



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11)

EP 1 584 279 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.10.2005 Bulletin 2005/41

(51) Int Cl.7: **A47L 9/20**

(21) Application number: **04022770.4**

(22) Date of filing: **24.09.2004**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR**
Designated Extension States:
AL HR LT LV MK

(72) Inventors:
• **Rew, Ho-Seon**
Mapo-Gu Seoul (KR)
• **Chung, Choon-Myun**
Gwangmyeong Gyeonggi-Do (KR)

(30) Priority: **06.04.2004 KR 2004023522**

(74) Representative: **Cohausz & Florack**
Patent- und Rechtsanwälte
Bleichstrasse 14
40211 Düsseldorf (DE)

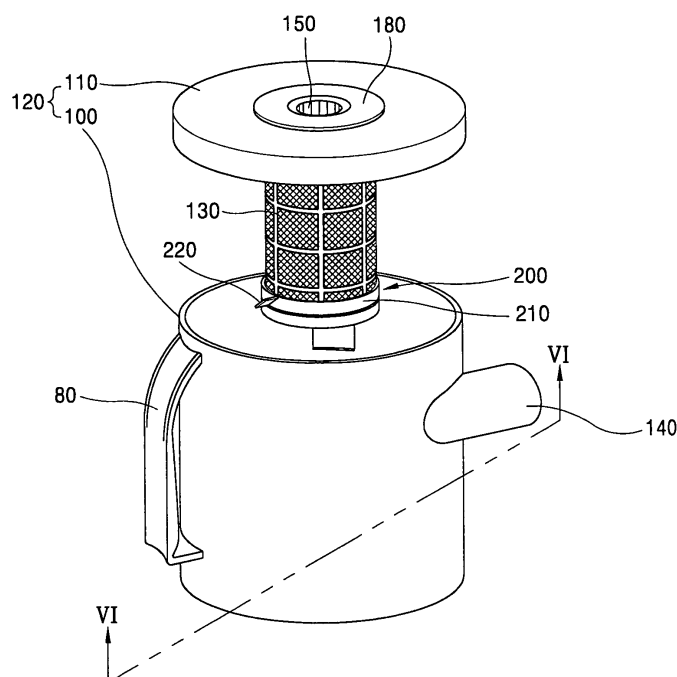
(71) Applicant: **LG ELECTRONICS INC.**
Seoul (KR)

(54) **Filtering device for vacuum cleaner**

(57) A filtering device for a vacuum cleaner comprises: a casing having a collecting space therein, a suction opening through which air including dust is sucked and a discharge opening through which purified air is discharged; a filter installed at the internal space of the casing, for filtering dust from air sucked through the suction

opening; and a filter cleaning unit disposed to encompass an outer circumferential surface of the filter, for cleaning the filter by being rotated by a rotation force of air sucked through the suction opening. Accordingly, the filtering device can remove fine dust attached to the filter in a cleaning operation, thereby preventing a channel of the filter from being closed with the dust.

FIG. 5



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to a vacuum cleaner, and more particularly, to a filtering device for a vacuum cleaner capable of removing dust attached to a filter in operation of a cleaner.

2. Description of the Background Art

[0002] In general, a vacuum cleaner is an electronic device for cleaning an indoor space such as a room, an office or the inside of a car. Undesired impurities such as dust, which exists at home or in a car can be removed by using a suction force of the vacuum cleaner.

[0003] Figure 1 is a perspective view showing a structure of a general vacuum cleaner.

[0004] As shown therein, a general vacuum cleaner includes a cleaner main body 1 and a suction head 2 connected to the cleaner main body 1 by a suction hose 3 and an extension pipe 4, to which dust and foreign substances are sucked from a floor.

[0005] The cleaner main body 1 includes a suction force generating part (not shown) for generating a suction force and a filtering device 6 for filtering dust and foreign substances by the suction force generated from the suction force generating part.

[0006] As shown in Figure 2, the filtering device 6 is provided with a knob 8 and is detachably attached to a filtering device mounting portion 5 recessed from one side of the cleaner main body 1. Accordingly, a user can couple the filtering device 6 to the cleaner main body 1 and separate the filtering device 6 therefrom, more conveniently, by using the knob 8.

[0007] Figure 3 is a disassembled perspective view showing a filtering device of a conventional vacuum cleaner, and Figure 4 is a longitudinal sectional view taken along line IV-IV of Figure 3.

[0008] The filtering device of a conventional vacuum cleaner includes a casing 12 having a collecting space therein, a suction opening 14 through which air including dust is sucked and a discharge opening 15 through which purified air is discharged; and a filter 13 installed at the internal space of the casing 12, for filtering dust from air sucked through the suction opening 14.

[0009] The casing 12 includes a body 10 formed in a cup shape an upper side of which is opened and having the suction opening 14 at its one side; and a cover 11 installed for covering the upper surface of the body 10.

[0010] A filter supporter 18 through which a discharge opening 15 penetrates is installed at the cover 11, and the filter 13 is mounted at the filter support plate 18, so that purified air is discharged outside. In addition, when the cover 11 and the body 10 are coupled to each other, the filter 13 is positioned inside the body 10.

[0011] A support wall body 16 is protruded from an inner lower portion of the body 10 at a predetermined height. A pair of blocking plates 17 are installed to face each other at an upper surface of the support wall body 16, having a certain gap therebetween, so that relatively big dust or foreign substances of dust introduced into the body 10 are prevented from escaping therefrom.

[0012] A process for collecting dust in a filtering device 6 of a conventional vacuum cleaner will now be described.

[0013] When power is applied, a suction force is generated from a suction force generating part (not shown), and dust and foreign substances are sucked into the casing 12 through the suction opening 14 via the suction head 3, the expansion pipe 4 and the suction hose 3. The dust sucked into the casing 12 is purified by the filter 13 and collected in the casing 12, and only air purified while passing through the filter 13 is discharged through the discharge opening. Here, dust or foreign substances having a relatively great weight fall to a gap between the blocking plates 17 by their weights and then are collected at an inner lower portion of the casing 12. The support wall body 16 cuts off an eddy that may occur in a space under the blocking plate 17 so as to prevent dust from floating and so from moving into a space above the blocking plate 17. Fine dust or foreign substances which are relatively light are not collected in the space under the blocking plate 17 but float together with air and are purified again by the filter 13.

[0014] However, the above-mentioned conventional vacuum cleaner has disadvantages in that the filter has to be cleaned or replaced periodically. This is because when the conventional vacuum cleaner is used for a certain period of time, fine dust is attached to the filter of the filtering device, thereby deteriorating a suction force. That is, since fine dust fills up a close mesh of the filter, it is difficult to discharge air, which is sucked through the suction opening, through the filter, and finally a decrease in suction force is caused. Accordingly, if the filter is not cleaned or replaced periodically, cleaning cannot be effectively performed due to the deterioration of the suction force.

SUMMARY OF THE INVENTION

[0015] Therefore, an object of the present invention is to provide a filtering device for a vacuum cleaner capable of preventing a channel of a filter from being closed with dust, by self-removing fine dust attached to a filter in a cleaning operation.

[0016] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, there is provided a filtering device for a vacuum cleaner comprising: a casing having a collecting space therein, a suction opening through which air including dust is sucked and a discharge opening through which purified air is discharged; a filter installed at the internal space of the cas-

ing, for filtering dust from air sucked through the suction opening; and a filter cleaning unit disposed to encompass an outer circumferential surface of the filter, for cleaning the filter by being rotated by a rotation force of the air sucked through the suction opening.

[0017] The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a unit of this specification, illustrate embodiments of the invention and together with the description serve to explain the principles of the invention.

[0019] In the drawings:

Figure 1 is a perspective view showing a conventional vacuum cleaner;

Figure 2 is a partial perspective view of a conventional vacuum cleaner, which shows that a dust container is separated from a main body;

Figure 3 is a disassembled perspective view showing a conventional vacuum cleaner;

Figure 4 is a longitudinal sectional view taken along line IV-IV of Figure 3 and showing an assembled conventional filtering device;

Figure 5 is a disassembled perspective view of a filtering device of a vacuum cleaner in accordance with the present invention;

Figure 6 is a longitudinal sectional view taken along line VI-VI of Figure 5 and showing an assembled filtering device in accordance with the present invention;

Figure 7 is a perspective view of a filter-cleaning unit in accordance with the present invention;

Figure 8 is a perspective view showing a modified example of a blade of a filtering cleaning unit in accordance with the present invention;

Figure 9A is a longitudinal sectional view of a dust container of a vacuum cleaner in accordance with the present invention, for showing a position of a filter cleaning unit when a suction force is weak;

Figure 9B is a longitudinal sectional view of a dust container of a vacuum cleaner in accordance with the present invention, for showing a position of a filter cleaning unit when a sectional force is normal; and

Figure 9C is a longitudinal sectional view of a dust container of a vacuum cleaner in accordance with the present invention, for showing a position of a filter-cleaning unit when a suction force is strong.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0021] There may exist a plurality of embodiments of a filtering device for a vacuum cleaner in accordance with the present invention, and hereinafter, the most preferred embodiment will be described.

[0022] In addition, the same reference numerals will be given to the same components as the conventional art.

[0023] Figure 5 is a disassembled perspective view of a filtering device for a vacuum cleaner in accordance with the present invention, Figure 6 is a longitudinal sectional view taken along line VI-VI of Figure 5 and showing an assembled filtering device in accordance with the present invention, and Figure 7 is a perspective view of a filter cleaning unit in accordance with the present invention.

[0024] As shown therein, a filtering device of a vacuum cleaner in accordance with the present invention is provided with a knob 80 and detachably attached to a filtering device mounting portion 5 recessed from one side of the main body 1. Accordingly, a user can couple the filtering device to the cleaner main body 1 and separate the filtering device therefrom, more conveniently, by using the knob 80.

[0025] A filtering device of a vacuum cleaner in accordance with the present invention includes a casing 120 having a collecting space therein, a suction opening 140 through which air including dust is sucked and a discharge opening 150 through which purified air is discharged; a filter installed at an internal space of the casing 120, for filtering dust from air sucked through the suction opening 140; and a filter cleaning unit 200 disposed to encompass an outer circumferential surface of the filter 130, for cleaning the filter 130 by being rotated by a rotation force of air sucked through the suction opening 140.

[0026] The casing includes a body 100 formed in a cup shape an upper side of which is opened; and a cover 110 installed for covering the upper surface of the body 100.

[0027] A cylindrical filter supporter 180 through which a discharge opening 150 penetrates is installed at the cover 110, and the filter is mounted to the filter supporter 180, so that purified air can be discharged outside. In addition, when the cover 110 and the body 100 are coupled to each other, the filter is positioned inside the body 100.

[0028] A support wall body 160 having a predetermined height is protruded from an inner lower portion of the body 100. A pair of blocking plates 170 are installed to face each other, having a certain gap therebetween, so that relatively big dust or foreign substances of dust introduced into the body 100 are prevented from escap-

ing therefrom.

[0029] The filter 130 can filter even fine dust and is formed in a cylindrical shape so as to be mounted to the filter supporter 180.

[0030] Preferably, the suction opening 140 is eccentrically formed at one side of the body 100 so that introduced air and dust can rotate in the casing 120.

[0031] The filter cleaning unit 200 includes a rotary ring 210 disposed to encompass an outer circumferential surface of the filter 130; a blade 220 formed at an outer circumferential surface of the rotary ring 210, for rotating and lifting the rotary ring 210 by a rotation force of air sucked through the suction opening 140; and a brush 230 mounted inside the rotary ring 210, for removing dust attached to the surface of the filter 130 by being rotated together with the rotary ring 210.

[0032] Preferably, the rotary ring 210 is formed in a round ring shape having a predetermined width and is made of light material such as plastic so as to be easily rotated and lifted.

[0033] The blade 220 is integrally protruded from an outer circumferential surface of the rotary ring 210. In addition, preferably, at least two blades 220 are formed at the outer circumferential surface of the rotary ring 210.

[0034] In addition, the blade 220 is inclined at a predetermined angle (θ) on the basis of an axial direction of the filter 130 in order to rotate and simultaneously lift the rotary ring 210 by air introduced through the suction opening 140 formed at the body 100.

[0035] In addition, a pair of blades 220 are formed to face each other in a diagonal direction of the rotary ring 210, so that the rotary ring 210 can be stably rotated. That is, preferably, a pair of blades 220 are formed in a diagonal direction of the rotary ring 210 so that the center of gravity of the rotary ring 210 does not become eccentric. In addition, in view of a design condition, several pairs of blades may be formed in diagonal directions of the rotary ring 210, or a plurality of blades 220 may be formed at an outer circumferential surface at regular intervals.

[0036] Figure 8 shows a modified example of a blade 220 in accordance with the present invention. As shown therein, a blade 220 formed at an outer circumferential surface of the rotary ring 210 is formed in a curved shape, so that the rotary ring 210 can be rotated and lifted much more efficiently.

[0037] The brushes 230 are protruded at regular intervals from an inner circumferential surface of the rotary ring 210 toward the center of the rotary ring 210.

[0038] As shown in the drawing, preferably, four brushes are installed at intervals of 90° . However, in view of the design, more than four brushes 230 may be formed by pairs to face each other, or only two brushes 230 may be formed to face each other at the inner circumferential surface of the rotary ring 210 at an interval of 180° . In addition, the brushes 230 may be successively formed at the entire inner circumferential surface

of the rotary ring 210, facing the center of the rotary ring 210.

[0039] An operation of the filtering device for a vacuum cleaner in accordance with the present invention will now be described.

[0040] When a fan-motor of a vacuum cleaner is operated, and a suction force work in the casing 120 of the filtering device, dust or foreign substances sucked through the suction head of the cleaner are sucked into the casing 120 through the suction opening 140 formed at one side surface of the casing 120, together with air. Big dust or foreign substances of the dust or foreign substances sucked in such a manner fall by self-weight and are collected at an inner lower portion of the casing 120 divided by the blocking plate 105. Only fine dust is discharged toward the discharge opening 150 together with air. Dust in the air discharged toward the discharge opening 150 is filtered by the filter 130, and only filtered air is discharged through the discharge opening 102.

[0041] In addition, the rotary ring 210 is rotated and simultaneously lifted by a rotation force of air introduced from the inner side surface of the casing 120 through the suction opening 140, which is applied to the blade 220 formed at an outer circumferential surface of the rotary ring 210 of the filter cleaning unit 200. The brush 230 installed inside the rotary ring 210 is rotated together therewith, thereby removing dust attached to an outer surface of the filter 103.

[0042] That is, when the vacuum cleaner performs a cleaning operation, the filter-cleaning unit 200 encompassing the outer circumferential surface of the filter 130 is operated. Dust attached to the outer surface of the filter 103 is removed by the operation of the filter cleaning unit 104, so that a rapid decrease in suction force due to a channel closed with dust attached to the filter 103 can be prevented.

[0043] Figures 9A to 9C are operational views showing that a filter is cleaned in accordance with the present invention. As shown therein, the filter cleaning unit 200 rises and falls according to a cleaning mode to thereby remove dust. When a suction force of a cleaner is weak, the filter cleaning unit 200 is rotated at a lower end portion of the filter 103 as shown in Figure 9a, thereby removing dust attached to an outer surface of the filter 130. When a suction force is normal, the filter cleaning unit 200 is rotated at a central portion of the filter 130 as shown in Figure 9B. When the suction force is strong, the filter cleaning unit 200 is rotated at an upper end portion of the filter 103, thereby removing dust attached to the outer surface of the filter 130. That is, in general, when a user uses a cleaner, changing a cleaning mode, the filter cleaning unit 200 is rotated at the outer surface of the filter and moves upwardly and downwardly, thereby removing dust attached to the filter 130.

[0044] As so far described, in the filtering device for a vacuum cleaner in accordance with the present invention, a filter cleaning unit is rotated, falling and rising by a rotation force of air sucked into an internal space of

the casing, thereby cleaning the outer circumferential surface of the filter. Hence, even if the cleaner is operated for a long time, flow resistance of air passing through the filter is reduced. Accordingly, a sudden deterioration of a suction force of a cleaner is prevented from occurring so that efficiency of a cleaner is remarkably improved.

[0045] As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalence of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A filtering device for a vacuum cleaner comprising:

a casing having a collecting space therein, a suction opening through which air including dust is sucked and a discharge opening through which purified air is discharged;
a filter installed at the internal space of the casing, for filtering dust from air sucked through the suction opening; and
a filter cleaning unit disposed to encompass an outer circumferential surface of the filter, for cleaning the filter by being rotated by a rotation force of air sucked through the suction opening.

2. The filtering device of claim 1, wherein the suction opening of the casing is eccentrically formed at one side of the casing so that sucked air can be rotated in the casing.

3. The filtering device of claim 1, wherein the filter cleaning unit comprises:

a rotary ring disposed to encompass an outer circumferential surface of the filter;
a blade mounted to an outer circumferential surface of the rotary ring, for rotating and lifting the rotary ring by the rotation force of air sucked through the suction opening; and
a brush mounted at an inner circumferential surface of the rotary ring, for removing dust attached to a surface of the filter by being rotated together with the rotary ring.

4. The filtering device of claim 3, wherein the blade is integrally protruded from the outer circumferential surface of the rotary ring.

5. The filtering device of claim 4, wherein the blade is inclined at a predetermined angle on the basis of an axial direction of the filter so that the rotary ring is lifted.

6. The filtering device of claim 5, wherein at least two blades are formed.

7. The filtering device of claim 6, wherein one pair of blades are formed in a diagonal direction of the rotary ring.

8. The filtering device of claim 6, wherein several pairs of blades are formed in diagonal directions of the rotary ring.

9. The filtering device of claim 6, wherein a plurality of blades are formed at an outer circumferential surface of the rotary ring at regular intervals.

10. The filtering device of claim 4, wherein the blade is formed in a curved shape.

11. The filtering device of claim 3, wherein the brushes are protruded from an inner circumferential surface of the rotary ring toward the center of the rotary ring at regular intervals.

12. The filtering device of claim 3, wherein the brushes are successively protruded from the entire inner circumferential surface of the rotary ring toward the center of the rotary ring.

FIG. 1

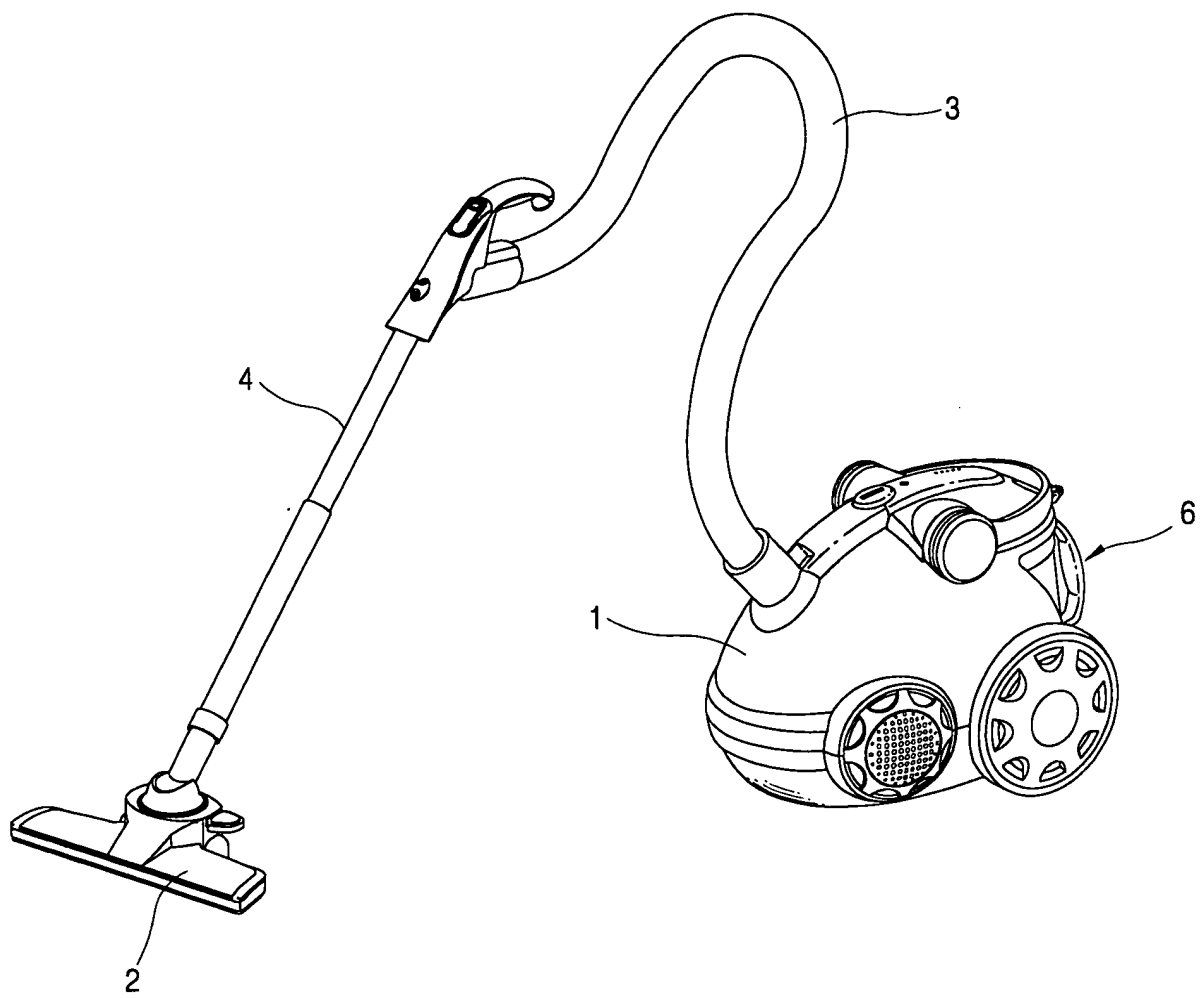


FIG. 2

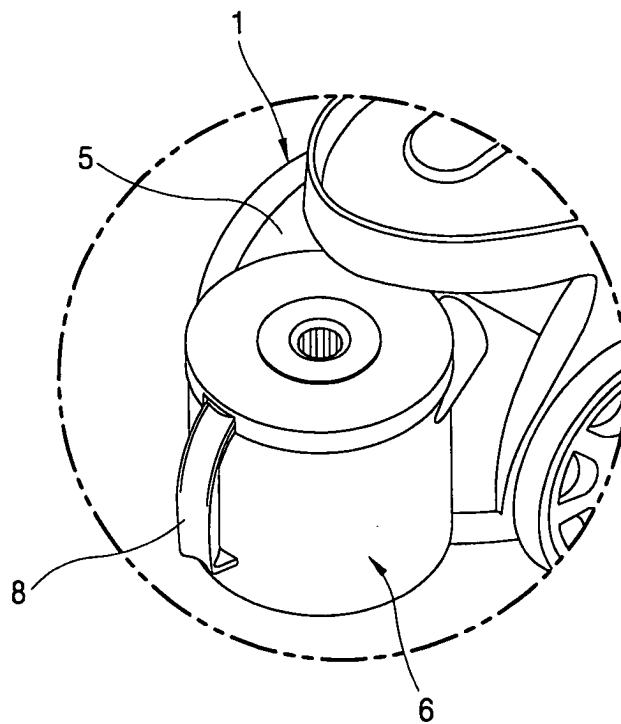


FIG. 3

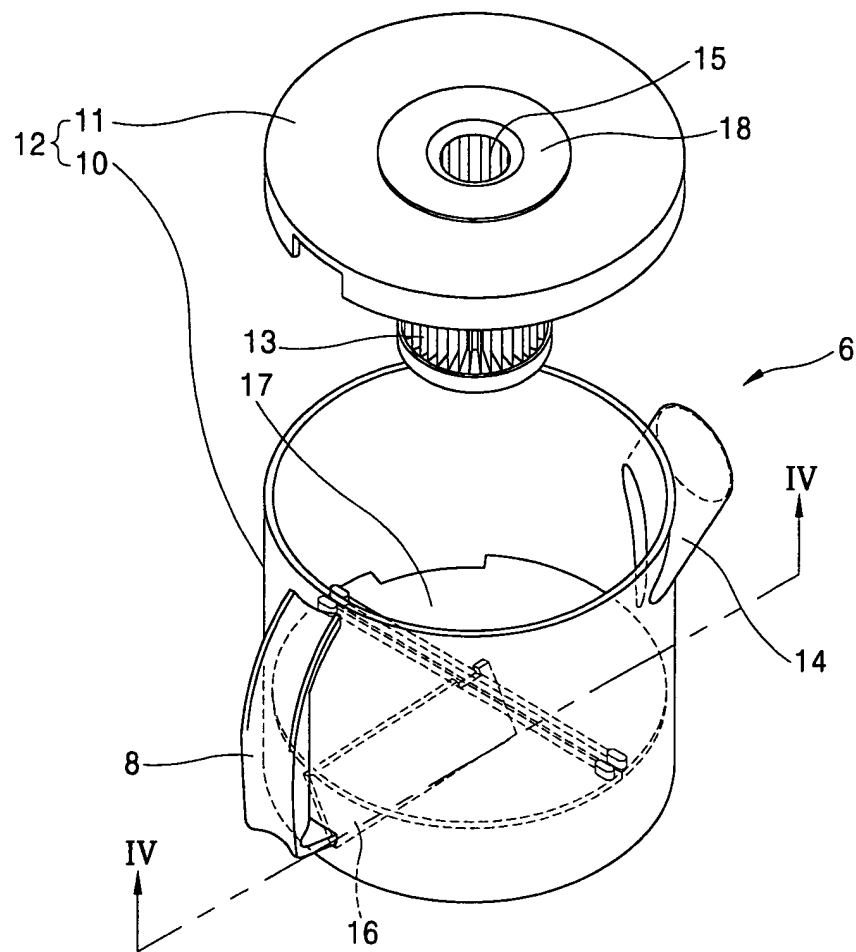


FIG. 4

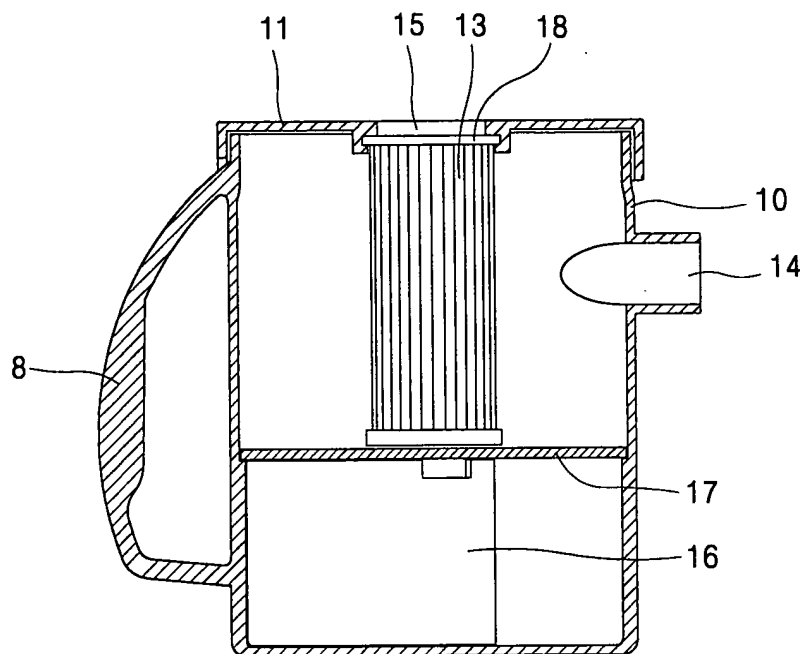


FIG. 5

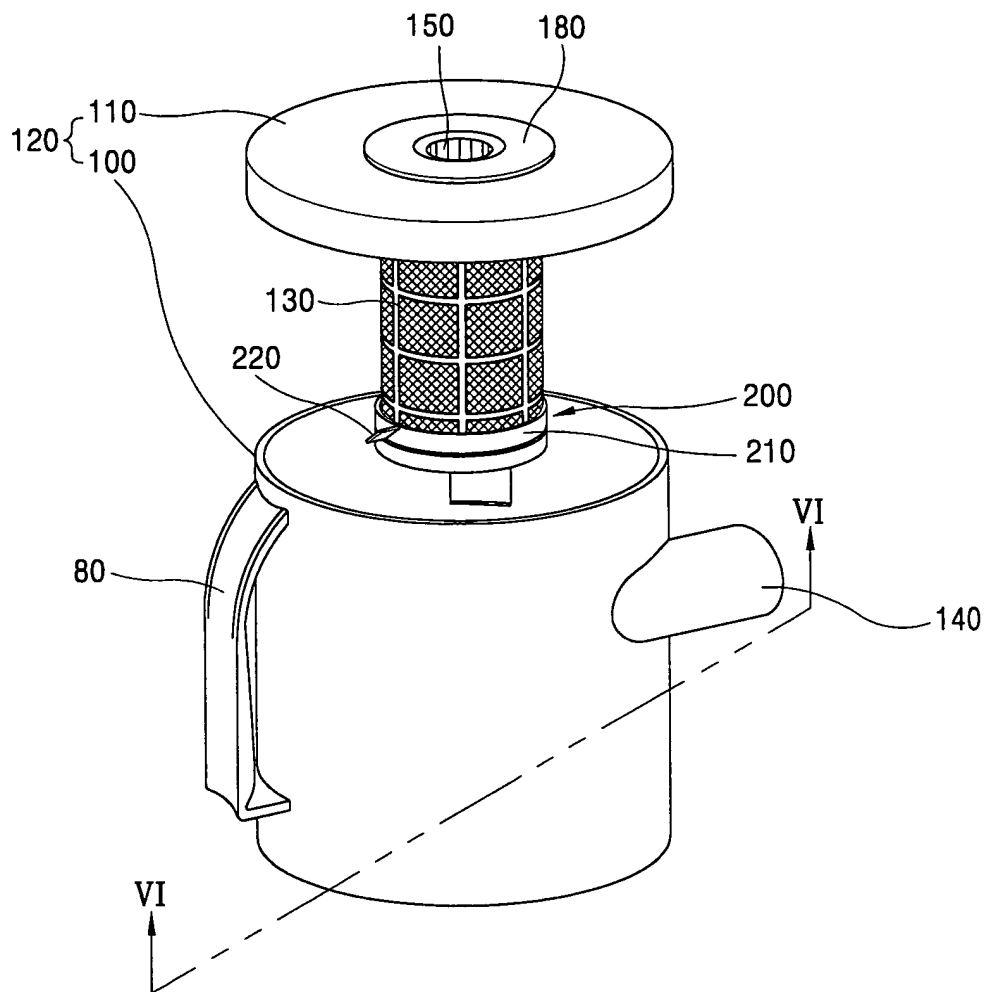


FIG. 6

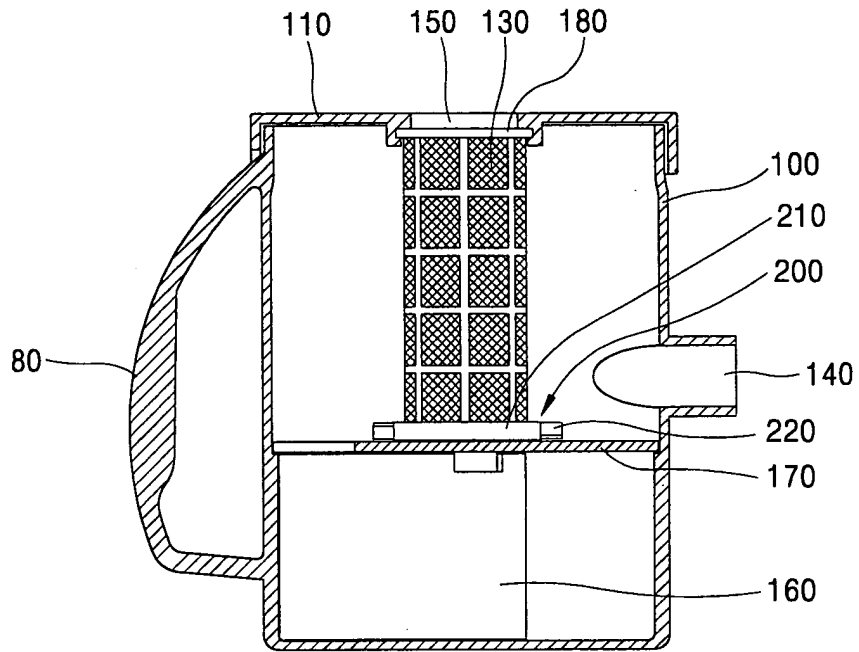


FIG. 7

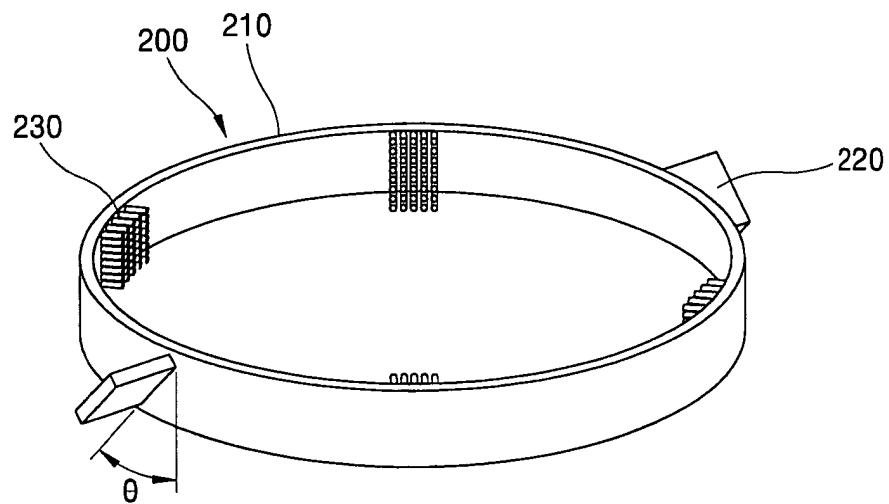


FIG. 8

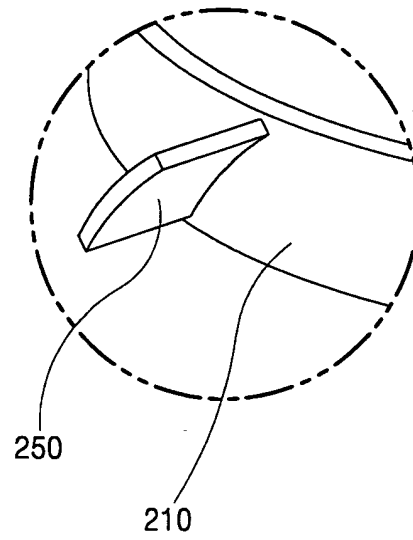


FIG. 9A

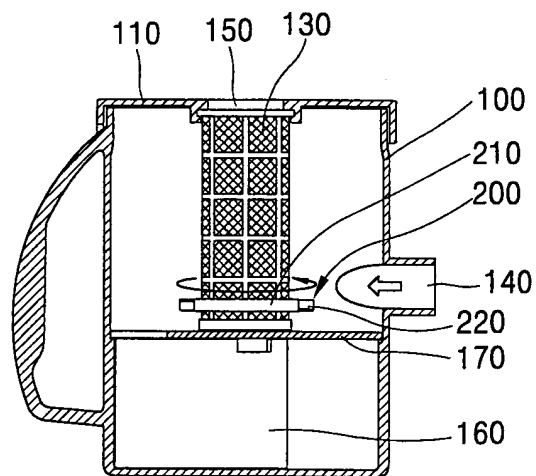


FIG. 9B

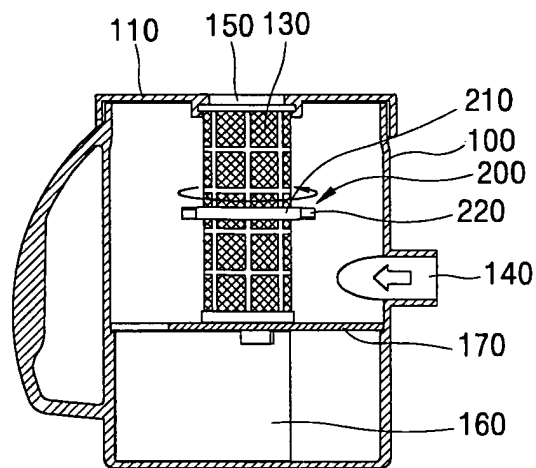


FIG. 9C

