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Dust Collecting Apparatus for a Vacuum Cleaner having Two Cyclone Chambers

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(56) Related Art
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ABSTRACT OF THE DISCLOSURE

DUST COLLECTING APPARATUS FOR A VACUUM CLEANER HAVING TWO CYCLONE CHAMBERS

A double cyclone dust collector for a vacuum cleaner includes a lower cyclone body having an air suction port and an air discharge port for separately collecting dust entrained in air which is drawn in through the air suction port, an upper cyclone body having a main body for sequential secondary separation of fine dust particles after the primary dust separation of the air flowing from the lower cyclone body, and an upper casing providing a fine dust collecting chamber by covering the surface of the main body, and an air path for guiding the air which is cleaned in the upper cyclone body by the secondary dust separation step into the upper and lower cyclone bodies, and discharging the air through the air discharge port. The dust particles entrained in the air can be separately and sequentially collected according to the size of the dust particles.

FIG. 2

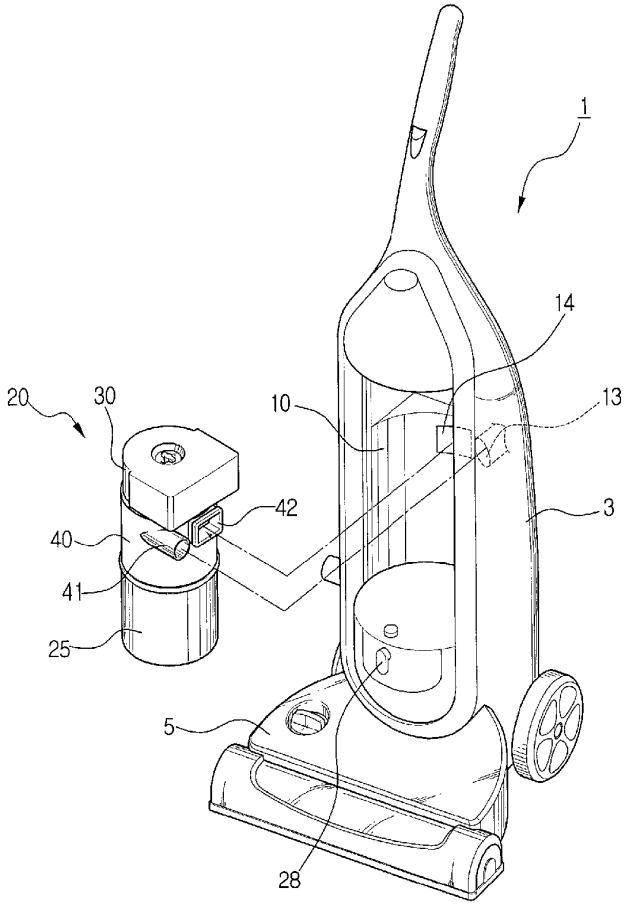
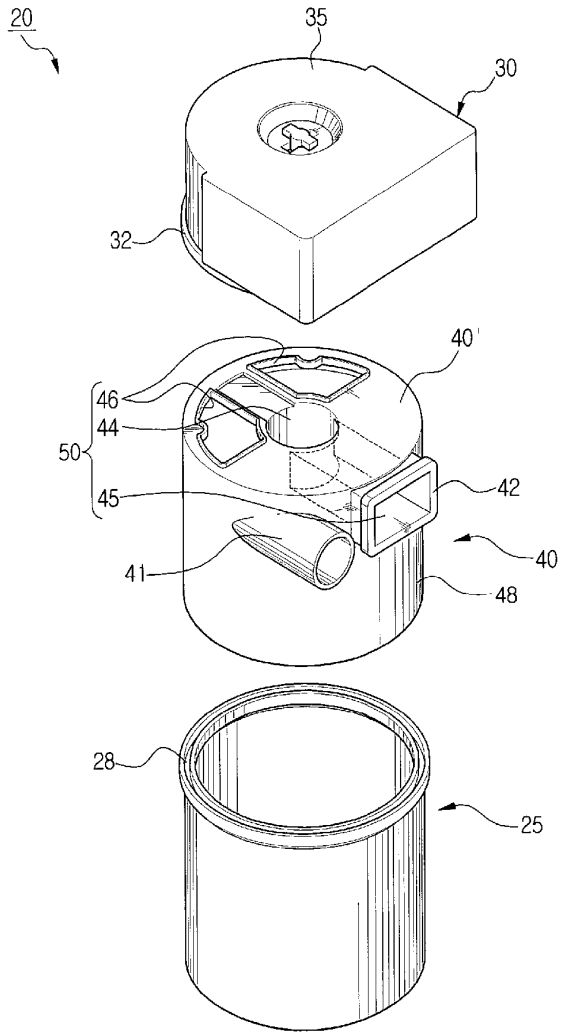


FIG. 4



AUSTRALIA

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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The following statement is a full description of this invention, including the best method of performing it known to us:

DUST COLLECTING APPARATUS FOR A VACUUM CLEANER HAVING TWO CYCLONE CHAMBERS

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates generally to a cyclone dust collector for a vacuum cleaner, and more particularly, to a double chambered cyclone dust collector which centrifugally separates dust and dirt entrained in the air stream drawn into the cyclone dust collector (hereinafter, referred to as "dust") by sequentially performing multiple separation operations of the dust from the air, and which collects the separated dust therein.

2. Description of the Related Art

Referring now to Figs. 1 and 2, Fig. 1 illustrates an enlarged, vertical view, in partial cross-section, of a conventional cyclone dust collector 20 (Fig. 2) for a vacuum cleaner 1. A conventional cyclone dust collector is usually removably mounted in a device receiving enclosure 10 of a main body 3 of a vacuum cleaner, as shown in Fig. 2. At the rear side of the device receiving enclosure 10, an air suction connection port 13 (shown in phantom in Fig. 2) for drawing in external air in which dust is entrained, and an air discharge connection port 14 (Fig. 2) for discharging clean air that has been filtered in the cyclone dust collector 100 of Fig. 1.

Referring now to Fig. 1, the conventional cyclone dust collector 100 comprises a cyclone body 110 and a filter 130 mounted within the cyclone body 110. The cyclone body 110 comprises an air suction port 113 (shown in phantom) and an air discharge port 115 and also comprises a dust receptacle 120 to be inserted within a lower part of the cyclone body 110. The air suction port 113 is formed to extend in a direction that is tangent or obliquely oriented relative to a sidewall of the cyclone body 110, and the port 113 is connected to the suction

connection port 13 (Fig. 2) of the main body 3. The air discharge port 115 is formed in the center of the upper part of the cyclone body 110 so as to extend upwardly therefrom, and is connected to the discharge connection port 14 of the main body 3.

According to the above-described structure, air is drawn in along the suction connection port 13 is discharged into the cyclone body 110 through the air suction port 113, and is directed to form a rotating air current. At this time, dust entrained in the rotating air current is centrifugally separated from the air and falls down to be collected in the dust receptacle 120. The dust receptacle 120 is replaceably removable from the cyclone body 110 so that the dust receptacle 120 can be emptied when it is full of dust.

Meanwhile, fine particles of the dust that may still remain in the air current are discharged through the air discharge port 115, after the centrifugal separation in the cyclone body 110. For filtering the fine dust particles, a lower filter 130 is mounted at an opening of the air discharge port 115. The lower filter 130, having a plurality of fine holes, is disposed in the cyclone body 110 in an upright or vertical position. Due to the presence of the lower filter 130, the air passing through the air discharge port 115 is separated from the fine dust particles, and thus, clean air is discharged through the discharge connection port 14 of the main body (Fig. 2).

However, in the cyclone dust collector 100 of a conventional vacuum cleaner, which has a single cyclone body and a single filter, a large amount of fine dust particles, which should be centrifugally separated in the cyclone body, remain entrained in the discharged air current to be scattered around the filter and even through eventual continued use, to block the fine holes of the filter. As a result, air flow is disturbed and impeded, efficiency of the vacuum cleaner diminishes and also noise is generated.

Further, since the filter filters a large amount of fine dust in the cyclone dust collector 100 of the conventional vacuum cleaner, the filter needs frequent cleaning or replacement.

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SUMMARY OF THE INVENTION

It is an object of the present invention to provide a double cyclone dust collector for a vacuum cleaner having improved suction efficiency and dust-collecting capability, by rotating drawn in air in the dust collector and separately collecting dust according to the size of the dust particles in sequential operational steps.

Another object of the present invention is to provide a double cyclone dust collector for a vacuum cleaner which requires low maintenance, by reducing the requirement for frequent cleaning or replacing the filter.

In order to achieve the above-described objects of the present invention, there is provided a double cyclone dust collector for a vacuum cleaner, comprising a lower cyclone body having an air suction port and an air discharge port for initially collecting dust entrained in air which is drawn in through the air suction port in a primary dust separation operation, an upper cyclone body detachably disposed above the lower cyclone body, the upper cyclone body having a main body for secondary dust separation of fine dust particles after separation of the air flowing into the upper cyclone body from the lower cyclone body, and an upper casing providing a fine dust particle collecting chamber by covering the surface of the upper cyclone main body, and an air path for guiding the air, after it is cleaned in the secondary dust separation operation in the upper cyclone body, from the upper and lower cyclone bodies, and discharging the cleaned air through the air discharge port.

The lower cyclone body further comprises the air suction port and the air discharge port being formed on a sidewall of the lower cyclone body and being disposed at a predetermined distance from each other, a lower cyclone center hole formed on an upper plate of the lower cyclone body, and a lower cyclone outlet formed on one side of the lower cyclone center hole, and a lower cyclone grill vertically disposed adjacent the lower cyclone center hole.

It is preferable that the cyclone main body of the upper cyclone body comprises a bottom plate having an upper cyclone center hole and an upper inlet adjacent and corresponding to the lower cyclone center hole and the lower cyclone outlet of the lower cyclone body, respectively, and an upper cyclone grill disposed in the upper cyclone center hole having a vertical orientation and surrounding the upper cyclone center hole.

Accordingly, there is provided a double cyclone dust collector for a vacuum cleaner, which is improved in suction efficiency and dust collecting capability, by directing a rotating air current in the dust collector and separately collecting dusts in sequential dust collecting operations according to the size of the dust particles.

In the double cyclone dust collector of the vacuum cleaner according to the present invention, there are provided two grills disposed, respectively, in the upper and lower cyclone bodies, and the grills sequentially filtering larger dust particles or fine dust particles according to the function of each grill. Therefore, the amount of fine dust particles, which is filtered by the upper filter in the upper cyclone body, can be reduced. In addition, frequency of cleaning or replacing the filter can be reduced.

The double cyclone dust collector according to the present invention is very simple to remove and empty the collected dust since the dust receptacle is easily detachable from the upper casing.

BRIEF DESCRIPTION OF THE DRAWING FIGURES

These and other features, aspects, and advantages of the present invention will become clearer and better understood with regard to the following description, appended claims, and accompanying drawings wherein:

Fig. 1 illustrates a partially enlarged vertical section r having a conventional cyclone dust collector for a vacuum cleaner;

Fig. 2 is a perspective, partially exploded view of an upright vacuum cleaner, having a double cyclone dust collector according to the present invention;

Fig. 3 is an enlarged perspective view of the exterior of the double cyclone dust collector of Fig. 2;

Fig. 4 is an exploded perspective view of the double cyclone dust collector shown in Fig. 3;

Fig. 5 is a cross-sectional side view of the double cyclone dust collector shown in Fig. 3;

Fig. 6 is an exploded perspective view of the upper cyclone body;

Fig. 7 is a top view of the upper cyclone body;

Fig. 8 is a partially enlarged cross-sectional view of the dust amount sensor unit of Fig. 6, shown in greater detail.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, preferred embodiments of a cyclone vacuum cleaner according to the present invention will be described in detail with reference to the accompanying drawings.

Fig. 2 is a perspective, partially exploded view of an upright vacuum cleaner, having a double cyclone dust collector according to the present invention. In the upright cyclone vacuum cleaner 1, a double cyclone body 20 according to the present invention is removably connected to a main body 3, as shown by the dashed lines in Fig. 2. A vacuum generating device (not shown) is mounted in the main body 3. A suction brush 5 for drawing in dust entrained in ambient air is mounted adjacent a lower part of the main body 3.

A device receiving enclosure 10 is provided as a cavity disposed in the center of the main body 3 to receive the double cyclone dust collector 20. Provided adjacent the rear of the device receiving enclosure 10 are a suction connection port 13, in fluid communication with the

suction brush 5, and a discharge connection port 14, in fluid communication with the vacuum generating device.

Fig. 3 is an enlarged view of the double cyclone dust collector 20 shown in Fig. 2 showing the detailed appearance of the double cyclone dust collector, and Fig. 4 is an exploded perspective view of the double cyclone dust collector 20 shown in Fig. 3. Fig. 5 shows a vertical cross-section of the double cyclone dust collector shown in Fig. 3, showing the structure of the double cyclone dust collector according to the present invention, in greater detail.

As shown in the drawing figures, the double cyclone dust collector 20 comprises a lower cyclone body 40, which has an air suction port 41 and an air discharge port 42, an upper cyclone body 30, which is disposed above the lower cyclone body 40, and a dust receptacle 25, which is removably connected to the underside of lower cyclone body 40. Inside the lower and upper cyclone bodies 40, 30, air paths are formed to circulate dust-laden air, as shown by the arrows.

The lower cyclone body 40 is in the shape of a cylinder, and having an open bottom. The air suction port 41 and the air discharge port 42 are disposed on a sidewall of the cylinder at a predetermined distance from each other. The air suction port 41 is formed in a direction inwardly tangential to the sidewall of the lower cyclone body 40, and is connected to the suction connection port 13 of the device receiving enclosure 10. The drawn in air is directed in a direction to rotate the air current as the air is discharged inwardly through the air suction port 41. The air discharge port 42 preferably is formed in a direction normal to the cylindrical sidewall of the lower cyclone body 40 to extend axially thereof, and is connected to the discharge connection port 14 of the device receiving enclosure 10, as shown in Fig. 2.

Referring now to Fig. 4, a top plate 40' of the lower cyclone body 40 includes a lower cyclone center hole 44 formed in a central location thereof. The lower cyclone center hole 44

and the air discharge port 42 are in fluid communication with each other through a lower cyclone air path 45 defined by the walls of the air discharge port 42. The lower cyclone air path 45 is formed under the top plate 40' of the lower cyclone body 40 to extend outwardly in a radial direction from the center hole 44. The lower cyclone air path 45 guides the air discharged through the lower cyclone center hole 44 to the air discharge port 42, as shown by the arrows in Fig. 5.

A lower cyclone outlet 46 is formed in the top plate 40' of the lower cyclone body 40. The lower cyclone outlet 46 can be formed, preferably in a pair of outlets extending around the lower cyclone center hole 44, as shown. The air, which is first separated from the entrained dust in the lower cyclone body 40, is discharged through the lower cyclone outlet 46, and then flows into the upper cyclone body 30, which will be described in detail below.

Referring now to Fig. 5, the lower cyclone body 40 includes a lower cyclone grill 60 that is formed in a vertical direction. The lower cyclone grill 60 comprises a lower cyclone grill unit 61, which is generally cylindrical, an upper flange unit 63 and a lower flange unit 67, which are formed on an upper part and a lower part respectively of the lower cyclone grill unit 61. On the outer circumference of the lower cyclone grill unit 61, a plurality of vertical lower cyclone slits 62 are defined having a parallel, and preferably vertical, orientation. The upper flange unit 63 extends upwardly from the lower cyclone grill unit 61 in the shape of a truncated cone, and is connected with an inner surface of the lower cyclone body 40. The end of the upper flange unit 63 is downwardly bent to form a rim or bent portion 64, and a connection rib 65 is circumferentially disposed at an upper part of an inner surface of the lower cyclone body 40, and is engagable with the bent portion 64, as shown. The lower flange unit 67 extends downwardly from the bottom part of the lower cyclone grill unit 61 and may be formed in the shape of a bell or inverted cup.

In the lower cyclone body 40, the drawn in air, which is discharged inwardly through

the air suction port 41, generates a rotating air current spinning around the lower cyclone grill 60. The dust in the drawn in air is centrifugally separated from the rotating air current, and falls by gravity to be collected in the dust receptacle 25. The dust receptacle 25 is removably connected at the lower part or underside of the lower cyclone body 40, and therefore, the user can remove the collected dust by separating the dust receptacle 25 from the lower cyclone body 40 and emptying it. An upper rim of the dust receptacle 25 includes a connection groove 28 formed in a circumferential direction, and the circumferential lower end 48 of the lower cyclone body 40 can be engagably force-fit into the connection groove 28 to provide a seal at the connection.

The air, which has been filtered in the lower cyclone body 40, passes through the lower cyclone grill 60 and is then discharged in an upward direction. Since the lower cyclone slits 62 of the lower cyclone grill 60 have a predetermined size, dust of a relatively large particle size that may be entrained in the discharged air current is blocked by the lower cyclone grill 60 as the air passes therethrough. However, the lower cyclone grill 60 cannot block particles of fine dust smaller than a certain size. Accordingly, the primarily filtered air, in which fine dust may still be entrained, is supplied into the upper cyclone body 30.

Fig. 6 is an exploded perspective view of the upper cyclone body 30. The upper cyclone body 30 comprises a cyclone main body 31 for separating fine dust and an upper casing 35 for openably covering the upper part of the cyclone main body 31. The cyclone main body 31 comprises a bottom plate 32, and an upper cyclone grill 55 disposed in the center of the bottom plate 32. An upper plate 36 is disposed in the bottom plate 32 through which the air from the lower cyclone body 40 flows into the upper cyclone body 30, and an upper cyclone center hole 34 is disposed within the upper cyclone grill 55 for discharging the air after it has been filtered in the secondary filtration operation.

The upper cyclone grill 55 is disposed in an upright or vertical position above and surrounding the upper cyclone center hole 34 of the bottom plate 32. A plurality of outlet slits 56 are formed in the outer surface of the upper cyclone grill 55, and the outlet slits 56 can be in the form of vertical slits similar to those in the lower cyclone grill 60 of the lower cyclone body 40. The upper cyclone grill 55 having the plurality of air outlet slits 56 preferably is capable of filtering the fine dust from the air. However, it is more preferable to utilize the upper cyclone grill 55 together with an external filter 70 surrounding the upper cyclone grill 55 so as to enable the more efficient filtering of fine dust. Further, it is preferable that a porous filtering member 73, which is detachable for easier cleaning, is connected radially outwardly of the external filter 70, so as to provide a tertiary filtration operation of the air stream.

The air current, which is directed through the upper cyclone grill 55 and the external filter 70 externally connected to the upper cyclone grill 55, then flows into the lower cyclone air path 45 of the lower cyclone body 40 through the upper air path 33 inside of the upper cyclone grill 55. Therefore, an air circulating path, that is, the air path 50 is formed in the upper and lower cyclone bodies 40, 30, respectively, by which the air drawn in through the air suction port 41 is discharged to the air discharge port 42 after sequentially circulating through the lower cyclone outlet 46, the upper inlet 36, the upper air path 33 and the lower cyclone air path 45. Although in Fig.6 the upper cyclone grill 55 and the bottom plate 32 are shown as separate elements, alternatively the upper cyclone grill 55 can be integrally formed with the bottom plate 32 by an injection molding process.

Meanwhile, the upper casing 35, which may be essentially cylindrical with a bottom thereof being open, has a shape and size sufficient to correspond to the bottom plate 32. The upper casing 35 has a recessed portion 38 disposed in the center of the upper surface thereof, and a connection hole portion 75 may be formed in the recessed portion 38. A longitudinally

oriented hole 76 is formed in the connection hole portion 75, which can be engaged by an operation knob 77 disposed on the upper cyclone grill 55 of the cyclone main body 31, so as to attach the upper casing 35 to the cyclone main body 31.

The operation knob 77 is rotatably formed on the upper part of the upper cyclone grill 55, and a head portion 78 thereof extends radially along both sides thereof. The head portion 78 can be inserted through hole 76 so as to be over the connection hole portion 75 to extend in one orientation. The operation knob 77 engages the connection hole portion 75 of the head portion 78 after being inserted through hole 76, by rotating the operation knob 77 clockwise or counterclockwise relative to the longitudinally extending sides of hole 76. By engaging the connection hole portion 75 with the operation knob 77, the upper casing 35 can be releasably connected to the cyclone main body 31. The upper casing 35 connected to the cyclone main body 31 forms a fine dust particle receiving chamber for collecting fine dust particles. The operation knob 77 can be fixed to the upper cyclone grill 55 by an appropriate attachment, such as a post or screw. Alternatively, the operation knob 77 can be integrally formed with the bottom plate 32 and the upper cyclone grill 55 by an injection molding process.

The above-described double cyclone dust collector 20 for a vacuum cleaner can be separated from the device receiving enclosure 10 of the main body 3 of the vacuum cleaner by withdrawing it in a predetermined direction. Additionally, The dust receptacle 25 may be separated from its connection to the lower cyclone body 40. The upper cyclone body 30 may be releasably connectable with the lower cyclone body 40 either integrally or separately. Connection of the lower cyclone body 40 to the main body 3 entails that the air suction port 41 and the air discharge port 42 become connected respectively to the suction connection port 13 and the discharge connection port 14, which are disposed in the rear wall of the device receiving enclosure 10, as shown in Fig. 2. To securely attach the upper cyclone body 30 to the upper part of the

lower cyclone body 40, it is preferable that an installation groove is formed in the upper plate 40'of the lower cyclone body 40.

When the device is switched on, the vacuum generating device is driven. At this time, the air, which includes entrained dust, is drawn into the vacuum cleaner through the suction brush 5 (Fig. 2), and is internally discharged into the air suction port 41 of the lower cyclone body 40 through the suction connection port 13. The discharged air, including entrained dust, generates a rotating air current within the lower cyclone body 40, and thereby the dust is centrifugally separated within the cyclone generated by the rotating air current, and the dust is collected into the dust receptacle 25 by gravity in a primary filtering operation.

The filtered air then passes through the lower cyclone grill 60 (Fig. 5) and rises into the upper cyclone body 30 through the lower cyclone outlet(s) 46 (Fig. 4) and the upper cyclone inlet 36 (Fig. 6). The lower cyclone grill 60 is provided to block relatively large dust particles entrained in the air during the primary filtration operation.

The air that is discharged into the upper cyclone body 30 from the upper cyclone inlet 36 is directed to the upper cyclone body 30, in which it encounters cyclone grill 55 having the upper cyclone slits 56 formed therein. At this time, the external filter 70 filters the air of any entrained fine dust particles in a secondary filtration operation. The fine dust particles, which are filtered in the secondary filtration operation, fall down to the bottom plate 32 of the cyclone main body 31, to be collected in the fine dust particle receiving chamber defined by the bottom plate 32 and upper casing 35. The cleaned air, after the fine dust particles are separated, is discharged through the upper cyclone slits 56 of the upper cyclone grill 55 and passes through the upper air path 33 and the lower cyclone air path 45 to be discharged from the air discharge port 42.

In the lower and upper cyclone bodies 40, 30, the amount of dust collected therein gradually increases with use off the vacuum cleaner. The larger dust particles, which are collected

in the lower cyclone body 40, are removed by separating the dust receptacle 25 and emptying it. Withdrawing the lower cyclone body 40 and the dust receptacle 25 from the device receiving enclosure 10 is facilitated by a withdrawal lever 28, as shown in Fig. 2. Thus, the dust receptacle 25, which is attached to the device receiving enclosure 10, can be separated by turning the withdrawal lever 28.

To remove the fine dust particles collected in the upper cyclone body 30, the upper cyclone body 30 first should be withdrawn from the device receiving enclosure 10. Then, the upper casing 35, which covers the cyclone main body 31, is separated from the bottom plate 32. The upper casing 35 can be separated only when the head portion 78 of the operation knob 77 and the longitudinally oriented hole 76 of the connection hole portion 75 are oriented parallel to each other, which may be achieved by rotating the operation knob 77. Reconnection of the upper casing 35 after removing the fine dust particles is simply done by going through the above steps in reverse order, that is, rotation of the operation knob so that the longitudinally oriented hole 76 and head portion are no longer aligned, as is shown in Fig. 7.

Additionally, a dust amount sensor unit 80, as shown in Fig. 6, is equipped in the upper cyclone body 30 to check the amount of dust particles that have been collected. Fig. 8 is a partially enlarged exploded cross-sectional view of the dust amount sensor shown in Fig. 6, showing the specific structure of the dust amount sensor unit 80 in greater detail. As shown in Fig. 8, the dust amount sensor unit 80 comprises a sensor casing 81, a dust amount indicator 83 to be connected within the sensor casing 81, a standard dust indicator 85, which is movable between a covered (empty) position and an exposed (full) position of the over dust indicator 83, and a spring 87 for elastically biasing the standard dust indicator 85 toward the covered position.

The sensor casing 81 preferably is formed of a transparent material, and having an outlet 82 formed at a longitudinal end thereof. The over dust indicator 83 is connected

adjacent the lower part of the sensor casing 81, and has a pressure inlet 84 formed on the bottom thereof. The over dust indicator 83 comprises an indication unit 86, which extends upwardly along the sensor casing 81 in a longitudinal direction. The standard dust indicator 85 cooperatively receives the indication unit 86 of the over dust indicator 83 within the sensor casing 81. The spring 87 is disposed between the standard dust indicator 85 and an opening of the sensor casing 81, which is opposite the standard dust indicator 85, so as to provide a biasing force urging the indication unit 86 in a direction away from the outlet 82.

The dust amount sensor unit 80 is disposed adjacent the front of the upper cyclone body 30, as shown in Fig. 6. Brackets 91, 92 (Fig. 8) are formed at the front of the upper cyclone body 30 and the dust amount sensor unit 80 is mounted on these brackets. The pressure inlet 84 of the standard dust indicator 85 is in fluid communication with the inside of the upper cyclone body 30, and the air outlet 82 of the sensor casing 81 is in fluid communication with outside environment. Additionally, an indicating window 37 is formed adjacent the front of the upper cyclone body 30 and the dust amount sensor unit 80, so that the user of the vacuum cleaner can check the state of the dust amount sensor unit 80 through the indicating window 37.

In the above-described structure, when the dust amount in the upper cyclone body 30 is under a predetermined threshold, the air flows through the upper inlet 36 and is discharged to the air discharge port 42, passing through the filter 70 and the upper air path 33. Accordingly, the inside and outside of the upper cyclone body 30 are at the same air pressure. During operation of the dust amount sensor unit 80, since the standard dust indicator 85 is in a position that blocks the view of the over dust indicator 83 by the resilient biasing recovery force of the spring 87, the standard dust indicator 85 only becomes exposed through the indicating window 37 when the dust amount is sufficient to overcome the spring force.

On the other hand, when the dust amount is over the predetermined threshold, that is, when

the collected dust requires removal, the inside pressure becomes relatively higher than the outside pressure because the airflow of the inside is interrupted by action of the pressure inlet 84. The inside pressure is exerted to the pressure inlet 84 of the standard dust indicator 85, thereby pressurizing the standard dust indicator 85. Accordingly, when the standard dust indicator 85 exposes the over dust indicator 83, the over dust indicator 83 becomes visible through the indicating window 37, thereby alerting the user that excessive dust has been collected in the upper cyclone body 30, and the user can withdraw the upper cyclone body 30 from the device receiving enclosure 10 to remove the dust.

While the invention has been shown and described with reference to certain preferred embodiments thereof, it will be understood by those skilled in the art that various modifications and changes in form and details may be made therein without departing from the spirit and scope of the invention, as defined by the appended claims.

The term "comprising" (and its grammatical variations) as used herein is used in the inclusive sense of "having" or "including" and not in the exclusive sense of "consisting only of".

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The claims defining the invention are as follows:

1. A double cyclone dust collector for a vacuum cleaner comprising:

a lower cyclone body having an air suction port and an air discharge port for initially collecting dust entrained in air which is drawn in through the air suction port in a primary dust separation step;

an upper cyclone body detachably disposed above the lower cyclone body, the upper cyclone body having a main body for secondary dust separation of fine dust particles, after separation of the air flowing into the upper cyclone body from the lower cyclone body, and an upper casing providing a fine dust particle collecting chamber by covering the surface of the upper cyclone main body; and

an air path for guiding the air, after it is cleaned in the secondary dust separation step in the upper cyclone body, from the upper and lower cyclone bodies, and discharging the cleaned air through the air discharge port.

2. The double cyclone dust collector for a vacuum cleaner of claim 1, wherein the lower cyclone body further comprises:

the air suction port and the air discharge port being formed on a sidewall of the lower cyclone body and being disposed at a predetermined distance from each other;

a lower cyclone center hole formed on an upper plate of the lower cyclone body;

a lower cyclone outlet formed on one side of the lower cyclone center hole; and

a lower cyclone grill vertically disposed adjacent the lower cyclone center hole.

3. The double cyclone dust collector for a vacuum cleaner of claim 2, wherein the cyclone main body of the upper cyclone body further comprises:

a bottom plate having an upper cyclone center hole and an upper inlet, adjacent and

corresponding to the lower cyclone center hole and the lower cyclone outlet of the lower cyclone body, respectively; and

an upper cyclone grill disposed in the upper cyclone center hole having a vertical orientation and surrounding the upper cyclone center hole.

4. The double cyclone dust collector for a vacuum cleaner of claim 3, further comprising an upper casing of the upper cyclone body removably connected to the cyclone main body, and

a means for detachably connecting the upper casing and the cyclone main body that comprises:

a connection hole portion formed as a longitudinally extending hole disposed on an upper plate of the upper casing; and

an operation knob mounted on the upper part of the upper cyclone grill extendable through the connection hole portion, the operation knob, when extending through the connection hole portion, being rotatable from a locked position, in which the connection hole portion is releasably locked therewith, to an unlocked position, in which the connection hole portion is unlocked therefrom.

5. The double cyclone dust collector for a vacuum cleaner of claim 1, wherein the lower cyclone body generates a rotating air current when the air flows in through the air suction port for centrifugally separating the dust in a primary dust separation step, and

the dust receptacle is removably connected to the lower cyclone body adjacent a lower part thereof.

6. The double cyclone dust collector for a vacuum cleaner of claim 1, wherein the upper cyclone body further comprises a filter to be connected to an outside of the upper grill for further filtering dust particles entrained in the air stream.

7. The double cyclone dust collector for a vacuum cleaner of claim 6, further comprising a dust amount sensor unit for sensing the amount of dust, which has been separated and collected in the upper cyclone body.

8. A double cyclone dust collector for a vacuum cleaner as substantially hereinbefore described and with reference to Figs 2 to 8.

Dated this 24th day of May 2004

SAMSUNG GWANGJU
ELECTRONICS CO., LTD.
By:

HODGKINSON AND MCINNES
Patent Attorneys for the Applicant

FIG. 1

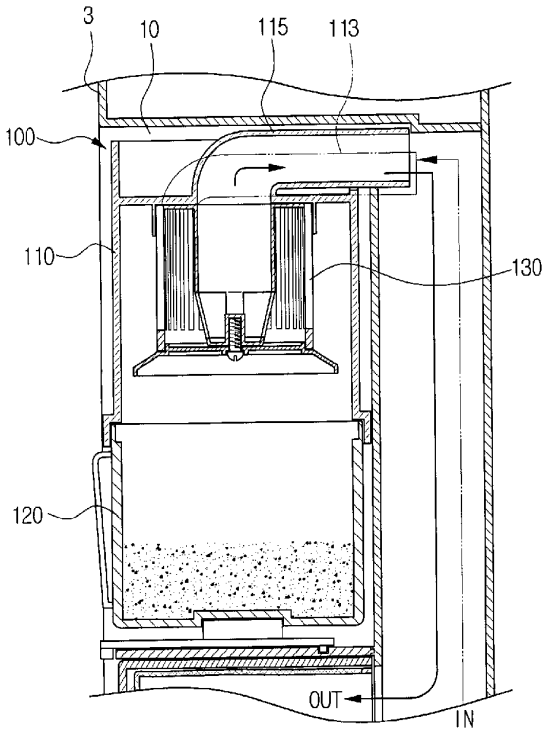


FIG. 2

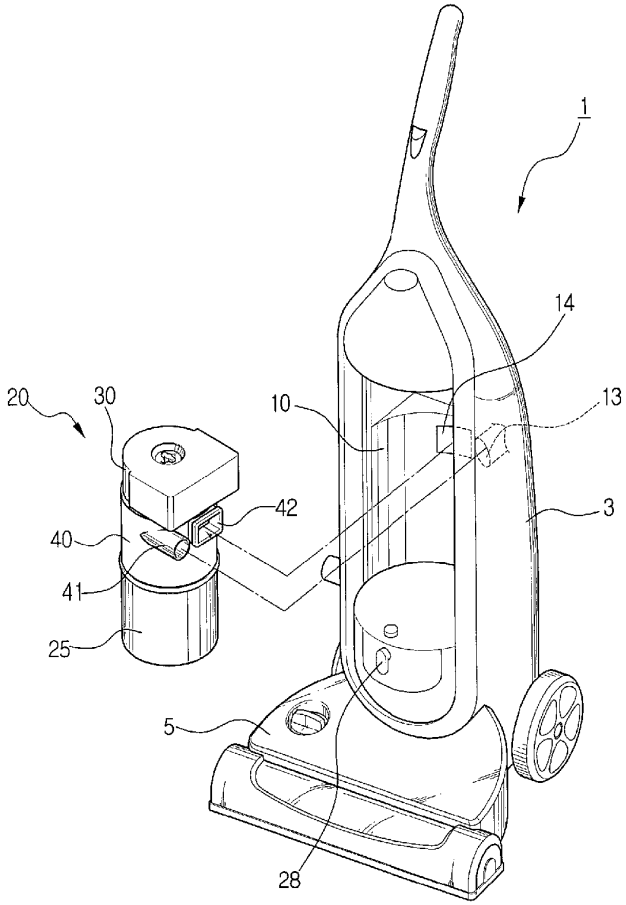


FIG. 3

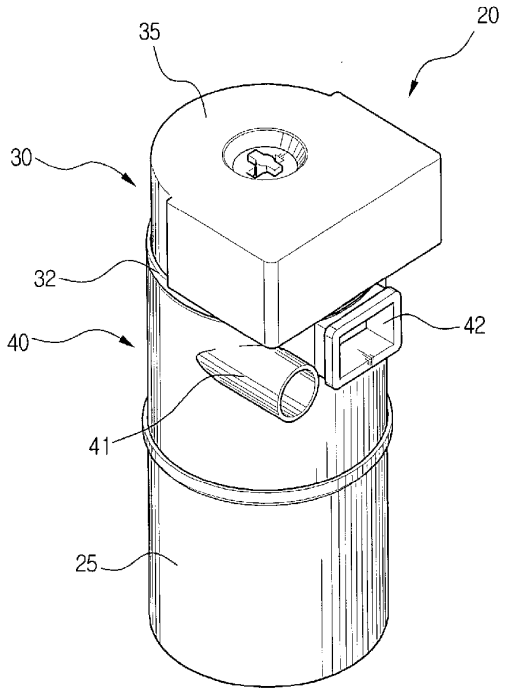


FIG. 4

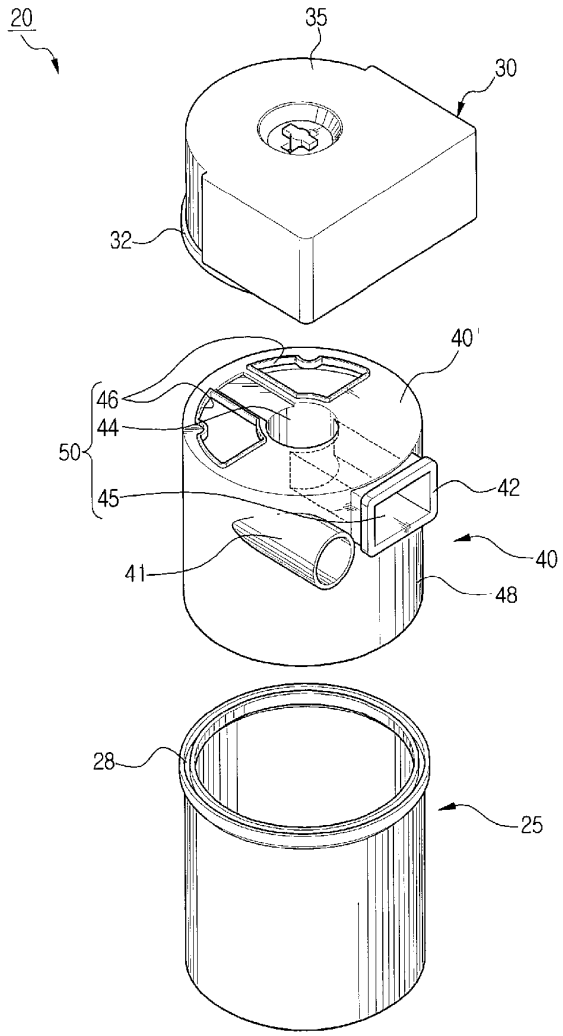


FIG. 5

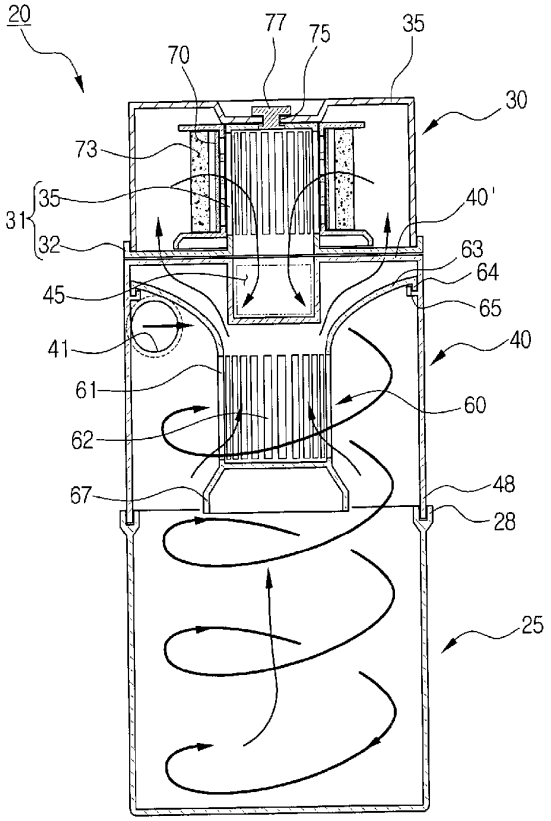


FIG. 6

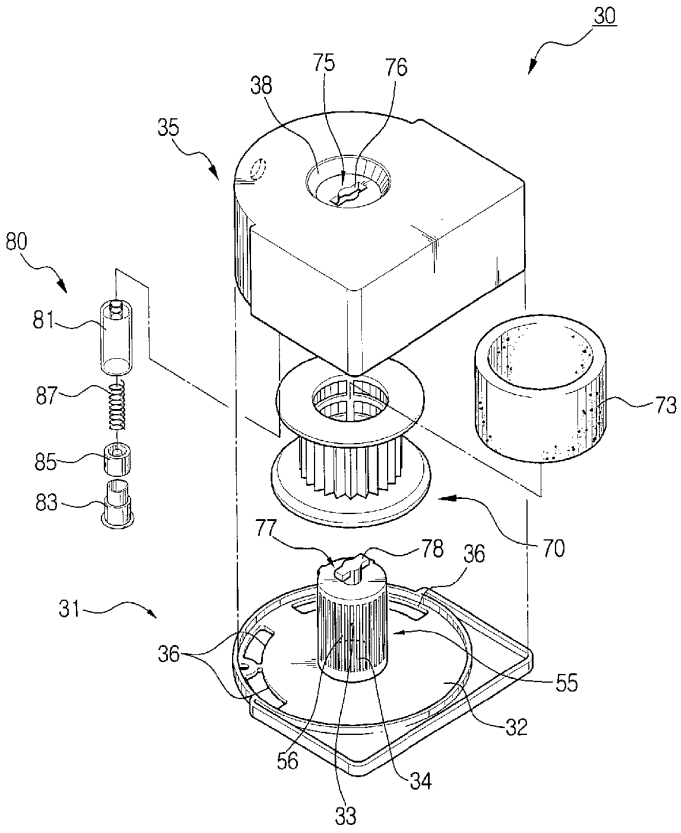


FIG. 7

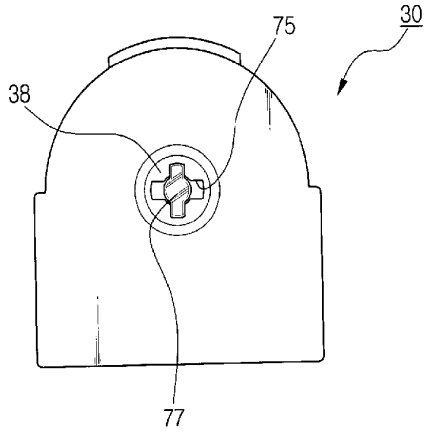


FIG. 8

