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(54) **CYCLONE DUST COLLECTOR, VACUUM CLEANER HAVING THE CYCLONE DUST COLLECTOR, AND HANDY-STICK TYPE VACUUM CLEANER HAVING THE CYCLONE DUST COLLECTOR**

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(57) **ABSTRACT**

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.

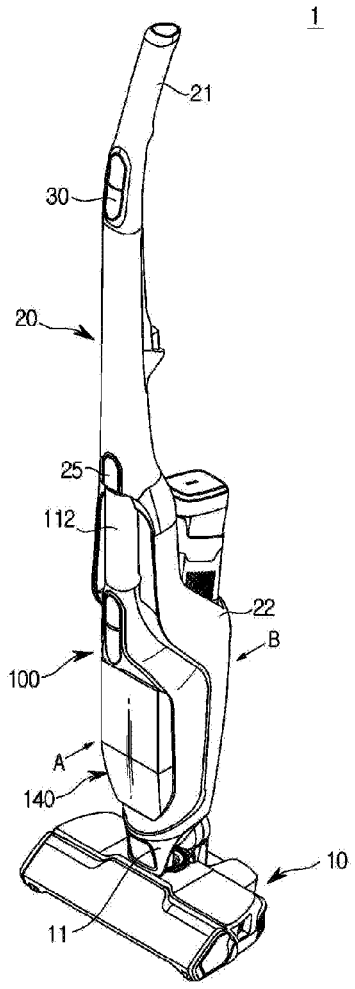


FIG. 1

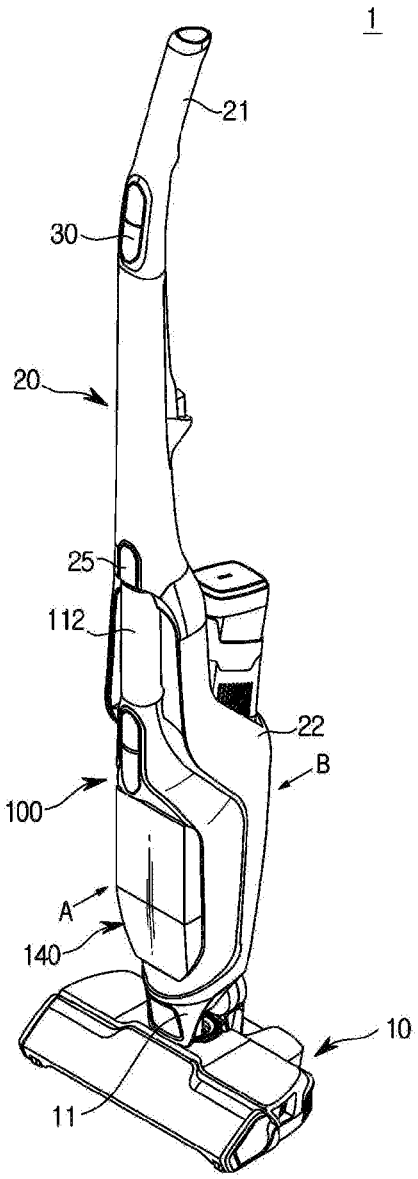


FIG. 2

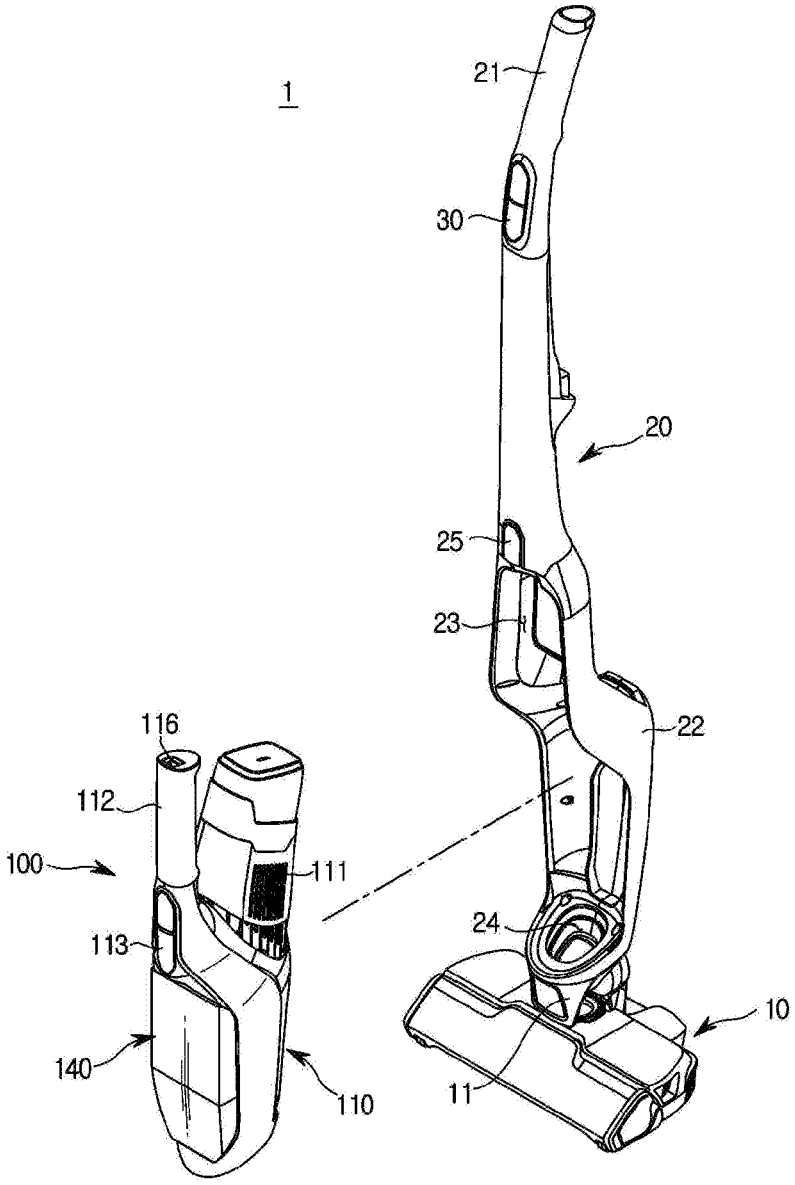


FIG. 3

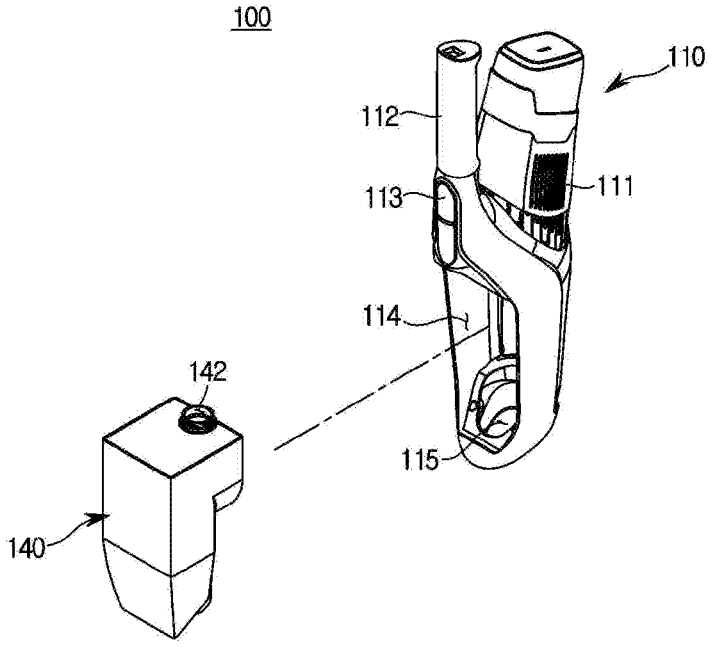


FIG. 4

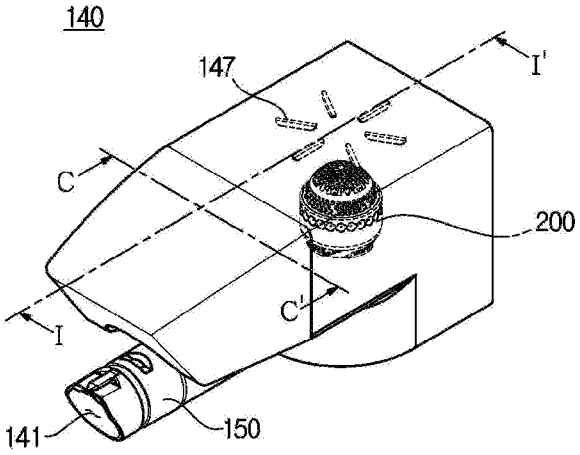
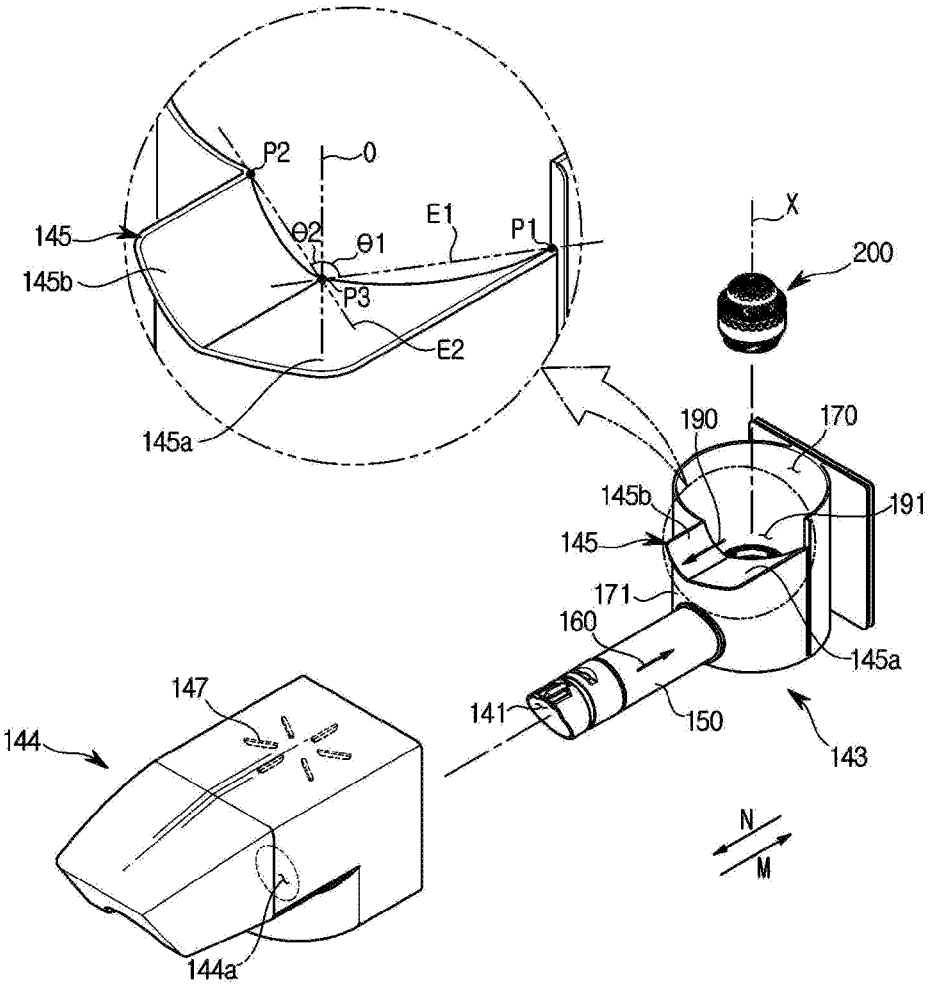


FIG. 5


P2
O
E1
P1
145
θ2
θ1
145b
P3
E2
145a
X
200
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170
145b
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160
145a
147
144
141
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143
N
M
144a

FIG. 6

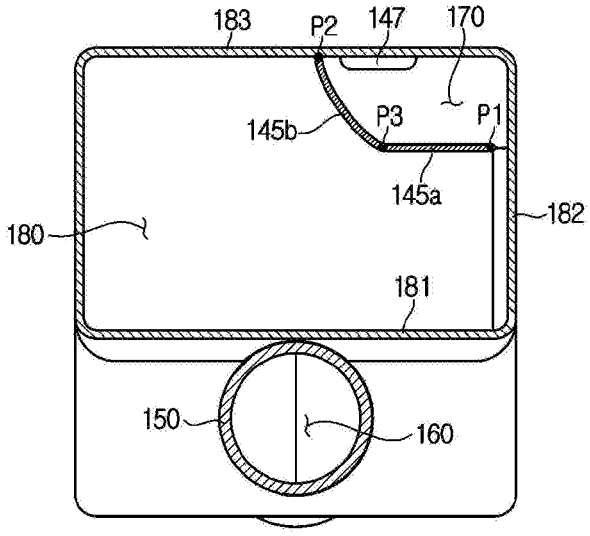
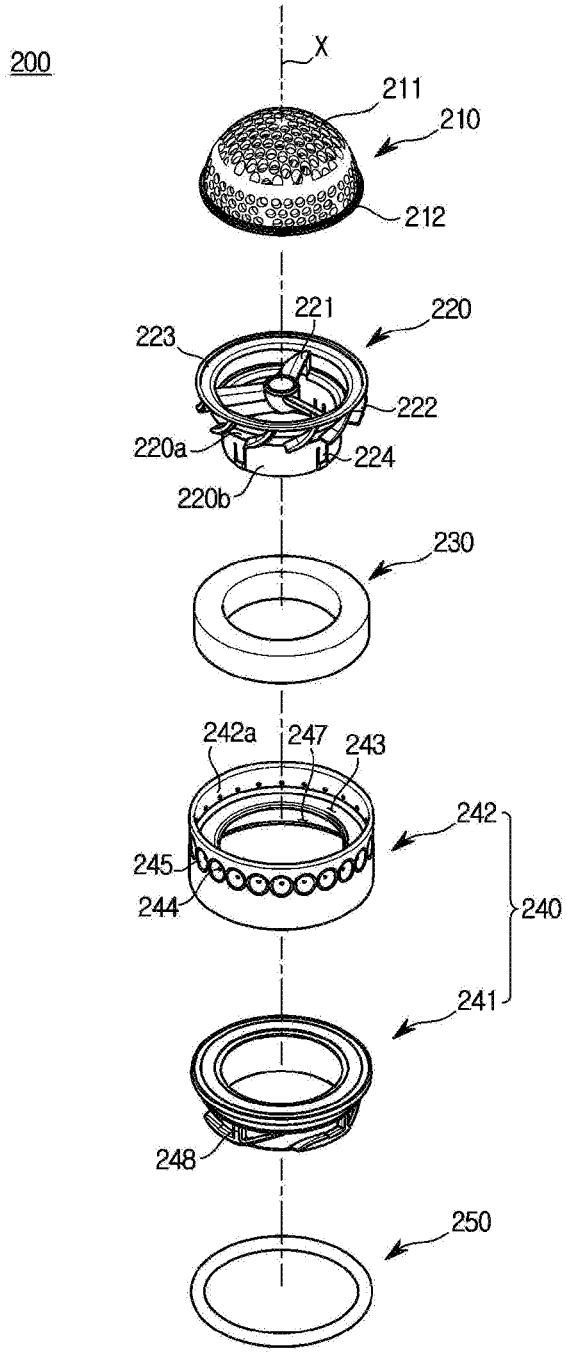


FIG. 7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242a
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250

FIG. 8

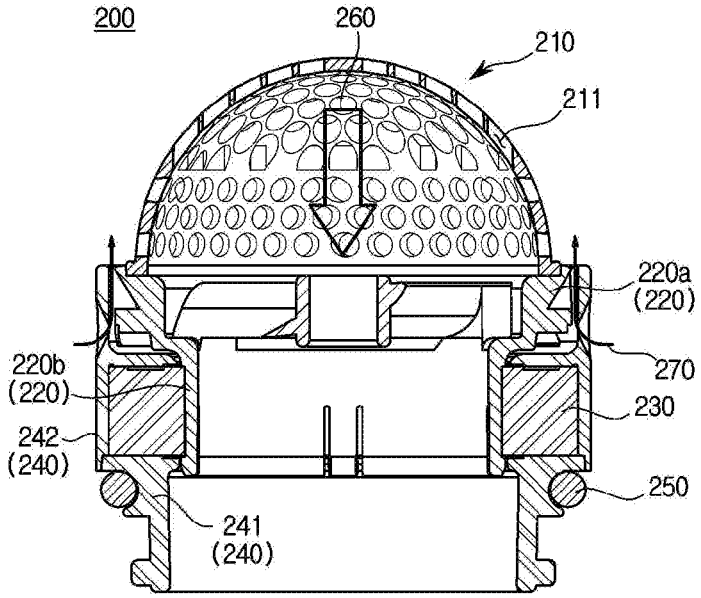


FIG. 9

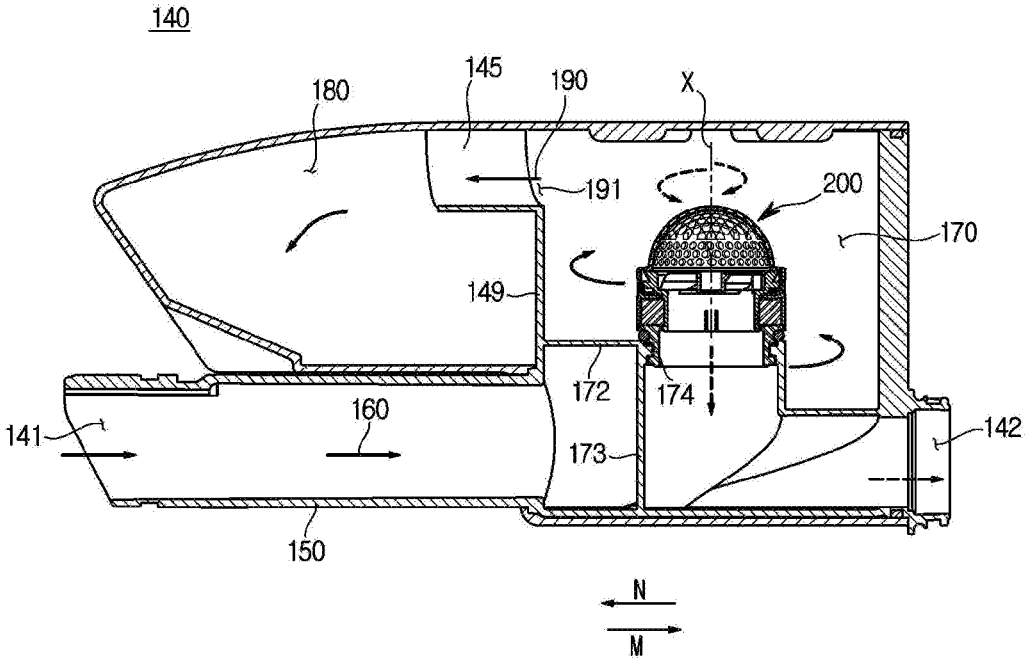
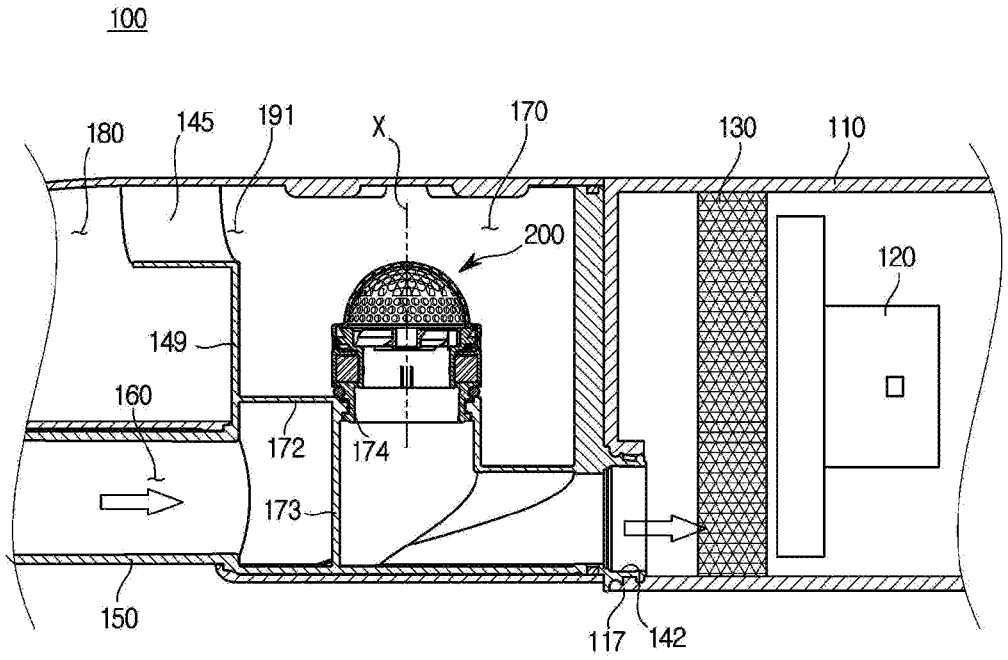


FIG. 10


100
180
145
191
X
170
130
110
200
120
149
160
172
174
173
150
117
142

CYCLONE DUST COLLECTOR, VACUUM CLEANER HAVING THE CYCLONE DUST COLLECTOR, AND HANDY-STICK TYPE VACUUM CLEANER HAVING THE CYCLONE DUST COLLECTOR

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 hand-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 hand-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 hand-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 directed 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 to the inner casing to define the dust collection chamber.

[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;

[0036] 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;

[0037] 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**;

[0038] FIG. **4** is a perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure;

[0039] FIG. **5** is an exploded perspective view illustrating a cyclone dust collector according to an embodiment of the disclosure;

[0040] FIG. **6** is a cross-sectional view taken along line C-C' of the cyclone dust collector shown in FIG. **4**;

[0041] FIG. **7** is an exploded perspective view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure;

[0042] FIG. **8** is a cross-sectional view illustrating a grille assembly used for a cyclone dust collector according to an embodiment of the disclosure;

[0043] FIG. **9** is a cross-sectional view taken along line I-I' of the cyclone dust collector shown in FIG. **4**; and

[0044] 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

[0045] 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.

[0046] 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**.

[0047] 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**.

[0048] 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**.

[0049] 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**.

[0050] 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**.

[0051] 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**.

[0052] 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.

[0053] The stick body **20** may be provided with a switch **30** for adjusting the operation of the handy-stick type vacuum cleaner **1**.

[0054] 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**.

[0055] 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**.

[0056] The handy type cleaner **100** may include the handy body **110** and a cyclone dust collector **140**.

[0057] 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.

[0058] 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**.

[0059] 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**.

[0060] Details of the cyclone dust collector **140** will be described below.

[0061] 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**.

[0062] 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**.

[0063] 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.

[0064] 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 **144***a* to which a suction duct **150** is coupled. The suction duct **150** may be coupled to the suction duct coupling hole **144***a* 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 **144***a* of the outer casing **144** is coupled to the handy type cleaner inlet **115**.

[0065] 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**.

[0066] 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.

[0067] 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.

[0068] 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.

[0069] 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.

[0070] 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.

[0071] 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.

[0072] 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.

[0073] 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.

[0074] At least a portion of the guide 145 may include a curved surface.

[0075] The guide 145 may include a first portion 145*a* and a second portion 145*b*. The first portion 145*a* 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 145*a* may have the first position P1 located upstream of the dust discharge passage 190. The second portion 145*b* 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 145*b* 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 145*b* may be connected to the first portion 145*a*. The second portion 145*b* may have a curvature. As an example, the second portion 145*b* may include a curved surface that is bulged in the outward direction of the dust discharge passage 190.

[0076] At least a portion of the guide 145 may have an inclination.

[0077] 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 145*a* and the second portion 145*b* 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 145*a*, and a portion connecting the second position P2 and the third position P3 may be referred to as the second portion 145*b*. 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 θ1 of the first portion 145*a*, 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 θ2 of the second portion 145*b*, the slope θ1 of the first portion 145*a* may be larger than the slope θ2 of the second portion 145*b*.

[0078] 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.

[0079] Preferably, the outer casing 144 may include a plurality of the protruding ribs 147 arranged in a radial form.

[0080] 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.

[0081] 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**.

[0082] 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**.

[0083] 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**.

[0084] 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 **145***a* 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 **145***a* directed to the second wall **182** and extending from the first position P**1** 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 **145***a* directed to the second wall **182** and the second wall **182**. The gap between the one end of the first portion **145***a* 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.

[0085] Meanwhile, one end of the second portion **145***b* directed to the third wall **183** may come into contact with the third wall **183**. That is, one end of the second portion **145***b* directed to the third wall **183** and extending from the second position P**2** toward the dust collection chamber **180** may come into contact with the third wall **183**.

[0086] 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.

[0087] 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**).

[0088] 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**.

[0089] 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.

[0090] 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.

[0091] 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.

[0092] 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**.

[0093] 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 portion **247** of the case **240**, and the other side of the bearing **230** may be supported by the rotating body **220**.

[0094] 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**.

[0095] The rotating body **220** may include a first rotating body **220***a* to which the grille **210** is coupled and a second rotating body **220***b* extending downward from the first rotating body **220***a*. The first rotating body **220***a* and the second rotating body **220***b* may be formed to have a step difference therebetween. A first fan **221** may be formed at an inside of the first rotating body **220***a*. 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 **220***a*. 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 **220***a*. 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 **220***b*. The bearing **230** may be coupled to the rotating body **220** by the bearing coupling portion **224**.

[0096] The first rotating body **220***a* 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.

[0097] 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**.

[0098] 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**.

[0099] 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 **220***a* of the rotating body **220**, to which the grille **210** is coupled, and the inner surface **242***a* of the second case **242**.

[0100] 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 **220***a* of the rotating body **220**, to which the grille **210** is coupled, and the inner surface **242***a* 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**.

[0101] 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.

[0102] 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.

[0103] Referring to FIG. **8**, the operation of the grille assembly **200** will be described.

[0104] 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.

[0105] 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**.

[0106] 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**.

[0107] 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**.

[0108] 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**.

[0109] 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.

[0110] 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.

[0111] 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**.

[0112] 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**.

[0113] 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**.

[0114] 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**.

[0115] 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**.

[0116] 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**.

[0117] 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**.

[0118] 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**.

[0119] 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.

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.

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