector includes a suction duct configured to suction air in a first direction and provided with an air suction passage formed therein, a cyclone chamber configured to separate dust from air introduced through the suction duct by turning the air, and provided with a grille rotatably formed therein, and a dust collection chamber configured to collect the dust separated from the air in the cyclone chamber in a second direction opposite to the first direction.

FIG. 9



Description

[Technical Field]

[0001] The disclosure relates to a cyclone dust collector, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone dust collector, and more specifically, to a cyclone dust collector with improved usability, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone dust collector.

[Background Art]

[0002] A vacuum cleaner is a device that performs cleaning by suctioning air using suction power generated by a fan and a motor, and filtering foreign substances contained in the suctioned air.

[0003] The vacuum cleaner includes a dust collecting unit therein configured to filter foreign substance in the suctioned air using a filtering device. The filtering device for filtering foreign substances in the dust collecting unit includes a porous filter unit for forcedly filtering foreign substance by allowing air to pass through a porous filter, and a cyclone type dust collecting unit for filtering foreign substances during cyclone flow of air.

[0004] The cyclone dust collector may be widely used for a canister type cleaner, an upright type cleaner, a handy type cleaner, and the like.

[0005] The cyclone dust collector may have an inlet through which air is introduced and an outlet through which air is discharged to the outside. Air introduced through the inlet may have foreign substances thereof filtered and then be discharged to the outside through the outlet.

[0006] The outlet may be provided with a grille. The grille is provided with an air passage hole to prevent foreign substances larger than or equal to a predetermined size from escaping through the outlet. Rotating air of the cyclone dust collector may cause large dust or hairs to be attached to or wound around the outer circumferential surface of the grille.

[0007] When the air passage hole is blocked by dust or hairs sticking to the outer circumference of the grille, the suction force of the vacuum cleaner may be reduced. In addition, the user has inconvenience in manually removing the dust stuck to the outer circumference of the grille.

[Disclosure]

[Technical Problem]

[0008] It is an object of the present disclosure to provide a cyclone dust collector having an improved structure capable of preventing degradation of suction force, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone

dust collector.

[0009] It is another object of the present disclosure to provide a cyclone dust collector having an improved structure capable of easily removing foreign substances in the cyclone dust collector, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone dust collector.

[0010] It is another object of the present disclosure to provide a cyclone dust collector having an improved structure capable of preventing excessive noise from occurring, a vacuum cleaner having the cyclone dust collector, and a handy-stick type vacuum cleaner having the cyclone dust collector.

[Technical Solution]

[0011] A handy-stick type vacuum cleaner according to an aspect of the disclosure includes a cyclone dust collector. The cyclone dust collector includes: a suction duct configured to suction air in a first direction and provided with an air suction passage formed therein; a cyclone chamber configured to separate dust from air introduced through the suction duct by turning the air, and provided with a grille rotatably formed therein; and a dust collection chamber configured to collect the dust separated from the air in the cyclone chamber in a second direction opposite to the first direction.

[0012] The suction duct and the dust collection chamber may be arranged at one side of the cyclone chamber, to be adjacent to each other.

[0013] The suction duct and the dust collection chamber may be arranged in parallel with each other.

[0014] The cyclone dust collector may include: an inner casing configured to define the air suction passage and the cyclone chamber; and an outer casing coupled to the inner casing to define the dust collection chamber.

[0015] The inner casing and the outer casing may be detachably coupled to each other.

[0016] The inner casing may include a cyclone body configured to define the cyclone chamber, wherein the cyclone body may include: a dust discharge port through which dust separated from air is discharged to the dust collection chamber; and a guide configured to define the dust discharge port and extending from the cyclone body into the dust collection chamber.

[0017] At least one portion of the guide may include a curved surface.

[0018] The guide may include: a first portion including a first position located upstream in a direction in which dust separated from air in the cyclone chamber moves toward the dust collection chamber; and a second portion including a second position located downstream in the direction in which dust separated from air in the cyclone chamber moves toward the dust collection chamber, and connected to the first portion while having a curvature.

[0019] The dust collection chamber may include a first wall facing the suction duct and a second wall connected to the first wall, wherein one end of the first portion di-

rected to the second wall may be spaced apart from the second wall.

[0020] A protruding rib may be arranged on an inner wall of the cyclone chamber facing the grille in a rotating axis direction of the grill.

[0021] A cyclone dust collector according to an aspect of the disclosure includes: a suction duct configured to suction air; a cyclone chamber configured to separate dust from air introduced through the suction duct by turning the air, and provided with a grille rotatably formed therein; a dust collection chamber configured to collect the dust separated from the air in the cyclone chamber and located in the same direction as the suction duct with respect to the cyclone chamber; an air suction passage formed in the suction duct; and a dust discharge passage formed in the dust collection chamber and arranged in parallel with the air suction passage.

[0022] A protruding rib may be arranged on an inner wall of the cyclone chamber adjacent to the dust collection chamber in a rotating axis direction of the grill.

[0023] The cyclone dust collector may further include a partition wall configured to partition the cyclone chamber from the dust collection chamber and allowing the dust discharge passage to pass therethrough; and a guide extending from the partition wall into the dust collection chamber and defining the dust discharge passage.

[0024] At least one portion of the guide may have a curved surface.

[0025] The guide may include a first portion including a first position located upstream of the dust discharge passage and a second portion including a second position located downstream of the dust discharge passage and connected to the first portion while having an inclination.

[0026] The second portion may have a curved surface bulged in the outward direction of the dust discharge passage.

[0027] The dust collection chamber may include a first wall facing the suction duct and a second wall connected to the first wall, wherein one end of the first portion directed to the second wall and extending from the first position toward the dust collection chamber may be spaced apart from the second wall.

[0028] A vacuum cleaning according to an aspect of the disclosure includes a cyclone dust collector. The cyclone dust collector may include: an inner casing; an air suction passage provided in the inner casing to suction air in a first direction; a cyclone chamber provided in the inner casing to separate dust from air introduced through the air suction passage by turning the air, and provided with a grille rotatably formed therein; a dust collection chamber configured to collect the dust separated from the air in the cyclone chamber in a second direction opposite to the first direction; and an outer casing coupled

[0029] The air suction passage and the dust collection chamber may communicate with the cyclone chamber

such that the air suction passage and the dust collection chamber are located in the same direction with respect to a rotating axis direction of the grill.

[0030] The inner casing and the outer casing may be detachably coupled to each other.

[Advantageous Effects]

[0031] As described above, foreign substances, such as hairs and the like, can be prevented from being caught or stuck in a grille by implementing a dust removal flow path in a grille assembly.

[0032] Suction force of the cleaner can be prevented from being lowered due to foreign substances tangled or attached to the grille by forming a dust removal flow path in a cyclone dust collector.

[0033] Dust separated from air in a cyclone chamber can be effectively collected into a dust collection chamber by installing a guide having an inclination or a curvature,

[0034] The grille can be prevented from rotating at an excessively high speed by arranging a protruding rib on one inner wall of the cyclone chamber, thereby preventing a bearing from being worn down while reducing noise of the cleaner.

[Brief description of Drawings]

[0035]

FIG. 1 is a perspective view illustrating a handy-stick type vacuum cleaner according to an embodiment of the disclosure;

FIG. 2 is a view illustrating a state in which a handy type cleaner is separated from a stick body in a handy-stick type vacuum cleaner according to an embodiment of the disclosure;

FIG. 3 is a view illustrating a state in which a cyclone dust collector is separated from a handy body in a handy type cleaner shown in FIG. 2;

FIG. 4 is a perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure;

FIG. 5 is an exploded perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure;

FIG. 6 is a cross-sectional view taken along line C-C' of the cyclone dust collector shown in FIG. 4;

FIG. 7 is an exploded perspective view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure;

FIG. 8 is a cross-sectional view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure;

FIG. 9 is a cross-sectional view taken along line I-I' of the cyclone dust collector shown in FIG. 4; and

FIG. 10 is a cross-sectional view illustrating a handy type cleaner in a handy-stick type vacuum cleaner according to an embodiment of the disclosure.

[Modes of the Invention]

[0036] Hereinafter, exemplary embodiments of the disclosure will be described in detail with reference to the accompanying drawings. On the other hand, the terms "front end", "rear end", "upper part", "lower part", "upper end" and "lower end" used in the following description are defined based on the drawings, and the shape and position of each component is not limited by these terms.

[0037] A cyclone dust collector 140 according to the disclosure may be applied to a handy type cleaner, a stick type cleaner, a handy-stick type cleaner, and the like. The following description will be made in relation to an embodiment of the disclosure in which the cyclone dust collector 140 is applied to a handy-stick type vacuum cleaner 1.

[0038] FIG. 1 is a perspective view illustrating a handy-stick type vacuum cleaner according to an embodiment of the disclosure, and FIG. 2 is a view illustrating a state in which a handy type cleaner is separated from a stick body in a handy-stick type vacuum cleaner according to an embodiment of the disclosure. Reference numerals not described herein will be described with reference to FIG. 3.

[0039] Referring to FIGS. 1 and 2, the handy-stick type vacuum cleaner 1 includes a suction brush 10 provided to suction foreign substances, such as hairs, on the surface to be cleaned by suction force of air and a stick body 20 provided to collect the foreign substance suctioned through the suction brush 10.

[0040] The stick body 20 may include a grip portion 21. The grip portion 21 may be provided on an upper side of the stick body 20 such that the user may easily hold the grip portion 21. When the user uses the handy-stick type vacuum cleaner 1, the user may push or pull the suction brush 10 while holding the grip portion 21. The stick body 20 may further include a central portion 22 in which a mounting space 23 is provided. A handy type cleaner 100 to be described below may be detachably coupled to the mounting space 23. The central portion 22 may be provided on a lower side of the grip portion 21.

[0041] In FIG. 1, a side of the stick body 20 facing in the direction of arrow A is a front portion of the stick body 20, and a side of the stick body 20 facing in the direction B is a rear portion of the stick body 20. A main body exhaust portion (not shown) including a plurality of exhaust holes may be formed on a rear portion of the stick body 20.

[0042] The suction brush 10 may be rotatably connected to a lower end of the stick body 20. An air flow path may be formed in the suction brush 10. The air flow path formed inside the suction brush 10 may communicate with a neck portion 11 and an opening 24 of the stick body 20. Accordingly, outside air and dust introduced through the suction brush 10 may be introduced into the handy type cleaner 100 through the neck portion 11 and the opening 24 of the stick body 20.

[0043] A first connection terminal (not shown) may be

provided in the mounting space 23 of the stick body 20, and a second connection terminal (not shown) may be provided on a rear portion of the handy type cleaner 100. When the handy type cleaner 100 is mounted in the mounting space 23, the first connection terminal and the second connection terminal come into contact each other, whereby the stick body 20 and the handy type cleaner 100 may be electrically connected to each other. The stick body 20 may be provided with a locking button 25. In addition, the stick body 20 may be provided with a holding protrusion (not shown) that is selectively coupled to a coupling groove 116 formed on an upper end of a handy body 110 according to whether the locking button 25 is pressed.

[0044] The stick body 20 may be provided with a switch 30 for adjusting the operation of the handy-stick type vacuum cleaner 1.

[0045] FIG. 3 is a view illustrating a state in which a cyclone dust collector is separated from a handy body in a handy type cleaner shown in FIG. 2.

[0046] Referring to FIG. 3, the handy-stick type vacuum cleaner 1 may further include the handy-type cleaner 100 detachably mounted in the mounting space 23 of the stick body 20.

[0047] The handy type cleaner 100 may include the handy body 110 and a cyclone dust collector 140.

[0048] The handy body 110 may include a handy exhaust portion 111 including a plurality of exhaust holes. In addition, the handy body 110 may be provided with a handle 112 and a power button 113. The handy body 110 may be equipped with a motor 120 (see FIG. 10) generating suction force and a battery (not shown). The second connection terminal (not shown) may be provided on the rear portion of the handy body 110. The handy body 110 may be provided with a dust collector mounting space 114 in which the cyclone dust collector 140 is detachably mounted.

[0049] The handy body 110 may include a handy type cleaner inlet 115 and an entry gasket (not shown) installed in the handy type cleaner inlet 115. The handy type cleaner inlet 115 may be tightly coupled to the opening 24 of the stick body 20 and an inlet 141 of the cyclone dust collector 140. The entry gasket may be installed along the circumference of the handy type cleaner inlet 115 to prevent air from leaking at a coupling portion between the handy type cleaner inlet 115 and the inlet 141 of the cyclone dust collector 140.

[0050] The handy body 110 may further include an exit gasket (not shown). The exit gasket may be installed along the circumference of an outlet 142 of the cyclone dust collector 140 provided to correspond to the inlet 141 of the cyclone dust collector 140. The outlet gasket serves to seal a gap between the outlet 142 of the cyclone dust collector 140 and an air inlet (117 in FIG. 10) of the handy body 110 to prevent air from leaking between the outlet 142 of the cyclone dust collector 140 and the air inlet (117 in FIG. 10) of the handy body 110 when the cyclone dust collector 140 is coupled to the handy body

110.

[0051] Details of the cyclone dust collector 140 will be described below.

[0052] FIG. 4 is a perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure, FIG. 5 is an exploded perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure, and FIG. 6 is a cross-sectional view taken along line C-C' of the cyclone dust collector shown in FIG. 4.

[0053] Referring to FIGS. 4 to 6, the handy type cleaner 100 may include the cyclone dust collector 140 detachably coupled to the handy body 110.

[0054] The cyclone dust collector 140 may include the inlet 141 through which air containing dust is introduced and the outlet (142 in FIG. 9) through which purified air is discharged.

[0055] The cyclone dust collector 140 may further include a casing that forms the external appearance thereof. The casing may include an inner casing 143 and an outer casing 144 that are detachably coupled to each other. The inner casing 143 may be provided to define an air suction passage 160 and a cyclone chamber 170. The outer casing 144 may be provided to define a dust collection chamber 180 by being coupled to the inner casing 143. The outer casing 144 may include a suction duct coupling hole 144a to which a suction duct 150 is coupled. The suction duct 150 may be coupled to the suction duct coupling hole 144a of the outer casing 144 such that at least a portion of the suction duct 150 is exposed to the outside. When the cyclone dust collector 140 is mounted in the dust collector mounting space 114 of the handy body 110, the suction duct 150 coupled to the suction duct coupling hole 144a of the outer casing 144 is coupled to the handy type cleaner inlet 115.

[0056] In other words, the inner casing 143 may include the suction duct 150 provided to define the air suction passage 160 and a cyclone body 171 provided to define the cyclone chamber 170.

[0057] The cyclone dust collector 140 may further include the suction duct 150 provided to suction air. In detail, the cyclone dust collector 140 may further include the suction duct 150 provided to suction air in a first direction (M). The suction duct 150 may have a cylindrical shape having a hollow. However, the shape of the suction duct 150 is not limited thereto, and may be variously changed. The air suction passage 160 through which air flows may be formed in the suction duct 150. An entry portion of the suction duct 150, that is, the most upstream side of the air suction passage 160, may be defined as the inlet 141 of the cyclone dust collector 140.

[0058] The cyclone dust collector 140 may further include the cyclone chamber 170. The cyclone chamber 170 may be provided to separate dust by turning air introduced through the suction duct 150. The cyclone chamber 170 may have a cylindrical shape having one side open to form a swirling airflow. The open side of the cyclone chamber 170 may be covered by one side of the

outer casing 144. However, the shape of the cyclone chamber 170 is not limited thereto, and may be variously changed. The cyclone chamber 170 may be provided inside the cyclone body 171. The cyclone body 171 and the suction duct 150 may be coupled to each other to communicate with each other. As an example, the cyclone body 171 and the suction duct 150 may be integrally formed with each other to communicate with each other. A spiral portion 172 inclined in a spiral form may be provided inside the cyclone chamber 170 to guide the swirling airflow. The air introduced into the cyclone chamber 170 through the suction duct 150 may be guided along the spiral portion 172 to turn around inside the cyclone chamber 170.

[0059] The cyclone dust collector 140 may further include the dust collection chamber 180. The dust collection chamber 180 may be provided to collect dust separated from air in the cyclone chamber 170. In detail, the dust collection chamber 180 may be provided such that dust separated from the air by the cyclone chamber 170 is collected in a second direction (N) opposite to the first direction (M). The dust collection chamber 180 may be provided to communicate with the cyclone chamber 170. The dust collection chamber 180 may be defined by the coupling of the inner casing 143 and the outer casing 144. The user may remove the dust collected in the dust collection chamber 180 by separating the inner casing 143 and the outer casing 144 from each other.

[0060] The suction duct 150 and the dust collection chamber 180 may be disposed at one side of the cyclone chamber 170, to be adjacent to each other. The suction duct 150 and the dust collection chamber 180 may be arranged in parallel with each other.

[0061] The suction duct 150 and the dust collection chamber 180 may be disposed to be located in the same direction with respect to the cyclone chamber 170. As an example, referring to FIG. 4, both the suction duct 150 and the dust collection chamber 180 may be disposed in front of the cyclone chamber 170.

[0062] The air suction passage 160 provided in the suction duct 150 may be located in the same direction as the dust collection chamber 180 with respect to a rotating axis X of a grille 210 to be described below.

[0063] The cyclone dust collector 140 may further include a grille assembly 200. The grille assembly 200 may be disposed inside the cyclone chamber 170. Details of the grille assembly 200 will be described below.

[0064] The inner casing 143 may further include a guide 145. In detail, the cyclone body 171 may include a dust discharge port 191 provided to discharge dust separated from the air in the cyclone chamber 170 to the dust collection chamber 180. In addition, the cyclone body 171 may further include the guide 145 that defines a dust discharge passage 190 and extends from the cyclone body 171 to the inside of the dust collection chamber 180. That is, the guide 145 may be integrally formed with the cyclone body 171 to guide dust separated from the air in the cyclone chamber 170 to the dust collection

chamber 180. The guide 145 may be formed along the circumference of the dust discharge port 191.

[0065] At least a portion of the guide 145 may include a curved surface.

[0066] The guide 145 may include a first portion 145a and a second portion 145b. The first portion 145a may include a first position P1 located upstream in a direction N in which dust separated from air in the cyclone chamber 170 moves toward the dust collection chamber 180. In other words, the first portion 145a may have the first position P1 located upstream of the dust discharge passage 190. The second portion 145b may include a second position P2 located downstream in the direction N in which dust separated from air in the cyclone chamber 170 moves toward the dust collection chamber 180. In other words, the second portion 145b may have the second position P2 located downstream of the dust discharge passage 190. The second position P2 may be located above the first position P1 in the rotating axis direction X of the grille 210. The second portion 145b may be connected to the first portion 145a. The second portion 145b may have a curvature. As an example, the second portion 145b may include a curved surface that is bulged in the outward direction of the dust discharge passage 190.

[0067] At least a portion of the guide 145 may have an inclination.

[0068] The guide 145 may further include a third position P3 located between the first position P1 and the second position P2 and is located on a boundary of the dust discharge port 191 together with the first position P1 and the second position P2. The first portion 145a and the second portion 145b may be divided based on the third position P3. A portion connecting the first position P1 to the third position P3 may be defined as the first portion 145a, and a portion connecting the second position P2 and the third position P3 may be referred to as the second portion 145b. When an angle between an imaginary line E1 connecting the first position P1 and the third position P3 and an imaginary line O extending in the rotating axis direction X of the grille 210 while passing through the third position P3 is defined as a slope θ_1 of the first portion 145a, and an angle between an imaginary line E2 connecting the second position P2 and the third position P3 and the imaginary line O extending in the rotating axis direction X of the grille 210 while passing through the third position P3 is defined as a slope θ_2 of the second portion 145b, the slope θ_1 of the first portion 145a may be larger than the slope θ_2 of the second portion 145b.

[0069] The outer casing 144 may further include a protruding rib 147. In detail, the protruding rib 147 may be formed at one inner wall of the outer casing 144 that defines the cyclone chamber 170 together with the cyclone body 171 of the inner casing 143. In more detail, the protruding rib 147 may be formed on one inner wall of the outer casing 144 facing the grille 210 in the rotating axis direction X of the grille 210. In other words, the protruding rib 147 may be arranged on one inner wall of the cyclone chamber 170 facing the grille (210 in FIG. 7) in

the rotating axis direction X of the grille 210. That is, the protruding rib 147 may be arranged on one inner wall of the cyclone chamber 170 adjacent to the dust collection chamber 180 in the rotating axis direction X of the grille 210.

[0070] Preferably, the outer casing 144 may include a plurality of the protruding ribs 147 arranged in a radial form.

[0071] The protruding rib 147 serves to adjust the rotational speed of the grille 210. When the rotational speed of the grille 210 is excessively high, the suction power of the handy type cleaner 100 or the handy-stick type vacuum cleaner 1 may become strong, but noise may increase, so that the user may have discomfort and a bearing 230 of the grille assembly 200 may be shortened. On the other hand, when the rotational speed of the grille 210 is excessively low, noise issue may be removed, but the suction power of the handy type cleaner 100 or the handy-stick type vacuum cleaner 1 may be lowered. In addition, since the rotational force and the centrifugal force generated by the rotation of the grille 210 are reduced, foreign substances attached to the grille 210, such as hairs, or dust, are not easily bound off using air discharged through a dust removal passage 270, which will be described below. The protruding rib 147 serves to maintain the rotational speed of the grille 210 at an appropriate level to remove the above described limitations.

[0072] The cyclone dust collector 140 may further include the air suction passage 160. The air suction passage 160 may be formed in the suction duct 150.

[0073] The cyclone dust collector 140 may further include the dust discharge passage 190. The dust discharge passage 190 may be formed in the cyclone chamber 170 and the dust collection chamber 180 such that dust separated from the air in the cyclone chamber 170 move through the dust discharge passage 190. The dust discharge passage 190 may be disposed in parallel with the air suction passage 160. The dust discharge passage 190 may be defined by the guide 145. The dust discharge port 191 may be located on the dust discharge passage 190.

[0074] The cyclone dust collector 140 may further include a partition wall (149 in FIG. 9). The partition wall 149 may be provided to partition the cyclone chamber 170 from the dust collection chamber 180. One wall of the inner casing 143 may be defined as the partition wall 149. In detail, one wall of the cyclone body 171 adjacent to the dust collection chamber 180 may be defined as the partition wall 149. In other words, one wall of the cyclone body 171 that is coupled to the outer casing 144 to define the dust collection chamber 180 may be defined as the partition wall 149. The partition wall 149 may have the dust discharge port 191. The dust discharge passage 190 may be provided to pass through the partition wall 149. When the guide 145 is described in terms of the partition wall 149, the guide 145 may extend from the partition wall 149 into the dust collection chamber 180 to

define the dust discharge passage 190.

[0075] As shown in FIG. 6, the dust collection chamber 180 includes a first wall 181 facing the suction duct 150, a second wall 182 connected to the first wall 181, and a third wall 183 facing the first wall 181. The first wall 181, the second wall 182, and the third wall 183 may each correspond to a portion of the outer casing 144. One end of the first portion 145a directed to the second wall 182 may be spaced apart from the second wall 182 by a predetermined distance. That is, one end of the first portion 145a directed to the second wall 182 and extending from the first position P1 to the dust collection chamber 180 may be spaced apart from the second wall 182 by a predetermined distance. Air introduced into the dust collection chamber 180 along with dust and the like and separated from the dust and the like is reintroduced into the cyclone chamber 170 through a gap between the one end of the first portion 145a directed to the second wall 182 and the second wall 182. The gap between the one end of the first portion 145a directed to the second wall 182 and the second wall 182 may have a size in which dust larger than or equal to a predetermined size does not pass through the gap.

[0076] Meanwhile, one end of the second portion 145b directed to the third wall 183 may come into contact with the third wall 183. That is, one end of the second portion 145b directed to the third wall 183 and extending from the second position P2 toward the dust collection chamber 180 may come into contact with the third wall 183.

[0077] FIG. 7 is an exploded perspective view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure, and FIG. 8 is a cross-sectional view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure.

[0078] As shown in FIG. 7 and FIG. 8, the cyclone dust collector 140 may be provided with the grille assembly 200 inside the cyclone chamber 170 to filter dust from purified air, in which dust has been primarily removed by centrifugal force. The grille assembly 200 may be provided on an outflow pipe 173 inside the cyclone chamber 170. The outflow pipe 173 may communicate with the outlet 142 of the cyclone dust collector 140. The grille assembly 200 may be detachably mounted to the outflow pipe 173 to be cleaned or replaced. The grille assembly 200 may be mounted to the outflow pipe 173 to filter dust larger than or equal to a predetermined size from the air. The air from which dust has been filtered by the grille assembly 200 is guided to the outlet 142 of the cyclone dust collector 140 through the outflow pipe 173. Some of the components of the grille assembly 200 may be provided to be rotatable by the suction force of the motor (120 see FIG. 10).

[0079] The grille assembly 200 includes a grille 210, a rotating body 220 on which the grille 210 is rotatably mounted, a case 240 in which the rotating body 220 is rotatably received, and a bearing 230 provided between the case 240 and the rotating body 220.

[0080] The case 240 may be mounted to the outflow pipe 173. The case 240 may be formed in a shape corresponding to the shape of the outflow pipe 173. As an example, when the outflow pipe 173 is cylindrical, the case 240 may also be formed in a cylindrical shape.

[0081] The case 240 may include a first case 241 and a second case 242 positioned above the first case 241 in the rotating axis direction X of the grille 210. The first case 241 may be formed to be coupled to the outflow pipe 173. The first case 241 and the second case 242 may be provided as separate components that may be coupled to each other as shown in FIG. 7, or the first case 241 and the second case 242 may be integrally formed with each other as a single component. A rotating body accommodating portion 243 may be formed in the second case 242 to rotatably accommodate the rotating body 220 therein.

[0082] The first case 241 may be coupled to the outflow pipe 173 by a coupling protrusion 248 provided on an outer wall of the first case 241. The outflow pipe 173 may have a locking step (174 in FIG. 9) corresponding to the coupling protrusion 248. The case 240 may be coupled to the outflow pipe 173 by the interaction between the coupling protrusion 248 formed on the first case 241 and the locking step 174 formed on the outflow pipe 173. However, the manner in which the case 240 is coupled to the outflow pipe 173 is not limited thereto and may be variously changed. As an example, the case 240 may be coupled to the outflow pipe 173 by a fastening member.

[0083] An opening 244 may be formed in the second case 242. The opening 244 of the second case 242 may be provided in plural. The plurality of openings 244 may be formed along the outer circumferential surface of the second case 242. The plurality of openings 244 may be spaced apart from each other at regular intervals along the outer circumferential surface of the second case 242. The opening 244 may be arranged to communicate with the rotating body accommodating portion 243 of the second case 242. The openings 244 may be spaced apart from each other in the periphery of the outer circumferential surface of the second case 242. Opening guides 245 recessed inward may be formed in the peripheries of the plurality of openings 244 to allow outside air to be easily introduced. The opening 244 may be formed at the center of the opening guide 245. Air outside the case 240 may be introduced into the rotating body accommodating portion 243 inside the case 240 through the plurality of openings 244.

[0084] The case 240 may be provided with a bearing mounting portion 247 on which the bearing 230 that enables the rotating body 220 to rotate is mounted. The bearing mounting portion 247 may be defined by an upper surface of the first case 241 and an inner circumferential surface of the second case 242. When the bearing 230 is mounted on the bearing mounting portion 247, the bottom surface of the bearing 230 may be seated on the upper surface of the first case 241. One side of the bearing 230 may be supported by the bearing mounting por-

tion 247 of the case 240, and the other side of the bearing 230 may be supported by the rotating body 220.

[0085] The rotating body 220 may be rotatably mounted in the case 240. The grille 210 may be mounted on the rotating body 220 to rotate together with the rotating body 220. The rotating body 220 may be provided to be rotatable by the bearing 230.

[0086] The rotating body 220 may include a first rotating body 220a to which the grille 210 is coupled and a second rotating body 220b extending downward from the first rotating body 220a. The first rotating body 220a and the second rotating body 220b may be formed to have a step difference therebetween. A first fan 221 may be formed at an inside of the first rotating body 220a. The first fan 221 may be provided to form an air flow when the rotating body 220 is rotated. The first fan 221 may extend in all directions from the center of the rotating body 220. The rotating body 220 may rotate in one direction when suction force is generated by the motor 120. That is, the first fan 221 provided on the rotating body 220 may rotate in one direction when suction force is generated by the motor 120. As the first fan 221 rotates, air is introduced to a side of the first fan 221 to form a main flow path (260 in FIG. 8) between the grille 210 and the outflow pipe 173. A second fan 222 may be formed at an outside of the first rotating body 220a. The second fan 222 may be provided to inhibit the air flow generated by the first fan 221. When the suction force is generated by the motor 120, the second fan 222 may allow air to flow from a side of the outflow pipe 173 to a side of the cyclone chamber 170. That is, the second fan 222 may generate an air flow in a direction opposite to the direction of the air flow generated by the suction force of the motor 120. The second fan 222 may include a plurality of blades that are spaced apart from each other by a predetermined interval on the outer circumferential surface of the first rotating body 220a. Since the second fan 222 is provided on the lateral side of the rotating body 220, the second fan 222 may be referred to as a side fan. A bearing coupling portion 224 for coupling the bearing 230 may be formed on the second rotating body 220b. The bearing 230 may be coupled to the rotating body 220 by the bearing coupling portion 224.

[0087] The first rotating body 220a is provided at the upper periphery thereof with a grille mounting portion 223 on which the grille 210 is mounted. The grille mounting portion 223 is formed in a circular shape and fixes and supports the grille 210 to prevent the grille 210 from being separated when the rotating body 220 is rotated.

[0088] Air from which foreign substances have been filtered by the grille 210 may be discharged from the cyclone dust collector 140 through the outlet 142 of the cyclone dust collector 140.

[0089] The grille 210 may be formed in a hemispherical shape. The grille 210 formed in a hemispherical shape may increase the area through which air passes, thereby preventing the suction force by the motor 120 from being lowered. The grille 210 may include a plurality of holes

211. A lower periphery of the grille 210 may be formed in a circular shape. The grille 210 is provided at the lower end thereof with a grille coupling portion 212 having a shape corresponding to that of the grille mounting portion 223 such that the grill coupling portion 212 is coupled to the grille mounting portion 223. The grille 210 may be coupled to the rotating body 220 by the coupling of the grille coupling portion 212 and the grille mounting portion 223. The grille 210 coupled to the rotating body 220 may rotate together with the rotating body 220.

[0090] Meanwhile, a gap of a predetermined interval may be formed between the rotating body 220 on which the grille 210 is mounted and the case 240 such that the grille 210 may rotate together with the rotating body 220.

The gap may be formed between the upper outer circumferential surface of the first rotating body 220a of the rotating body 220, to which the grille 210 is coupled, and the inner surface 242a of the second case 242.

[0091] When the grille 210 rotates, foreign substances, such as hairs, may be caught between the grille 210 and the case 240. The foreign substances, such as hairs, may interfere with rotation of the grille 210. Such a limitation may be prevented by forming the dust removal passage 270 in the grille assembly 200. The dust removal passage 270 may be formed between the rotating body 220 and the case 240 such that air introduced through the plurality of openings 244 formed through the second case 242 is discharged from the grille assembly 200. In other words, the dust removal passage 270 may be formed between the upper outer circumferential surface of the first rotating body 220a of the rotating body 220, to which the grille 210 is coupled, and the inner surface 242a of the second case 242. That is, the dust removal passage 270 may be formed in the gap between the rotating body 220 and the case 240.

[0092] Air discharged through the dust removal passage 270 may allow dust or foreign substances attached to the hemispherical grille 210 to be separated by centrifugal force.

[0093] The grille assembly 200 may further include a sealing member 250. The sealing member 250 may be provided between the first case 241 and the outflow pipe 173. The sealing member 250 may be formed in a ring shape. The sealing member 250 may be fitted to the outer circumferential surface of the first case 241. The case 240 may be coupled to the outflow pipe 173 in a state in which the sealing member 250 is coupled to the outer circumferential surface of the first case 241. The sealing member 250 prevents a gap between the outflow pipe 173 and the first case 241 from being generated, and prevents the first case 241 inserted into the outflow pipe 173 from being separated from the outflow pipe 173. The sealing member 250 may include rubber or silicon material.

[0094] Referring to FIG. 8, the operation of the grille assembly 200 will be described.

[0095] The grille assembly 200 is provided with the grille 210 and the rotating body 220 rotatably provided

such that dust and foreign substances are separated from the surface of the grille 210 by centrifugal force.

[0096] When the suction force is generated by the motor 120, the rotating body 220 and the grille 210 may be rotated as a unitary body. Air from which dust has been primarily filtered by the swirling airflow of the cyclone chamber 170 forms the main flow path 260 flowing through the grille 210 to the outflow pipe 173. The main flow path 260 may be formed from the upper side to the lower side such that the air introduced through the grille 210 is discharged toward the outflow pipe 173.

[0097] Meanwhile, an air flow having a direction opposite to the direction of the main flow path 260 may be formed between the second fan 222 of the rotating body 220 and the case 240 by the second fan 222. Between the second fan 222 of the rotating body 220 on which the grille 210 is mounted and the case 240, the air flow having a direction opposite to the direction of the air flow generated by the suction force of the motor 120 may be formed to inhibit the air flow generated by the suction force of the motor 120.

[0098] The plurality of openings 244 formed through the case 240 are provided to allow outside air to flow between the second fan 222 and the case 240. The outside air introduced between the second fan 222 and the case 240 may be discharged through the dust removal passage 270 to remove foreign substances, such as dust and hair, stuck to the dust removal passage 270 or attached to the grille 210.

[0099] The dust separated from the grille 210 or the dust removal passage 270 may be rotated by the swirling airflow of the cyclone chamber 170 to be collected in the dust collection chamber 180.

[0100] As such, by using the rotatable grille 210 for the cyclone dust collector 140, the suction force of the handy type cleaner 100 or the handy-stick type vacuum cleaner 1 may be prevented from being lowered and the cleaning efficiency may be improved. In addition, since dust may be prevented from adhering to the surface of the grille 210, dust in the cyclone dust collector 140 may be easily removed. In detail, the user may separate the cyclone dust collector 140 from the handy body 110, separate the outer casing 144 from the inner casing 143, and remove only the dust collected in the dust collection chamber 180, so that the cyclone dust collector 140 may be cleaned easily and simply.

[0101] FIG. 9 is a cross-sectional view taken along line I-I' of the cyclone dust collector shown in FIG. 4, and FIG. 10 is a cross-sectional view illustrating a handy type cleaner in a handy-stick type vacuum cleaner according to an embodiment of the disclosure. FIG. 10 is a schematic cross-sectional view of the handy type 100. In FIG. 9, the solid line represents the movement of dust, and the dotted line represents the movement of air from which dust is removed.

[0102] As shown in FIGS. 9 and 10, when the motor 120 is driven, contaminated air on the surface to be cleaned may be introduced into the suction duct 150 by

suction force generated by the driving of the motor 120.

[0103] The air introduced into the suction duct 150 is guided to the cyclone chamber 170. The air guided to the cyclone chamber 170 rises while turning by the spiral portion 172 in the cyclone chamber 170.

[0104] Dust heavier than air is scattered radially outwardly by centrifugal force and is introduced into the dust collection chamber 180 through the dust discharge port 191 positioned above the cyclone chamber 170. At this time, the dust may smoothly flow into the dust collection chamber 180 along the guide 145. The dust introduced into the dust collection chamber 180 may fall by gravity and be collected in the dust collection chamber 180.

[0105] The air from which dust has been primarily removed by centrifugal force in the cyclone chamber 170 may be secondarily filtered to have dust larger than or equal to a predetermined size removed while passing through the grille assembly 200.

[0106] The air passing through the grille assembly 200 may flow through the outflow pipe 173. The air flowing along the outflow pipe 173 is discharged to the outside of the cyclone dust collector 140 through the outlet 142 of the cyclone dust collector 140 and flows into the air inlet 117 of the handy body 110. The air introduced into the air inlet 117 sequentially passes through a filter 130 and the motor 120 and then is discharged to the outside of the handy type cleaner 100.

[0107] In addition, the air from which dust has been primarily removed by the centrifugal force in the cyclone chamber 170 flows into the plurality of openings 211 of the grille assembly 200 with the rotational force properly adjusted by the protruding ribs 147. The air introduced into the plurality of openings 211 of the grille 210 may rotate the first fan 221 of the grille assembly 200. The rotation of the first fan 221 may prevent dust from adhering to the grille 210.

[0108] At this time, the rotation of the first fan 221 causes the second fan 222 to generate an air flow in a direction opposite to the suction direction, so that air introduced into the dust removal passage 270 is pushed in a direction opposite to the suction direction, thereby preventing dust from being stuck between the rotating body 220 and the case 240.

[0109] The cyclone dust collector 140 described above may employ a bottom collecting method in which dust is introduced into the lower portion of the handy type cleaner 100 and is collected at the lower portion of the handy type cleaner 100. That is, the cyclone dust collector 140 may employ a bottom collecting method in which dust is introduced into the first direction M of the handy type cleaner 100 and is collected in the second direction N opposite to the first direction M. As such, in the case of using the bottom collecting method, the first direction M and the second direction N do not coincide with the rotating axis direction X of the grille 210, so that dust is effectively separated from the air in the cyclone chamber 170. That is, when the bottom collecting method is used, the grille assembly 200 may not interfere dust from being

separated from the air in the cyclone chamber 170.

[0110] Although embodiments of the disclosure have been described with reference to the accompanying drawings, a person having ordinary skilled in the art will appreciate that other specific modifications can be easily made without departing from the technical spirit or essential features of the disclosure.

Claims

1. A handy-stick type vacuum cleaner comprising a cyclone dust collector, the cyclone dust collector comprising:

a suction duct configured to suction air in a first direction and provided with an air suction passage formed therein;
a cyclone chamber configured to separate dust from air introduced through the suction duct by turning the air, and provided with a grille rotatably formed therein; and
a dust collection chamber configured to collect the dust separated from the air in the cyclone chamber in a second direction opposite to the first direction.

2. The handy-stick type vacuum cleaner of claim 1, wherein the suction duct and the dust collection chamber are arranged at one side of the cyclone chamber, to be adjacent to each other.

3. The handy-stick type vacuum cleaner of claim 2, wherein the suction duct and the dust collection chamber are arranged in parallel with each other.

4. The handy-stick type vacuum cleaner of claim 1, wherein the cyclone dust collector comprises:

an inner casing configured to define the air suction passage and the cyclone chamber; and
an outer casing coupled to the inner casing to define the dust collection chamber.

5. The handy-stick type vacuum cleaner of claim 4, wherein the inner casing and the outer casing are detachably coupled to each other.

6. The handy-stick type vacuum cleaner of claim 4, wherein the inner casing comprises a cyclone body configured to define the cyclone chamber, wherein the cyclone body comprises:

a dust discharge port through which dust separated from air is discharged to the dust collection chamber; and
a guide configured to define the dust discharge port and extending from the cyclone body into

the dust collection chamber.

7. The handy-stick type vacuum cleaner of claim 6, wherein at least one portion of the guide has a curved surface.

8. The handy-stick type vacuum cleaner of claim 6, wherein the guide comprises:

a first portion including a first position located upstream in a direction in which dust separated from air in the cyclone chamber moves toward the dust collection chamber; and
a second portion including a second position located downstream in the direction in which dust separated from air in the cyclone chamber moves toward the dust collection chamber, and connected to the first portion while having a curvature.

9. The handy-stick type vacuum cleaner of claim 8, wherein the dust collection chamber comprises a first wall facing the suction duct and a second wall connected to the first wall, wherein one end of the first portion directed to the second wall is spaced apart from the second wall.

10. The handy-stick type vacuum cleaner of claim 1, wherein a protruding rib is arranged on an inner wall of the cyclone chamber facing the grille in a rotating axis direction of the grill.

FIG. 1

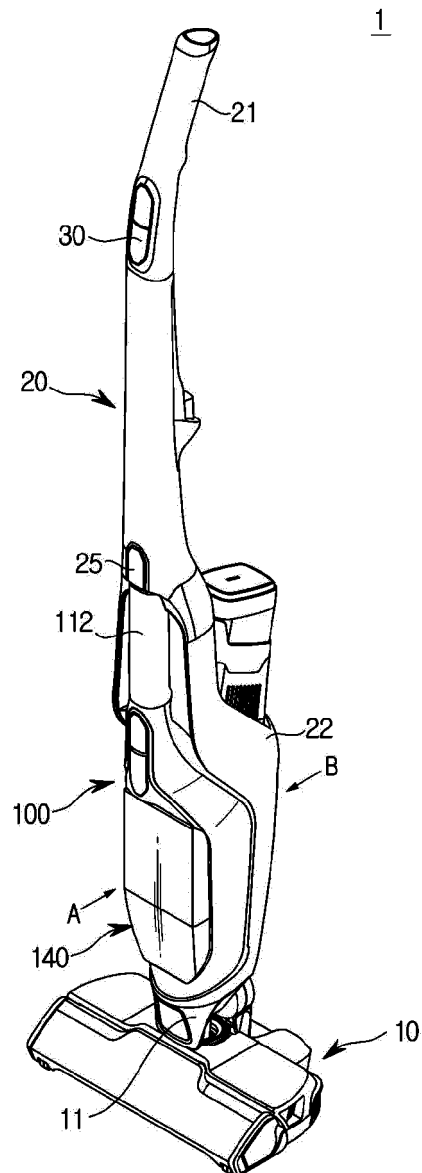


FIG. 2

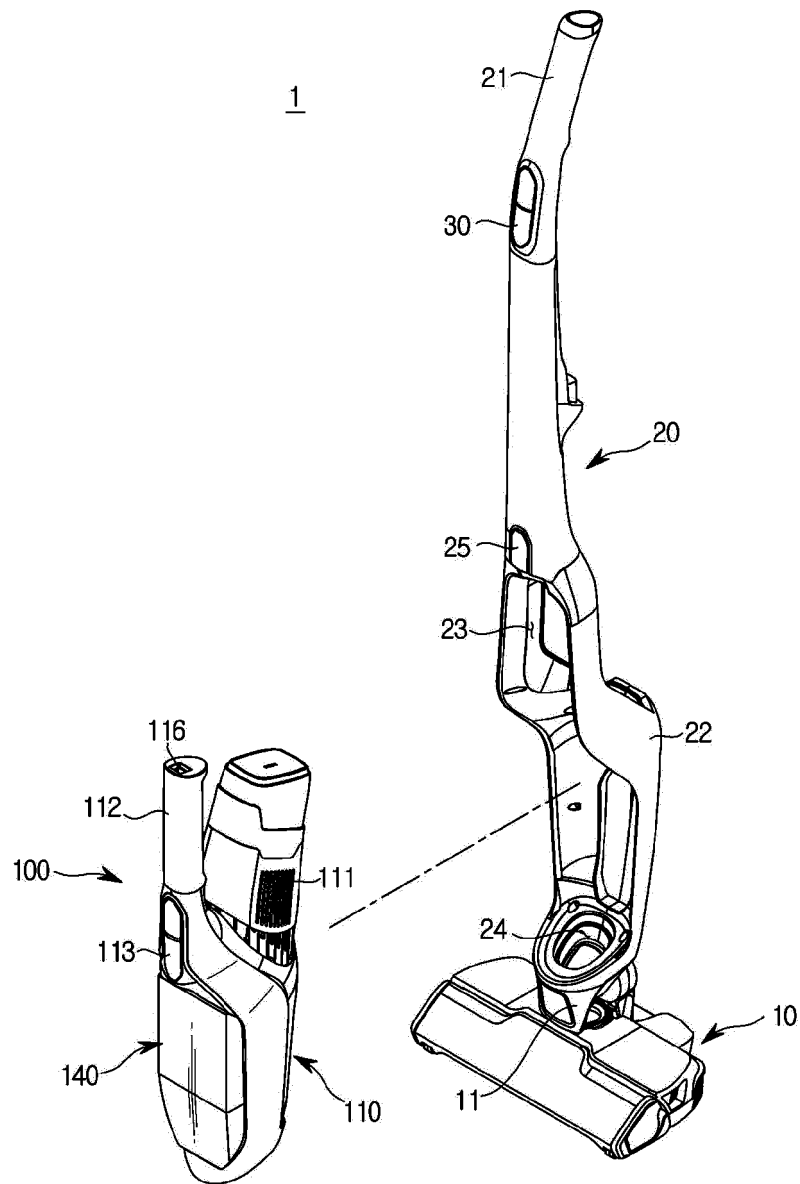


FIG. 3

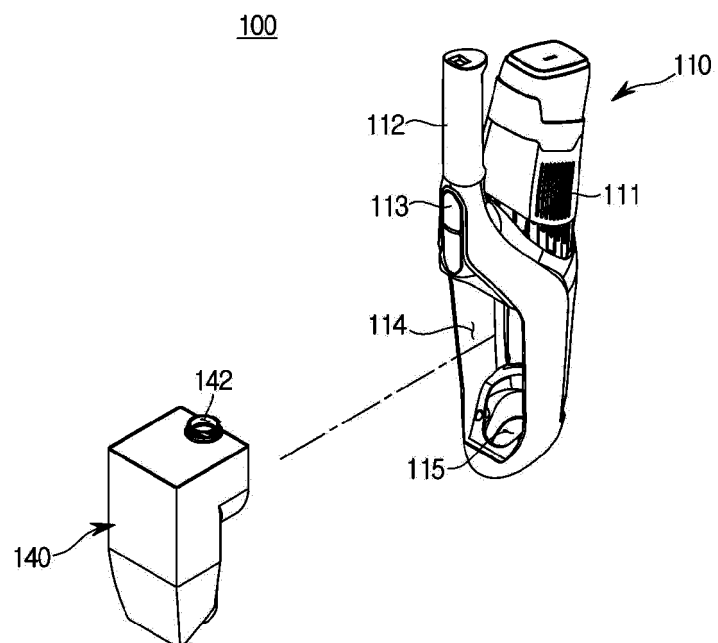


FIG. 4

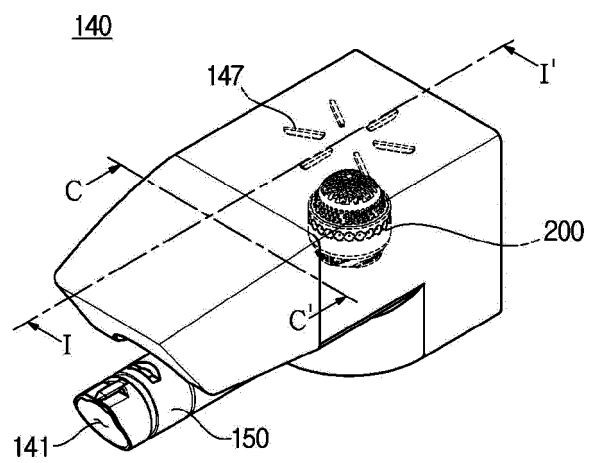


FIG. 5

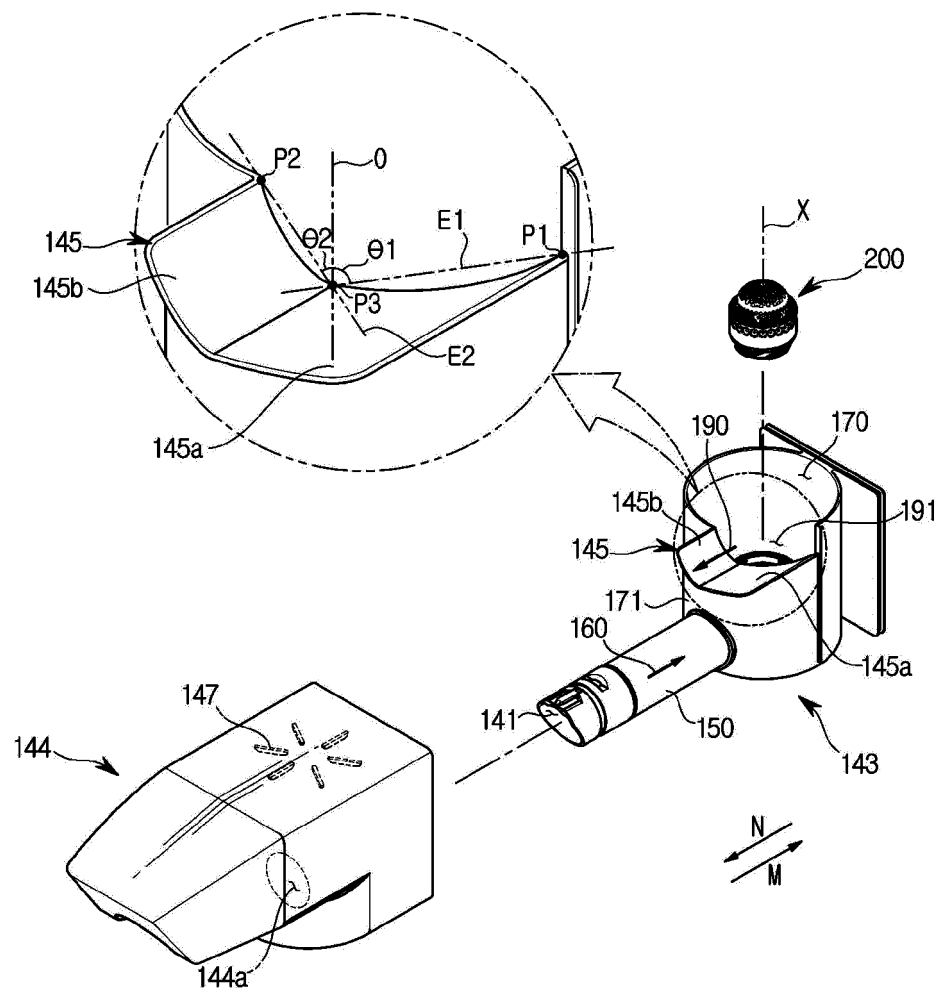


FIG. 6

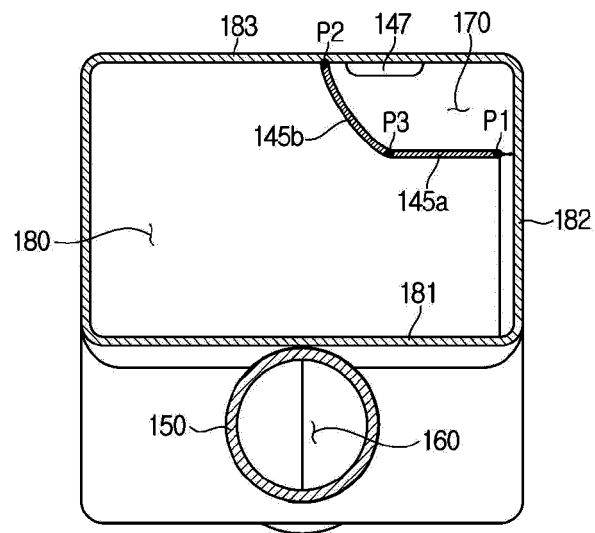


FIG. 7

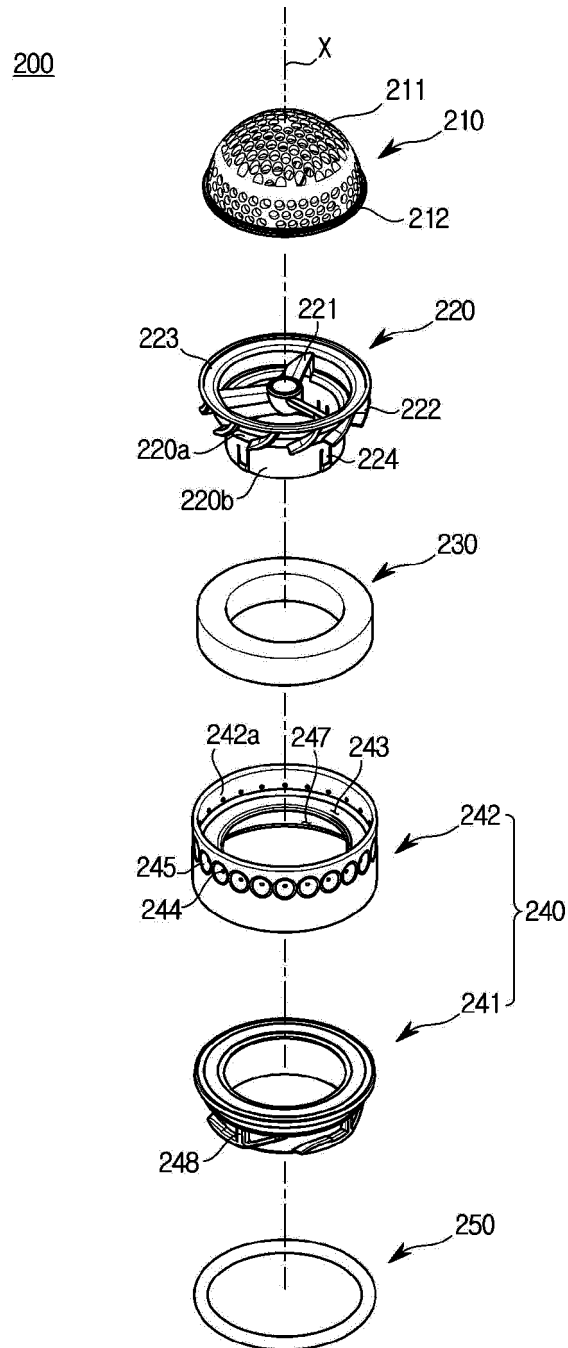


FIG. 8

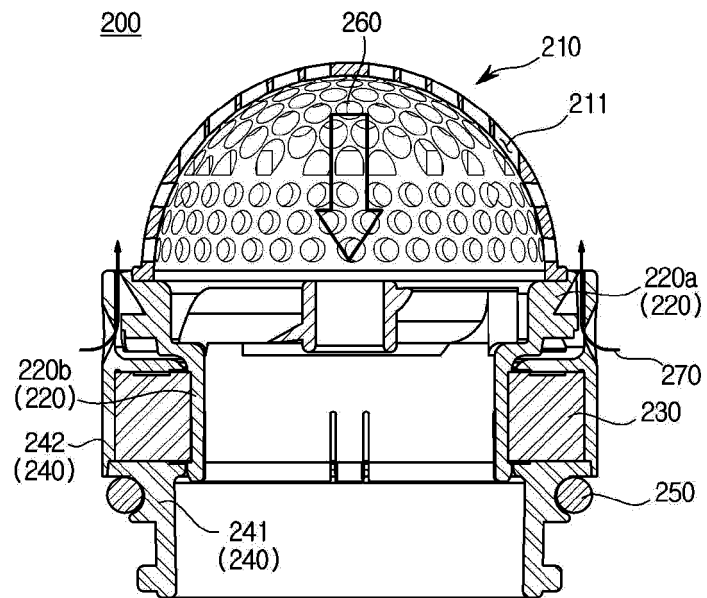


FIG. 9

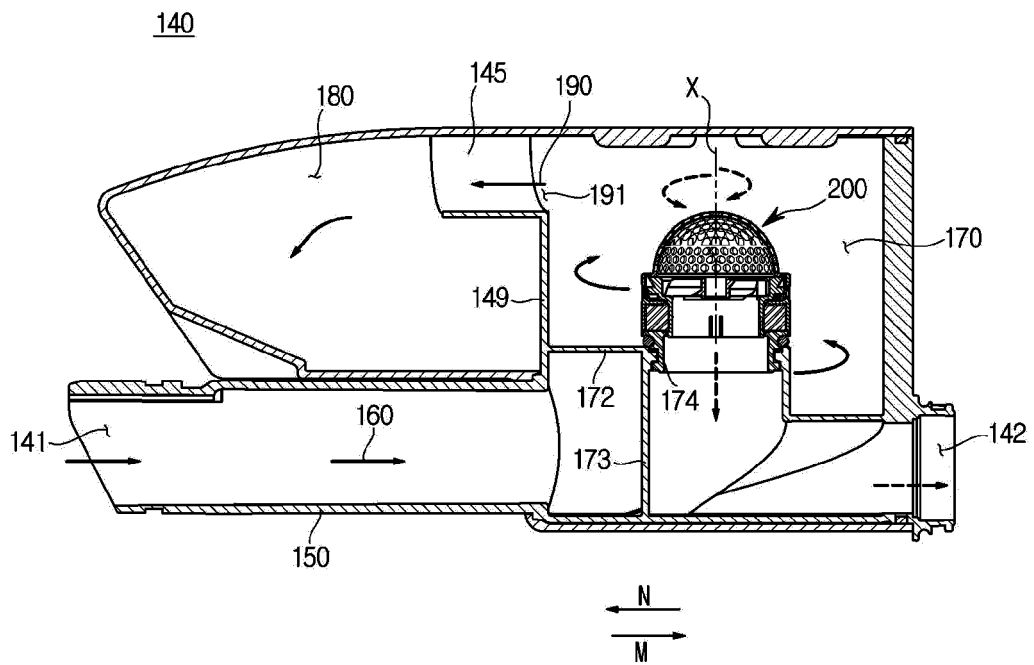
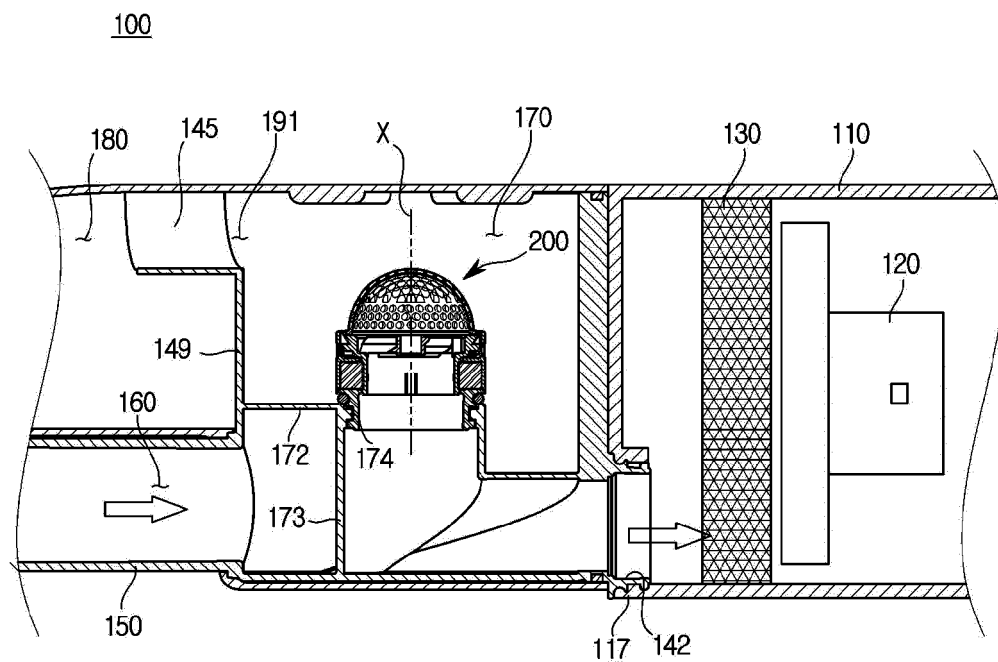


FIG. 10



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2018/008630

A. CLASSIFICATION OF SUBJECT MATTER

A47L 5/24(2006.01)i, A47L 9/16(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47L 5/24; A47L 5/28; A47L 5/32; A47L 9/16; A47L 9/22; B04C 5/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: cyclone, dust collecting device, suction duct, dust collecting chamber, air suction flow passage

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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Date of the actual completion of the international search

14 NOVEMBER 2018 (14.11.2018)

Date of mailing of the international search report

14 NOVEMBER 2018 (14.11.2018)

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