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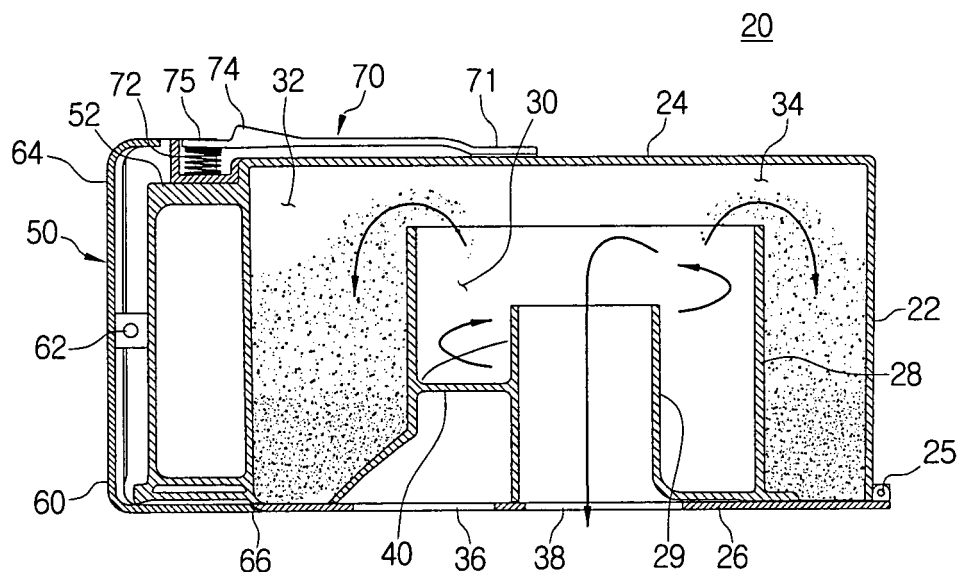
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(54) **Cyclone dust collecting apparatus with air outlet on the lower part and with a hinged cover**

(57) A dust collecting apparatus for a vacuum cleaner according to the present disclosure includes an inner wall defining a cyclone chamber in which air is whirled; an outer wall which is apart from the inner wall at a distance to form a dust chamber together with the inner wall; an

upper wall which is apart from an upper end of the inner wall and connected with an upper end of the upper wall; and a lower cover disposed at a lower side of the outer wall, wherein the air separated from dust is discharged through a lower part of the cyclone chamber, and the lower cover opens or closes the dust chamber.

FIG. 3



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Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present disclosure relates to a dust collecting apparatus, and more particularly to a cyclone dust collecting apparatus in which dust-laden air is sucked by using a vacuum motor and then air is flowed out through a lower part thereof.

2. Description of the Related Art

[0002] A dust collecting apparatus used in a vacuum cleaner is to suck dust-laden air and separate dust from the air and then discharge purified air. The dust collecting apparatus is classified into a filter dust collecting apparatus using a filter for separating the dust and a cyclone dust collecting apparatus in which the dust-laden air is whirled and thus the dust is separated from the air by centrifugal force.

[0003] The cyclone dust collecting apparatus has a cyclone body in which the sucked air is whirled and a dust container in which the separated dust is collected. In a conventional cyclone dust collecting apparatus, generally, the cyclone body is disposed at an upper side thereof so that the dust separated from the air falls into the dust container and the dust container is disposed at a lower side thereof. Therefore, since the dust collecting apparatus has a high height, it is mainly used in an upright vacuum cleaner rather than a canister vacuum cleaner.

[0004] The applicant has developed a low height dust collecting apparatus, as disclosed in Korean Patent No. 560967, in order to use the cyclone dust collecting apparatus in the canister vacuum cleaner. In the dust collecting apparatus, the cyclone body is surrounded by the dust container, and the air is flowed from a lower part to an upper part thereof, and the dust is radially discharged from a center portion thereof. Since the air is discharged through the lower part thereof, it has a complicated construction. However, due to the construction, it is possible to apply the cyclone dust collecting apparatus to the canister vacuum cleaner having a low height. Herein, it has been continuously required to improve a user's convenience in an operation of removing the dust from the dust container or installing/separating the dust collecting apparatus in/from the main body of the vacuum cleaner.

SUMMARY OF THE INVENTION

[0005] The present disclosure has been developed in order to overcome the above drawbacks and other problems associated with the conventional arrangement. An aspect of the present disclosure is to provide a cyclone dust collecting apparatus in which a user's convenience is improved and air is discharged through a lower part thereof.

[0006] The above aspect and/or other feature of the present disclosure can substantially be achieved by providing a dust collecting apparatus for a vacuum cleaner, including an inner wall defining a cyclone chamber in which air is whirled; an outer wall which is apart from the inner wall at a distance to form a dust chamber together with the inner wall; an upper wall which is apart from an upper end of the inner wall and connected with an upper end of the upper wall; and a lower cover disposed at a lower side of the outer wall, wherein the air separated from dust is discharged through a lower part of the cyclone chamber, and the lower cover opens or closes the dust chamber. Therefore, the dust can be facilely removed from the canister cyclone dust collecting apparatus through a lower part of which air is flowed out.

[0007] Herein, the lower cover can be rotatably hinged-coupled to a lower side of the outer wall.

[0008] Further, the dust collecting apparatus further includes a handle frame disposed at the outer wall and a first locking member locked to the lower cover. Preferably, the first locking member is swung around a central shaft of the handle frame so as to lock or release the lower cover so that the dust chamber is closed or opened.

[0009] Further, the dust collecting apparatus further includes a second locking member disposed at an upper surface of the upper wall so as to be locked to a main body of the vacuum cleaner.

[0010] Furthermore, the dust collecting apparatus includes a concaved part which is depressed downward at a center portion thereof and also further includes a skirt member which is protruded downward from a lower surface of the upper wall to have an annular shape and a part of which is cut off.

[0011] Further, the lower cover is formed with a first opening through which the air is introduced and a second opening through which the air is discharged.

[0012] Therefore, the dust collecting apparatus according to the present disclosure has a low height which can be applied to the canister vacuum cleaner. Further, since the user can open the lower cover of the dust collecting apparatus with one hand, it is possible to easily and facilely remove the collected dust from the dust collecting apparatus.

[0013] Furthermore, the second locking member is fixed to the upper wall which is integrally formed with the outer wall, and the pressing part is protruded to the upper side of the handle unit. Therefore, the user can install and separate the dust collecting apparatus to/from the main body.

[0014] In addition, due to the concaved part provided at the upper wall, the whirling force of the air is increased, thereby improving the dust collecting efficiency.

[0015] Other objects, advantages and salient features of the disclosure will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] These and/or other aspects and advantages of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

[0017] Fig. 1 is a perspective view illustrating a vacuum cleaner having a dust collecting apparatus according to a first embodiment of the present disclosure;

[0018] Fig. 2 is a perspective view illustrating the dust collecting apparatus according to the first embodiment of the present disclosure;

[0019] Fig. 3 is a cross-sectional view taken along a line III-III of Fig. 2;

[0020] Fig. 4 is a bottom view illustrating the dust collecting apparatus of Fig. 2;

[0021] Fig. 5 is a cross-sectional view illustrating a status that a lower cover is opened in Fig. 3;

[0022] Fig. 6 is a perspective view illustrating a dust collecting apparatus according to a second embodiment of the present disclosure;

[0023] Fig. 7 is a cross-sectional view taken along a line VII-VII of Fig. 6;

[0024] Fig. 8 is a perspective view illustrating a bottom surface of an upper wall of the dust collecting apparatus of Fig. 6;

[0025] Fig. 9 is a schematic cross-sectional view illustrating a structure of locking the dust collecting apparatus of Fig. 6 in the main body of the vacuum cleaner, and

[0026] Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0027] Hereinafter, certain exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0028] Fig. 1 is a perspective view illustrating a canister vacuum cleaner 10 having a dust collecting apparatus 20 according to a first embodiment. As shown in Fig. 1, the canister vacuum cleaner 10 includes a main body 12, a dust collecting apparatus 20, a nozzle assembly 18, an extension pipe 16 and a flexible hose 14. The dust collecting apparatus according to the first embodiment of the present disclosure can be installed in an installation space 13 formed at a front side of the main body 12 by pushing it therein or can be separated from the installation space 13 by pulling it out therefrom while gripping a handle unit 50 and pushing a pressure part 75 of a second locking member 70. Since other construction elements are already known, description thereof will be omitted.

[0029] Figs. 2 to 5 are views showing the dust collecting apparatus according to the first embodiment of the present disclosure, Fig. 2 is a perspective view watched obliquely from an upper side, Fig. 3 is a cross-sectional

view taken along a line III-III of Fig. 2, Fig. 4 is a bottom view illustrating the dust collecting apparatus, and Fig. 5 is a cross-sectional view illustrating a status that a lower cover is opened in Fig. 3.

[0030] Referring to Figs. 2 to 4, the dust collecting apparatus 20 of the vacuum cleaner includes an inner wall 28, an outer wall 22, an upper wall 24, a lower cover 26, a handle unit 50, a first locking member 60 and the second locking member 70.

[0031] The inner wall 28 is formed into the shape of a cylinder and also integrally formed with the outer wall 22 and the upper wall 24. An inner space of the cylindrical inner wall 28 forms a cyclone chamber 30, and an outlet pipe 29 is formed at a center part of the inner space to be protruded from a bottom surface, and a guide member 40 is disposed between the inner wall 28 and the outlet pipe 29. The cylindrical outlet pipe 29 is disposed vertically to have an upper end lower than that of the inner wall 28. The outlet pipe 29 functions as a central axis for maintaining whirl force of air when the air is introduced from a lower side and also serves to divide the whirling air from discharged air when the air is discharged through the lower part. Further, the outlet pipe 29 is connected with a second opening 38 of the lower cover 26. The guide member 40 is formed into the shape of a spiral plate so as to wind around the outlet pipe 29 and thus form a spiral air path. Therefore, the air introduced into the cyclone chamber 30 is flowed around the outlet pipe along the spiral guide member 40, so that the whirl force of the air is increased.

[0032] The outer wall 22 forms an external appearance of the dust collecting apparatus 20 and is disposed to be parallel with the inner wall 28 while being apart from the inner wall 28 at a desired distance. As shown in Fig. 2, one surface of the outer wall 22 has a substantial linear shape and the other surface thereof has a substantial semicircular shape. The outer wall 22 has a height which is higher than the inner wall 28, and an upper end of the outer wall 22 is connected with the upper wall 24. A space between the inner wall 28 and the outer wall 22 is served as a dust chamber 32 in which the dust separated from the cyclone chamber 30 is stored. Referring to Fig. 3, the dust is discharged to the dust chamber 32 through a dust discharging space 34 between the upper end of the inner wall 28 and the upper wall 24 by centrifugal force. A hinge shaft 25 which is hinge-coupled with the lower cover 26 is formed at a lower side of one 23 of the outer wall 22.

[0033] The plate-shaped upper wall 24 is integrally formed with the outer wall 22. The second locking member 70 is mounted on an upper surface of the upper wall 24 so as to be locked to the main body 12 (referring to Fig. 1). The detailed description of the second locking member 70 will be provided later.

[0034] The lower cover 26 is hinge-coupled with the lower end of the outer wall 22 and also locked to the first locking member 60 to seal up the dust chamber 32. The lower cover 26 is rotated on the hinge shaft 25 so as to open the lower part of the dust chamber 32 and thus

remove the dust 80 as shown in Fig. 5. Referring to Fig. 4, the lower cover 26 is formed with a first opening 36 through which the air is introduced to the cyclone chamber 30 and a second opening 38 which is communicated with the outlet pipe 29 to function as an air discharging path for discharging the air from the cyclone chamber 30 to the outside. The first opening 36 is communicated with the nozzle assembly 18 through the flexible hose 14 and the extension pipe 16 (referring to Fig. 1), and the second opening 38 is communicated with a vacuum motor room (not shown) disposed in the main body 12.

[0035] Referring to Fig. 3, the handle unit 50 is disposed in the form of a "C" shape at a side of the outer wall 22. In the embodiment, the handle unit 50 is integrally formed with the outer wall 22. The handle unit 50 has a "C"-shaped handle frame 52 to which the first locking member 60 is hinge-coupled. Further, an elastic member 72 is disposed at an upper side of the handle frame 52.

[0036] The first locking member 60 is locked to the lower cover 26 so as to closely contact the lower cover 26 to the lower end of the outer wall 22 and also hinge-coupled to a central shaft 62 of the handle frame 52. The first locking member 60 is formed into a "C"-shape and formed with a button part 64 formed at an upper side of the central shaft 62 and a locking part 66 formed at a lower side thereof so as to be coupled to the lower cover 26. Therefore, as shown in Fig. 5, if the button part 64 is pushed by a user, the locking part 66 is separated from the lower cover 26, and the lower cover 26 is rotated on the hinge shaft 25 by its own weight so that the dust chamber 32 is opened and the stored dust 80 is discharged.

[0037] The locking member 70 includes a connecting part 71 fixed to the upper surface of the upper wall 24, a pressing part 75 pushed by the user and a hook part 74 coupled to the main body 12. The elastic member 72 is disposed on the upper end of the handle frame 52 and the pressing part 75 is disposed on an upper end of the elastic member 72, so that the dust collecting apparatus 20 can be pushed in the main body 12 while the user presses the pressing part 72 and then locked in the main body 12 if the user releases the pressing part 72.

[0038] Figs. 6 to 9 are views illustrating a second embodiment of the present invention, Fig. 6 is a perspective view, Fig. 7 is a cross-sectional view taken along a line VII-VII of Fig. 6, Fig. 8 is a perspective view illustrating a bottom surface of an upper wall 24a, Fig. 9 is a schematic cross-sectional view illustrating a structure of locking a second locking member 70a to the main body 12.

[0039] A dust collecting apparatus 20a of the second embodiment has the same constructions as the dust collecting apparatus 20 of the first embodiment, but there is a difference in structures of the second locking member 70a and the upper wall 24a. In order to avoid duplicated descriptions of the same parts as in the first embodiment such as the inner wall 28, the outer wall 22, the lower cover 26, the handle unit 50 and the first locking member 60, they will be omitted.

[0040] Referring to Figs. 6 and 7, the second locking member 70a is formed with a connecting part 71 a fixed to a concaved part 82 of the upper wall 24a. The connecting part 71 a is formed into the shape of a circular knob, as shown in Fig. 6. And the shapes of a hook part 74a, a pressing part 75a and an elastic member 72 are the same as those in the first embodiment.

[0041] Referring to Figs. 7 and 8, the upper wall 24a is formed with the concaved part 82 which is depressed toward the cyclone chamber 30 at a center portion thereof. As shown in Fig. 7, a bottom surface of the concaved part 82 is depressed to an upper end of the inner wall 28, and the concaved part 82 is formed into a portion of a sphere, as shown in Fig. 8. Due to the shape of the concaved part 82, the dust-laden air is whirled at an upper side of the cyclone chamber 30 while describing a larger circle, and the dust separated from the air can be easily discharged through the dust discharging space 34 to the dust chamber 32.

[0042] Further, a skirt member 84 is provided around the concaved part 82 on a bottom surface of the upper wall 24a. The skirt member 84 has a cut-off portion 32. Therefore, it is prevented that the dust separated by the skirt member 84 is discharged through the outlet pipe 29 along the whirling air, whereas large-sized dust can be easily collected in the dust chamber 32 through the cut-off portion 32. As shown in Fig. 7, a diameter D1 of the skirt member 84 is formed to be larger than a diameter D2 of the cylindrical inner wall 28.

[0043] Hereinafter, the operation of the dust collecting apparatus will be described with reference to the drawings. Since the dust collecting apparatuses 20 and 20a of the first and second embodiments have a similar operating construction, the operations of the same parts will be described together, and the operations of the other parts will be described separately.

[0044] Referring to Figs. 1 to 9, if the user pushes the dust collecting apparatus 20, 20a into the installation space 13 of the main body while gripping the handle unit 50, the hook part 74, 74a of the second locking member 70, 70a is pressed by a hook part 15 of the main body 12 and then slid in the installation space 13 while the elastic member 72 is compressed, as described by a dotted line of Fig. 9. When the hook part 74, 74a of the second locking member 70, 70a is completely inserted into the hook part 15 of the main body 12, the second locking member 70, 70a is moved upward by the elastic member 72. Thus, the hook part 74, 74a of the second locking member 70, 70a is locked to the hook part 15 of the main body 12.

[0045] Referring to Fig. 3, the external air is introduced through the first opening 36 to a lower part of the cyclone chamber 30. The introduced air is moved and whirled along the guide member 40, and the large-sized dust having a large centrifugal force is moved from the upper side of the cyclone chamber 30 to the dust chamber 32 through the dust discharging space 34. Meanwhile, since the dust chamber 34 is isolated from the cyclone chamber

30 by the inner wall, it is prevented that the dust stored in the dust chamber is flowed backward to the cyclone chamber 30.

[0046] In order to remove the stored dust, the dust collecting apparatus 20, 20a is separated from the main body 12. In the order of removing the dust, the user pushes the pressing part 75, 75a of the second locking member 70, 70a to release the locking state of the dust collecting apparatus 20, 20a with the main body 12, and then separate the dust collecting apparatus 20, 20a from the main body 12. Then, as shown in Fig. 5, the user presses the button part 64 of the first locking member 60. The locking member 60 is rotated around the central shaft 62 and the locking state of the locking part 66 with the lower cover 26 is released and the lower cover 26 is rotated on the hinge shaft 25 by its own weight, whereby the dust chamber 32 is opened and the dust is fallen. Therefore, the user can facilely remove the dust with one hand.

[0047] Referring to Fig. 7, in the second embodiment, since the concaved part 82 is formed at the upper wall 24a, the whiling force of the air is increased and a whirling diameter of the air is also increased. And it is further difficult that the dust collected in the dust chamber 32 is flowed backward to the cyclone chamber 30.

[0048] As described above, the dust collecting apparatus according to the present disclosure has a low height which can be applied to the canister vacuum cleaner. Further, since the user can open the lower cover of the dust collecting apparatus with one hand, it is possible to easily and facilely remove the collected dust from the dust collecting apparatus.

[0049] Furthermore, the second locking member is fixed to the upper wall which is integrally formed with the outer wall, and the pressing part is protruded to the upper side of the handle unit. Therefore, the user can install and separate the dust collecting apparatus to/from the main body.

[0050] In addition, due to the concaved part provided at the upper wall, the whirling force of the air is increased, thereby improving the dust collecting efficiency.

wherein the air separated from dust is discharged through a lower part of the cyclone chamber, and the lower cover opens or closes the dust chamber.

- 5 2. The dust collecting apparatus of claim 1, wherein the lower cover is rotatably hinge-coupled to a lower side of the outer wall.
- 10 3. The dust collecting apparatus of claim 1 or 2, further comprising a handle frame disposed at the outer wall and a first locking member locked to the lower cover.
- 15 4. The dust collecting apparatus of claim 3, wherein the first locking member is swung around a central shaft of the handle frame so as to lock or release the lower cover so that the dust chamber is closed or opened.
- 20 5. The dust collecting apparatus of claim 3 or 4, further comprising a second locking member disposed at an upper surface of the upper wall so as to be locked to a main body of the vacuum cleaner.
- 25 6. The dust collecting apparatus of any of claims 1 to 5, further comprising a concaved part which is depressed downward at a center portion thereof.
- 30 7. The dust collecting apparatus of any of claims 1 to 6, further comprising a skirt member which is protruded downward from a lower surface of the upper wall to have an annular shape and a part of which is cut off.
- 35 8. The dust collecting apparatus of claim 7, wherein the skirt member has a large diameter than the cylindrical inner wall.
- 40 9. The dust collecting apparatus of any of claims 1 to 8, wherein the lower cover is formed with a first opening through which the air is introduced and a second opening through which the air is discharged.

Claims

1. A dust collecting apparatus for a vacuum cleaner, comprising:

an inner wall defining a cyclone chamber in which air is whirled;
 an outer wall which is apart from the inner wall at a distance to form a dust chamber together with the inner wall;
 an upper wall which is apart from an upper end of the inner wall and connected with an upper end of the upper wall; and
 a lower cover disposed at a lower side of the outer wall,

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FIG. 1

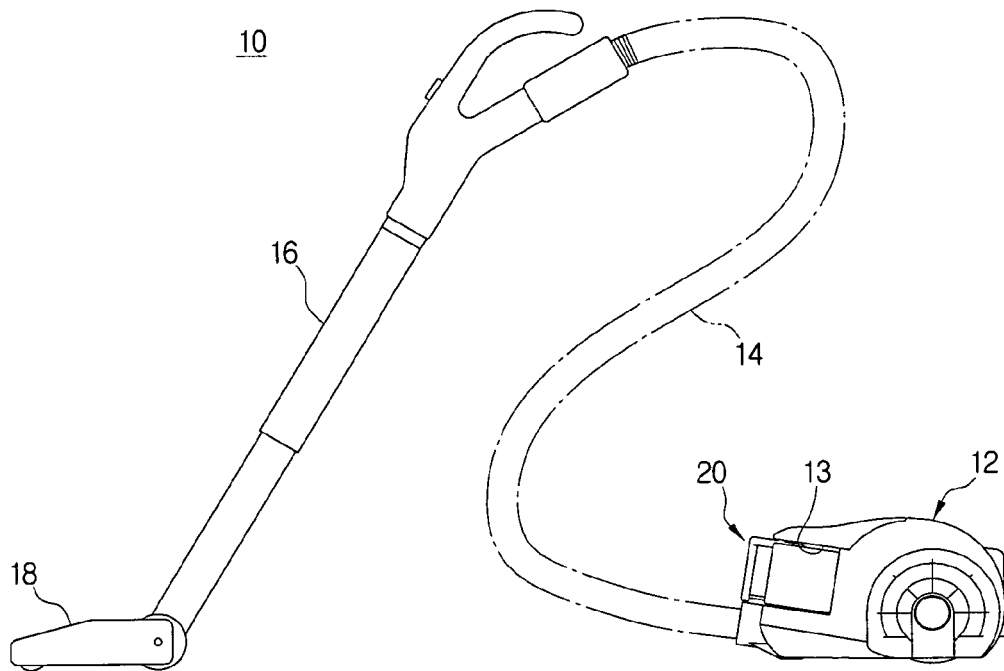


FIG. 2

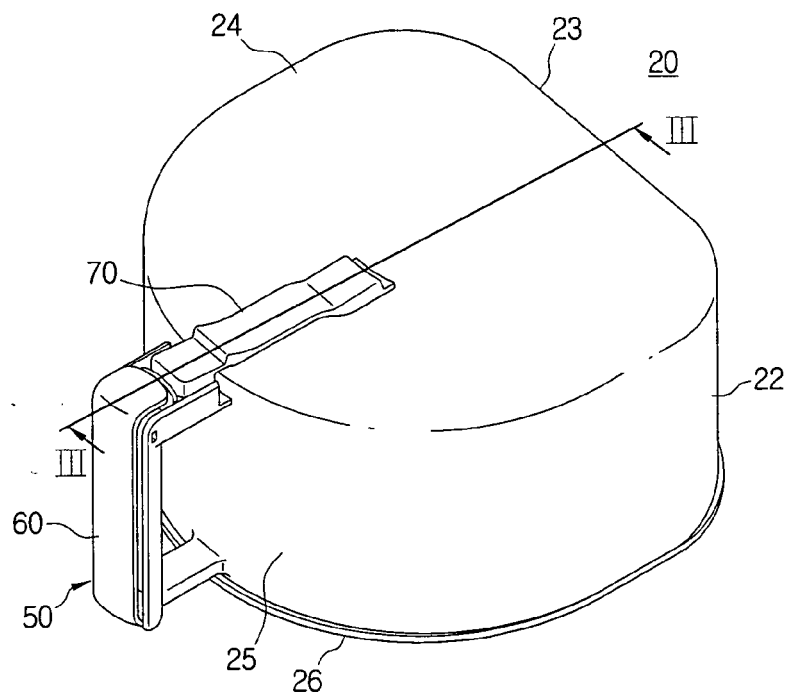


FIG. 3

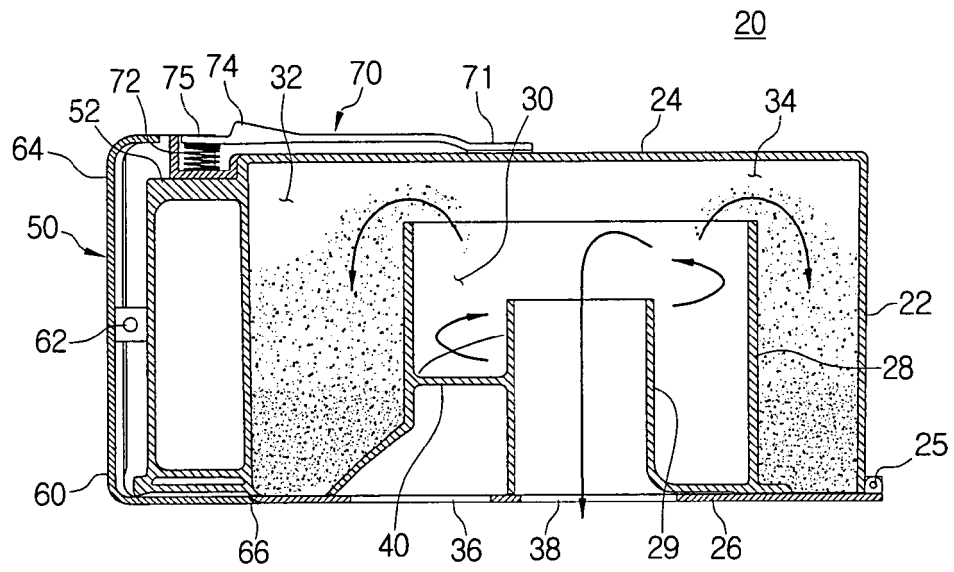


FIG. 4

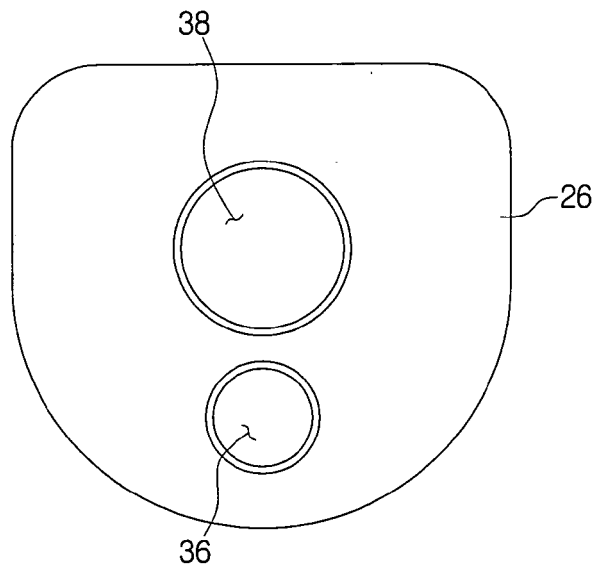


FIG. 5

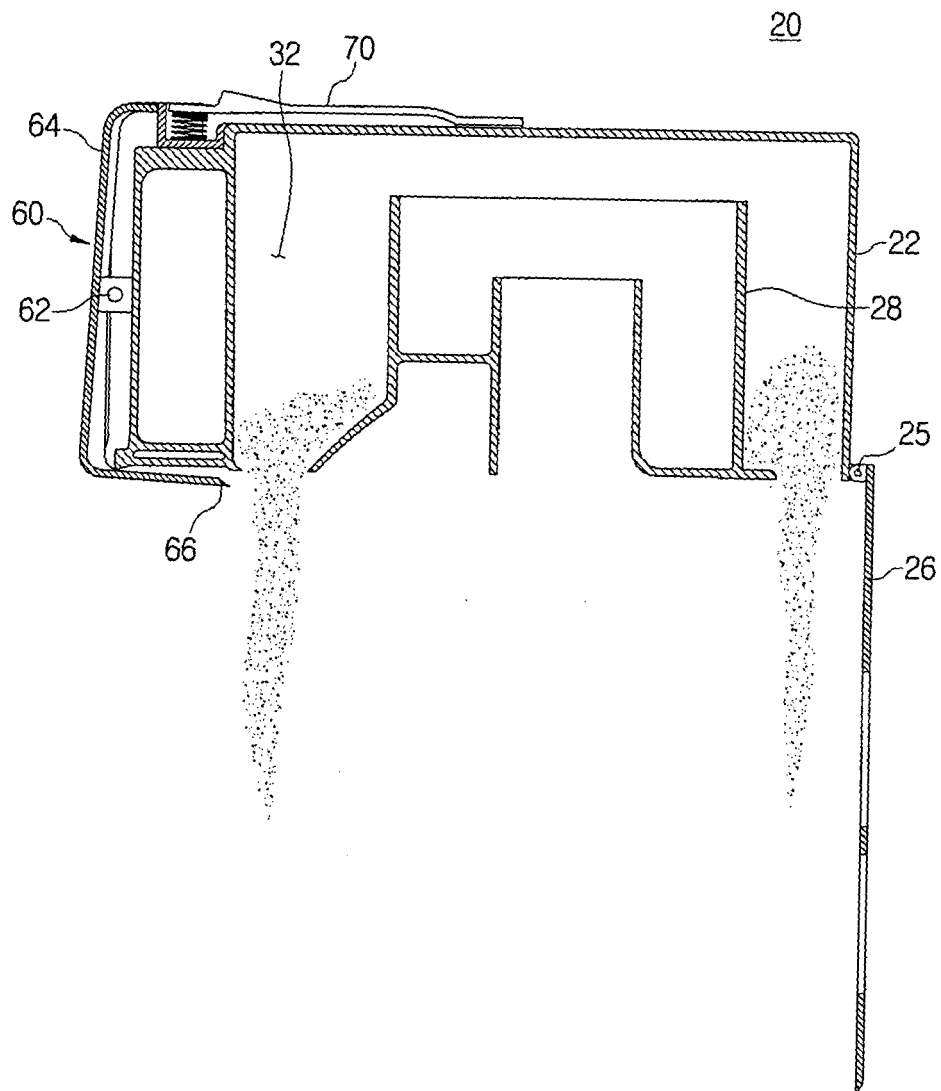


FIG. 6

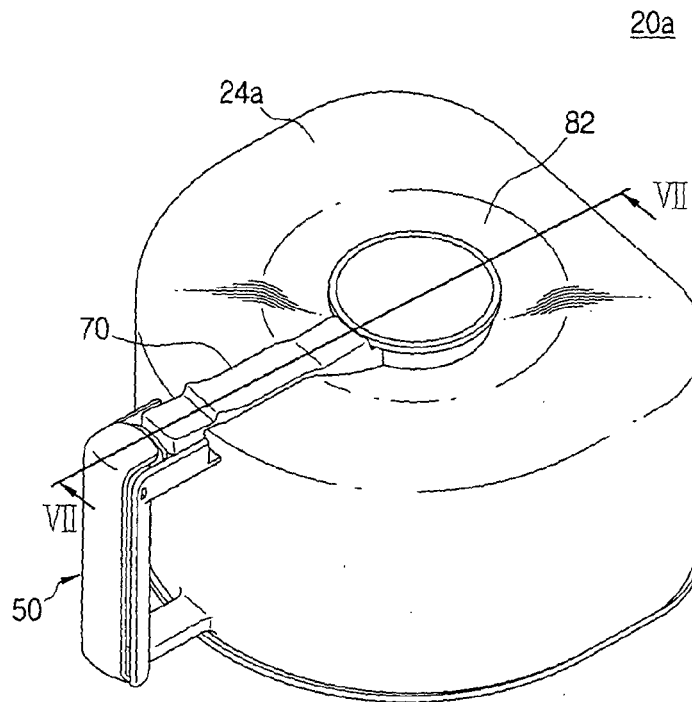


FIG. 7

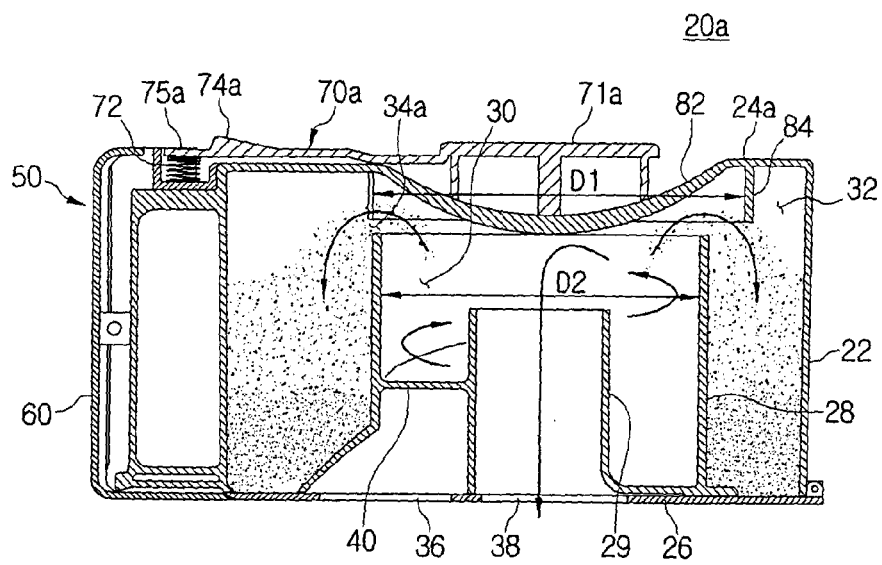


FIG. 8

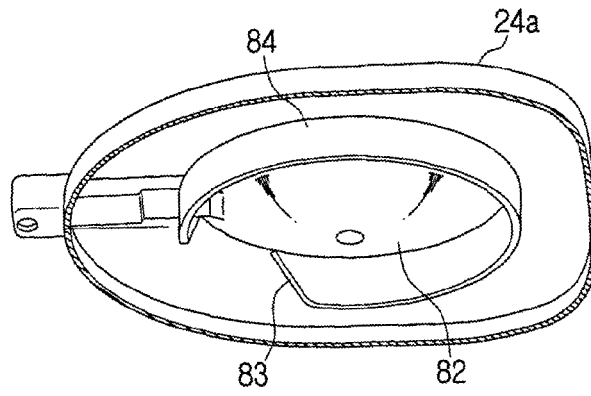
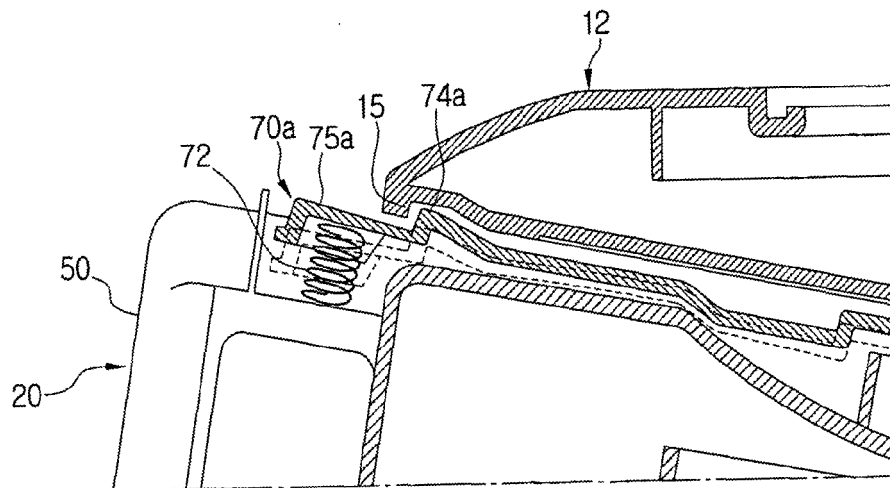


FIG. 9



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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