



US 20050198771A1

(19) **United States**(12) **Patent Application Publication**
Min et al.(10) **Pub. No.: US 2005/0198771 A1**(43) **Pub. Date: Sep. 15, 2005**(54) **VACUUM CLEANER**(52) **U.S. Cl. 15/353**(75) Inventors: **Young Gun Min**, Changwon-si (KR);
Jae Duck Jung, Changwon-si (KR)(57) **ABSTRACT**Correspondence Address:
FLESHNER & KIM, LLP
P.O. BOX 221200
CHANTILLY, VA 20153 (US)(73) Assignee: **LG Electronics Inc.**(21) Appl. No.: **11/006,785**(22) Filed: **Dec. 8, 2004**(30) **Foreign Application Priority Data**Mar. 11, 2004 (KR) P2004-0016485
Mar. 11, 2004 (KR) P2004-0016486
Mar. 11, 2004 (KR) P2004-0016488**Publication Classification**(51) **Int. Cl.⁷ A47L 9/16**

Disclosed is a vacuum cleaner for easily cleaning an inside of a dust collector and for easily cleaning and replacing a filter, the vacuum cleaner including a suction nozzle for drawing in air containing impurities such as dust; a main body coupled with the suction nozzle and having suction means for generating a suction force therein; a dust collector formed in a cylindrical form and detachably provided at the main body, into which the air drawn in by the suction nozzle is introduced; a suction tube provided on an outer surface of the dust collector for guiding the air drawn in by the suction nozzle to an inside of the dust collector; a separation plate for dividing an inside of the dust collector into an upper inner space and a lower inner space; a filter provided in the upper inner space of the dust collector divided by the separation plate, filtering the air drawn into the dust collector, and guiding the filtered air to the lower inner space of the dust collector; and a lower cover for discharging the air downward by selectively opening and closing a lower surface of the dust collector, the air guided by the filter.

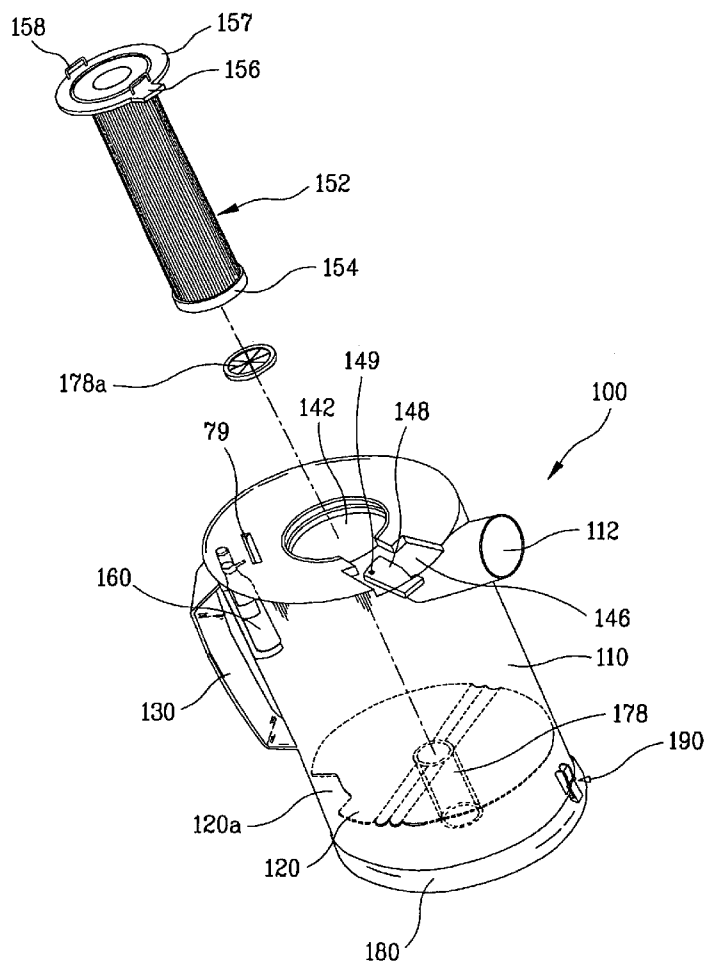


FIG. 1
Related Art

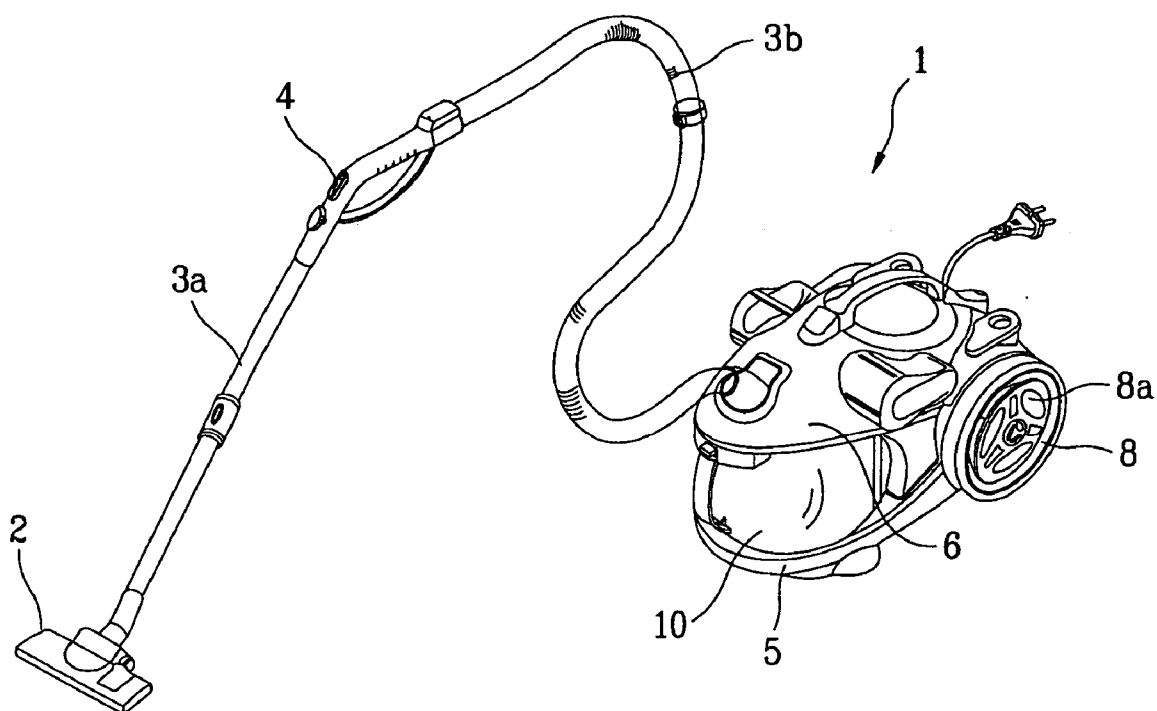


FIG. 2

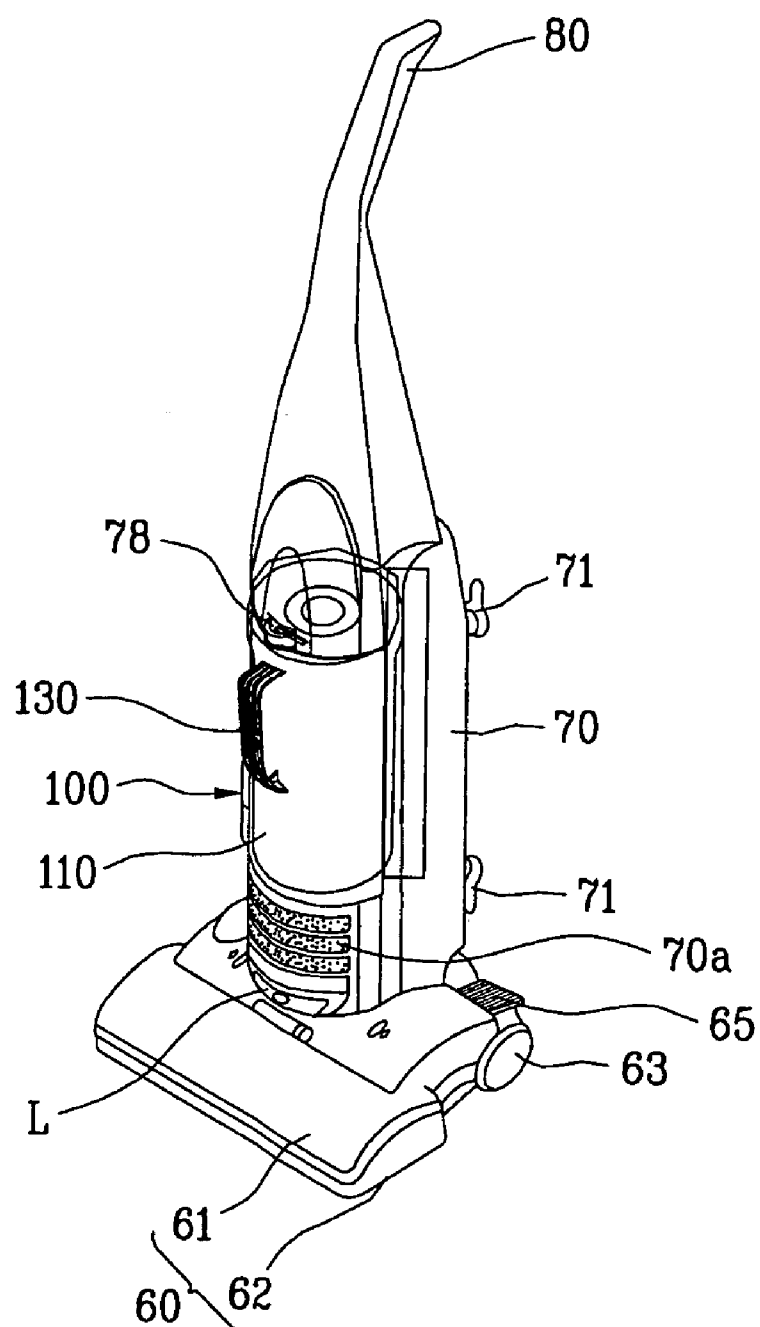


FIG. 3

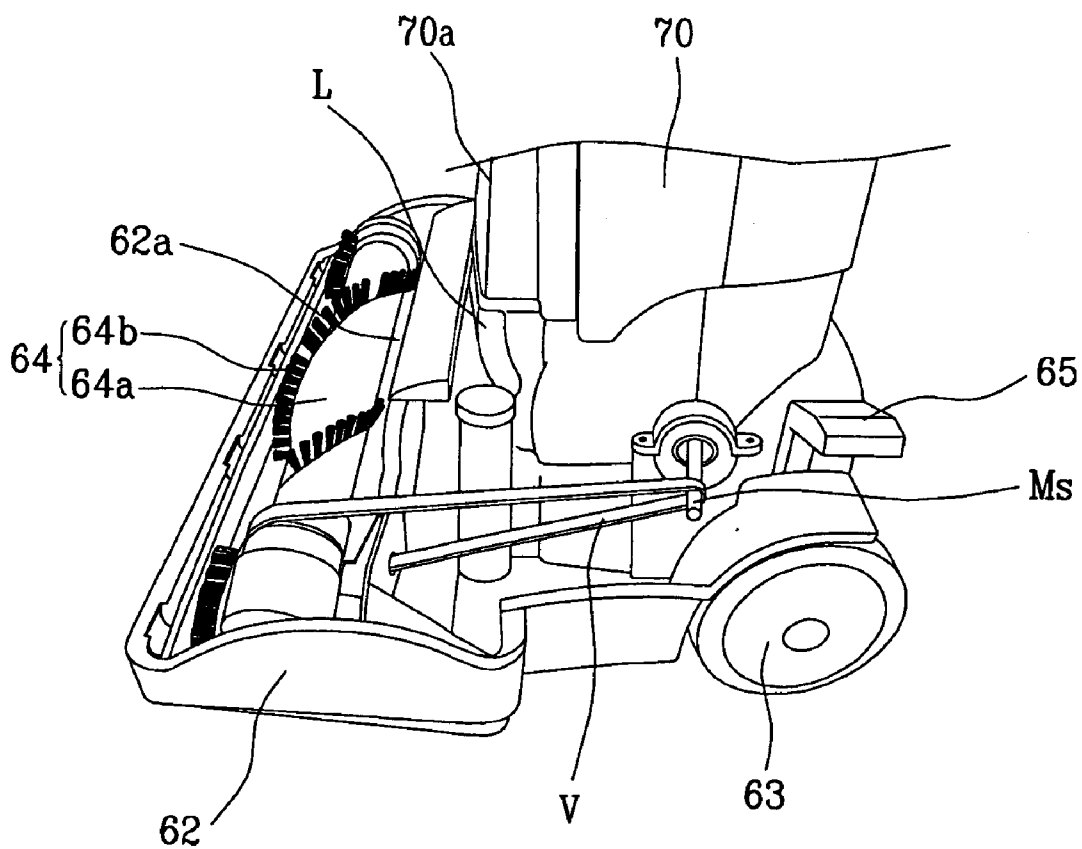


FIG. 4

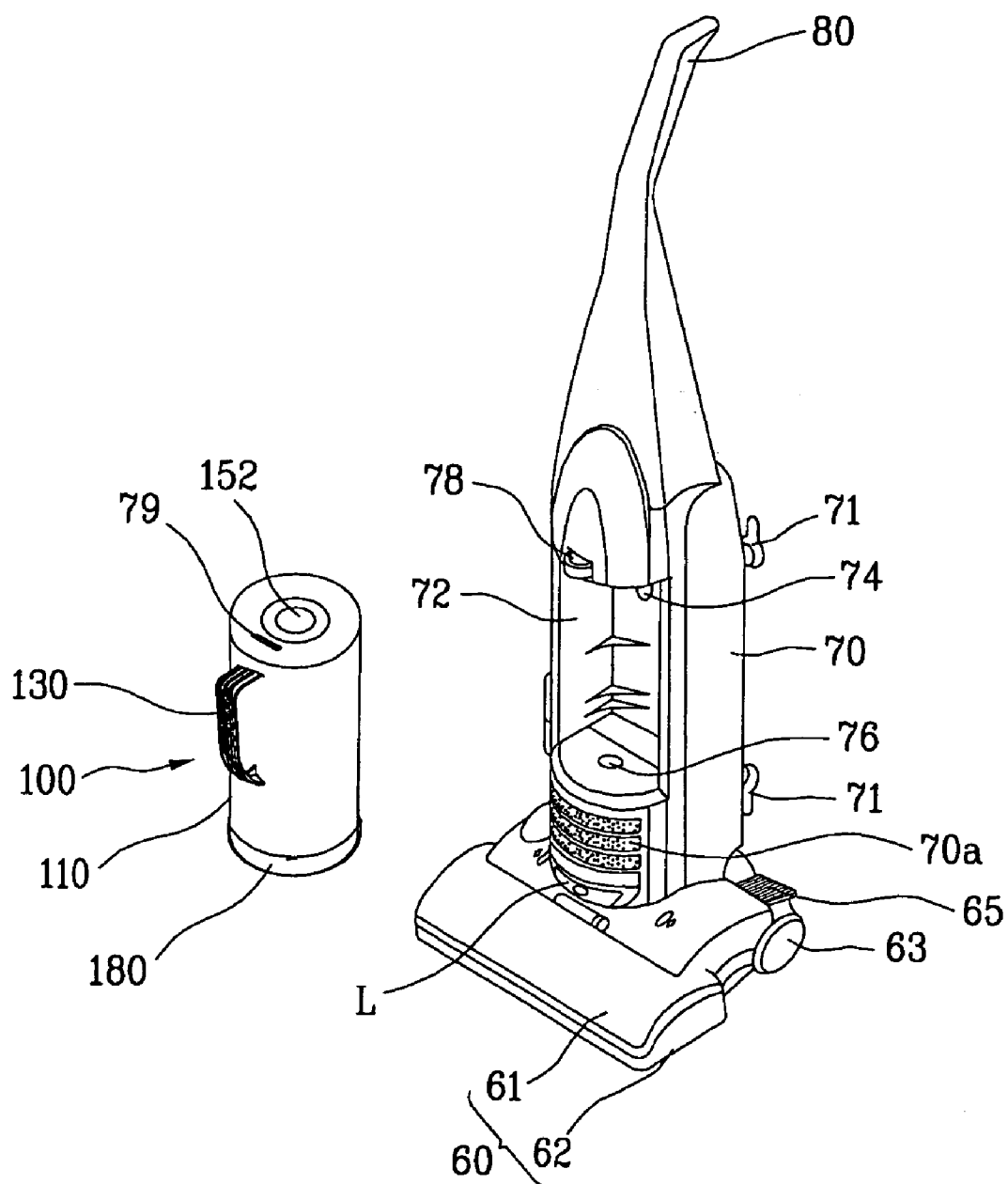


FIG. 6

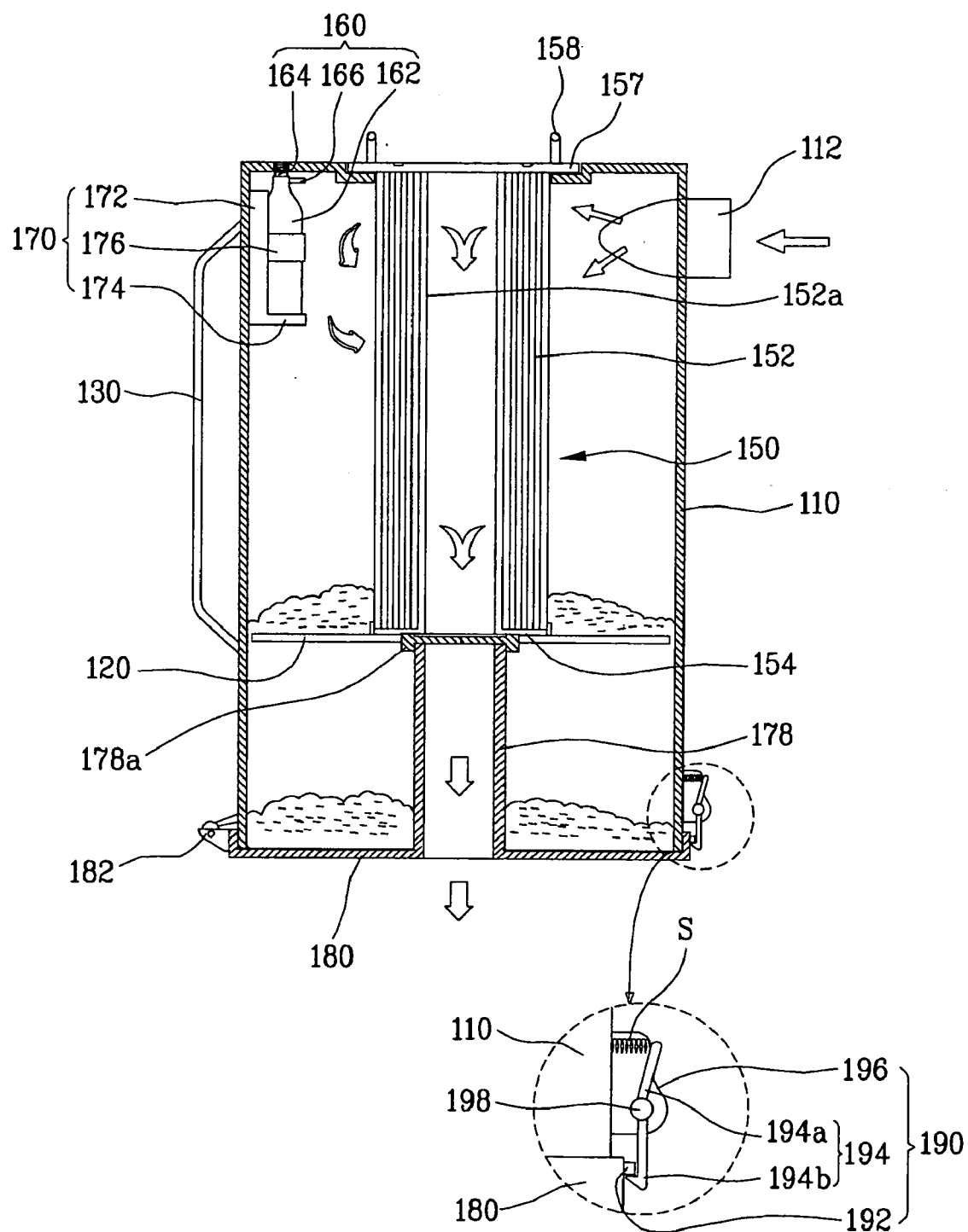


FIG. 7

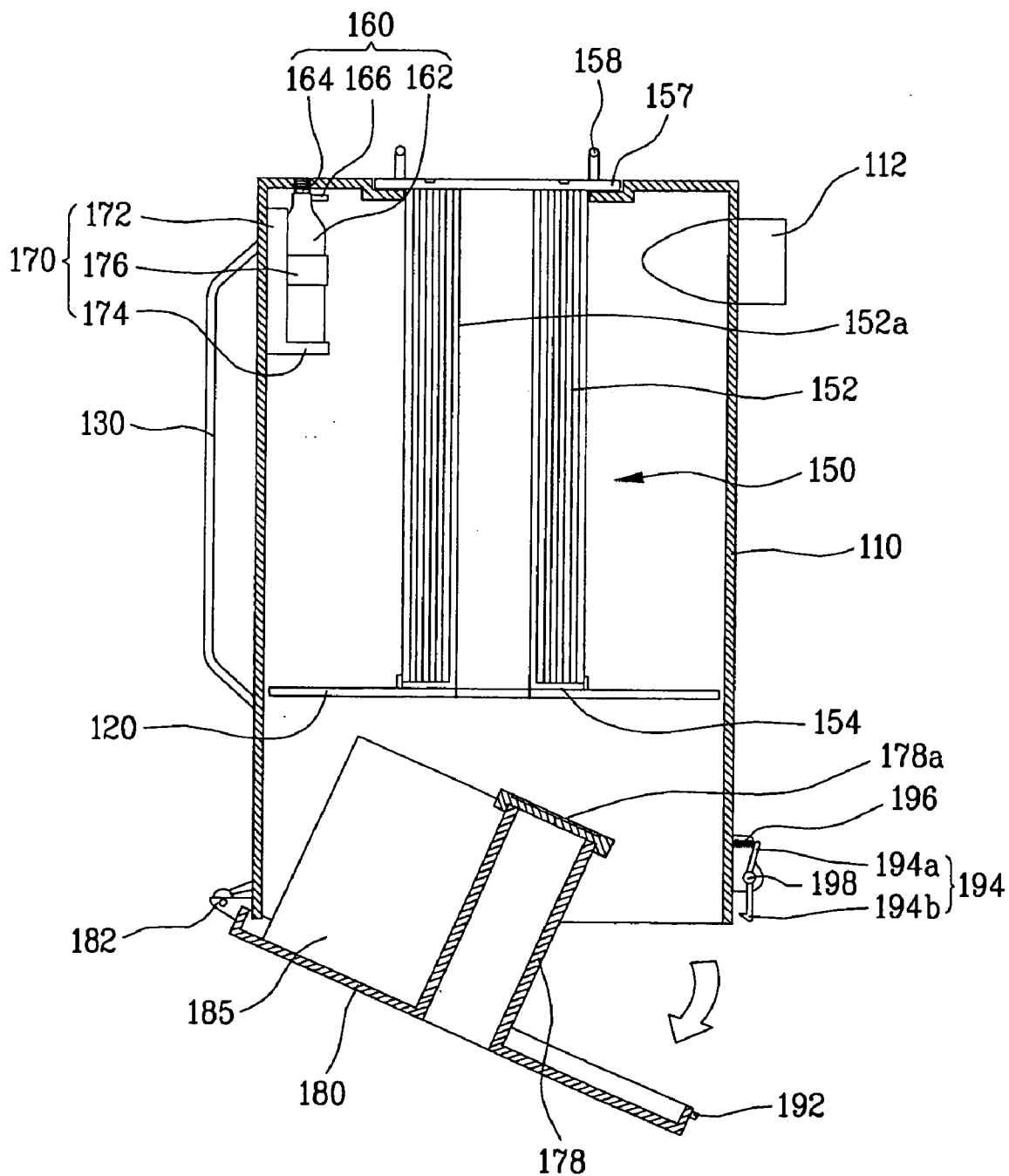


FIG. 8

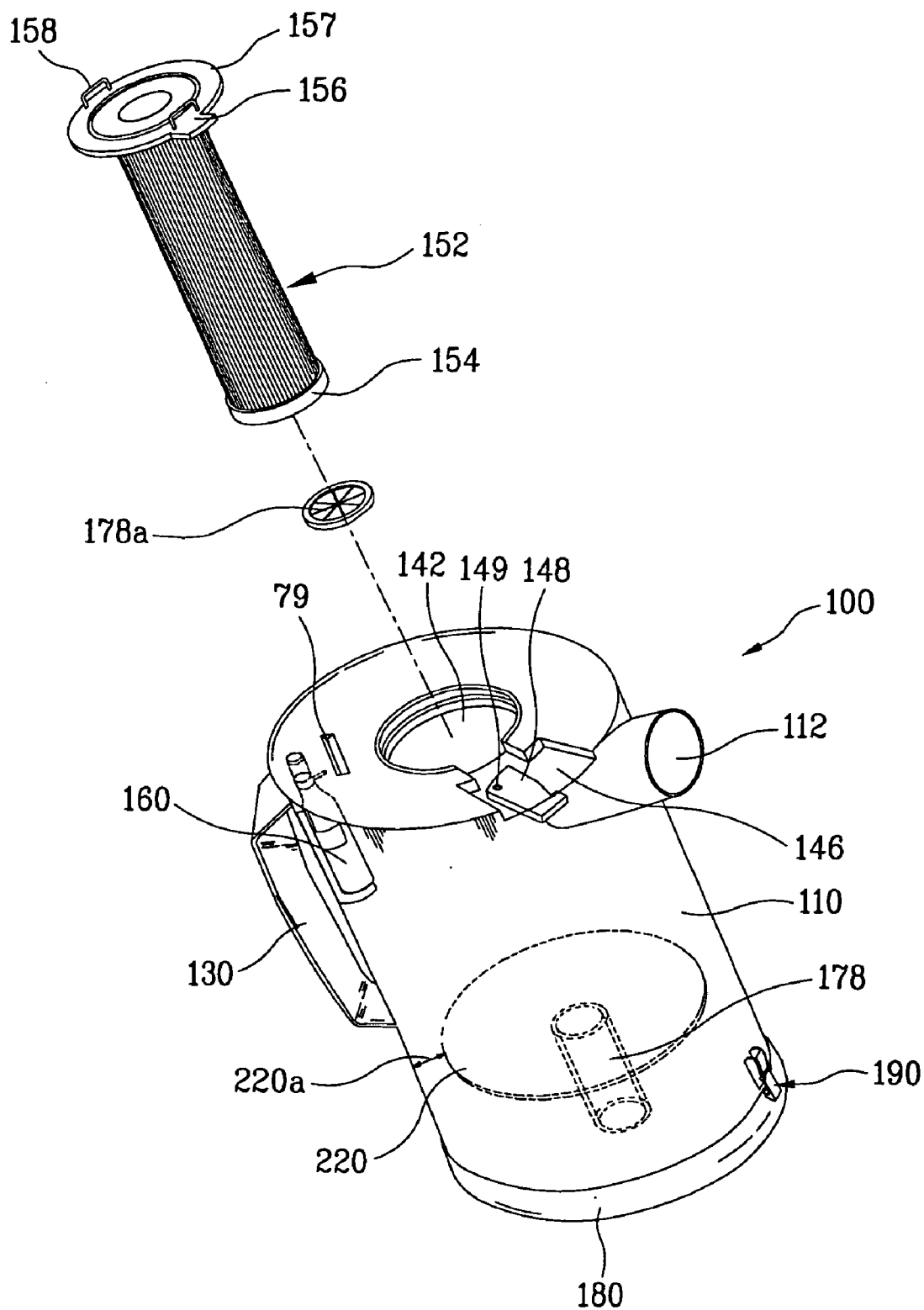


FIG. 10

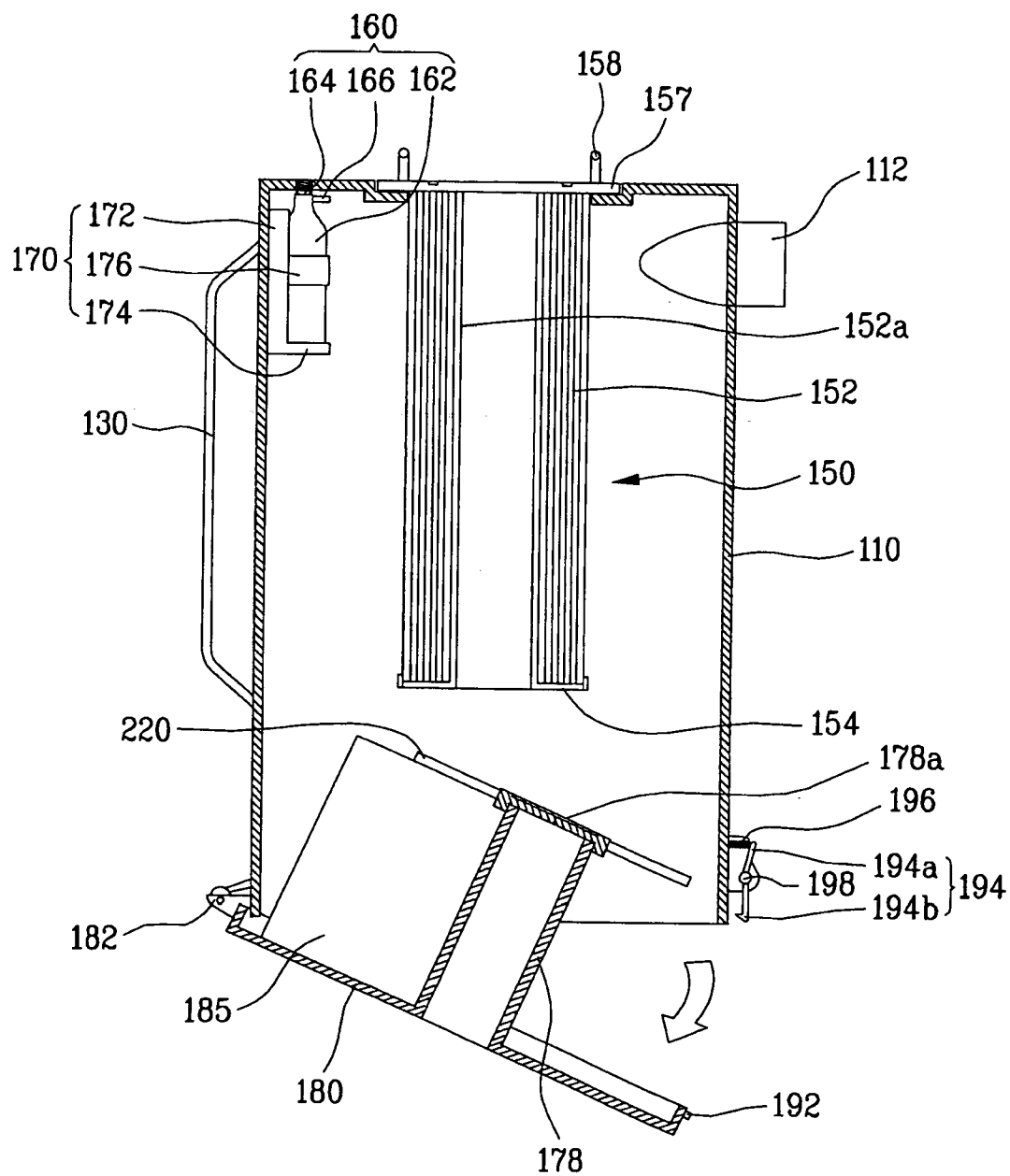


FIG. 11

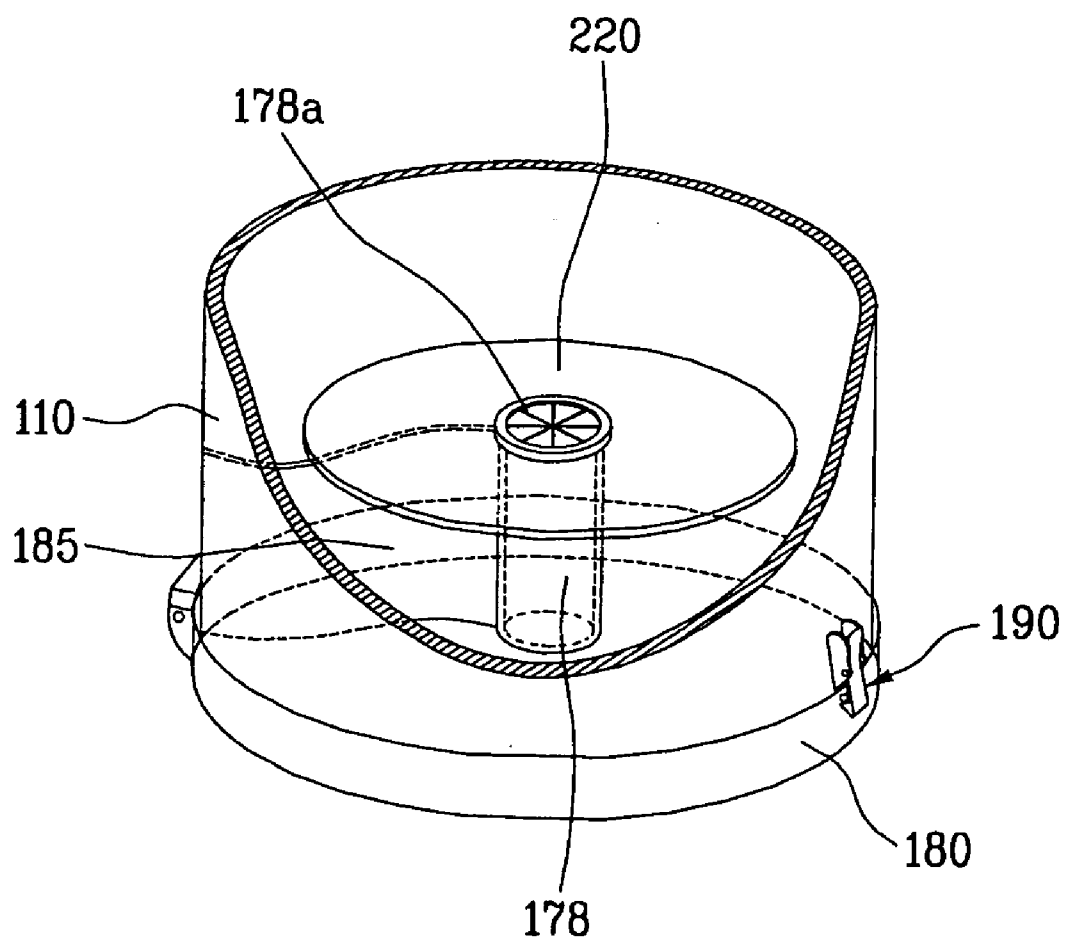
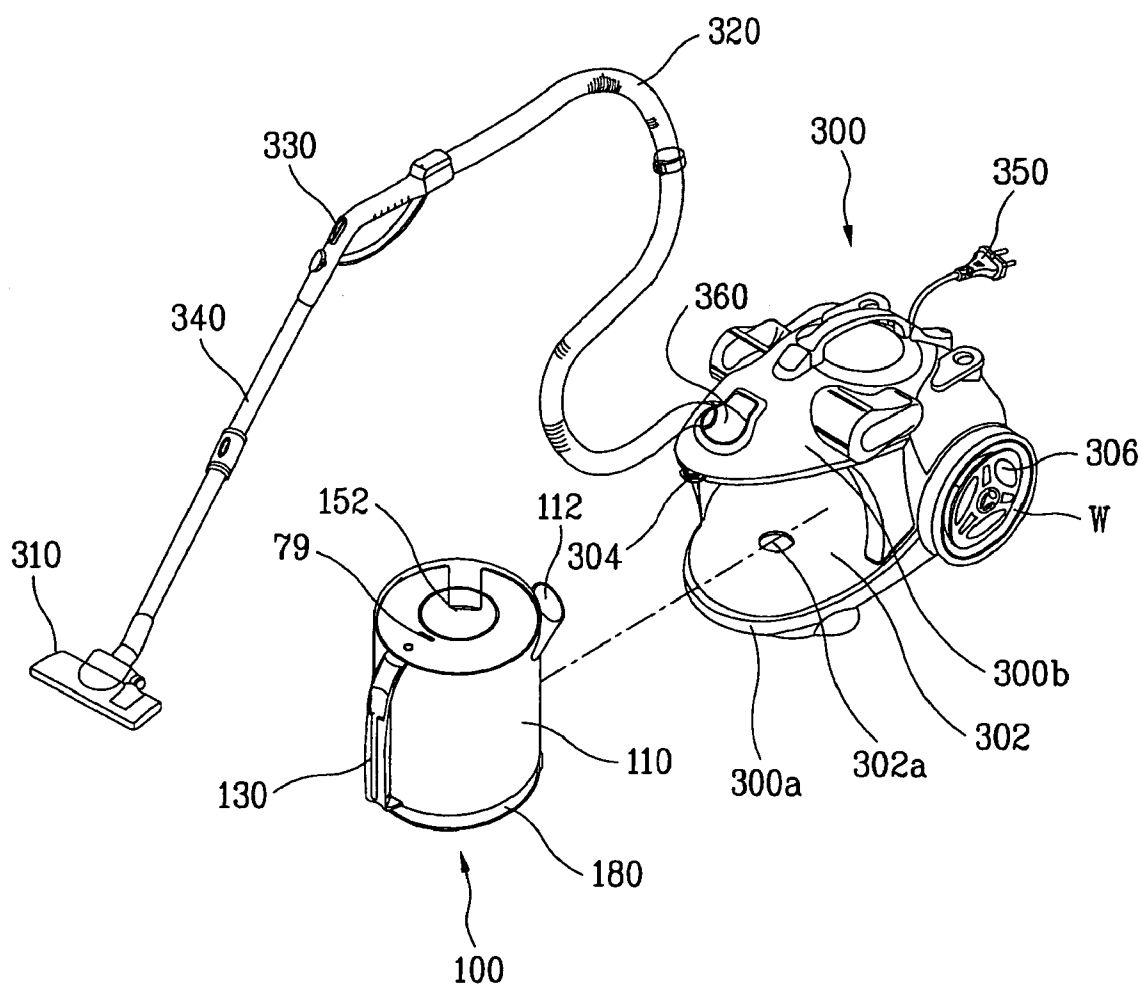


FIG. 12



VACUUM CLEANER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Application No. P2004-16485, P2004-16486, P2004-16488, filed on Mar. 11, 2004, which are hereby incorporated by reference as if fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a vacuum cleaner, and more particularly, to a vacuum cleaner for easily removing impurities accumulated in a dust collector.

[0004] 2. Discussion of the Related Art

[0005] In general, as an apparatus for removing impurities such as dust, a vacuum cleaner is used for cleaning a place that is difficult to clean with a broom or other cleaning tools.

[0006] FIG. 1 illustrates a perspective view showing a related art vacuum cleaner. As illustrated in FIG. 1, the related art vacuum cleaner includes a main body 1 having suction means built therein for drawing in air, and a suction nozzle 2 for drawing in air on a floor by a suction force generated at the main body 1.

[0007] The main body 1 includes a lower body 5 with suction means mounted therein, and an upper body 6 for protecting parts received in the lower body 5 and having electric components (Not shown) received therein for controlling the vacuum cleaner.

[0008] Wheels 8 are provided at both sides of the main body 1 such that the main body freely moves on a floor. The wheel 8 has an outlet 8a for discharging air drawn in by the suction nozzle 2.

[0009] Between the main body 1 and the suction nozzle 2, a suction hose 3b, an operating member 4, and an extension tube 3a are mounted in succession so as to transmit the suction force generated at the main body 1 to the suction nozzle 2.

[0010] A dust collector 10 is mounted at the main body 1 for filtering air drawn in through the suction nozzle 2. Accordingly, the air drawn into an inside of the main body 1 by the suction nozzle 2 is discharged to an outside of the main body 1 through the outlet 8a after impurities in the air such as dust is removed by the dust collector 10.

[0011] However, the related art vacuum cleaner has problems in cleaning the inside of the dust collector and replacing the filter provided in the dust collector.

SUMMARY OF THE INVENTION

[0012] Accordingly, the present invention is directed to a vacuum cleaner that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0013] An object of the present invention is to provide a vacuum cleaner enabling cleaning an inside of a dust collector with ease.

[0014] Another object of the present invention is to provide a vacuum cleaner enabling cleaning and replacing a filter with ease.

[0015] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0016] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, a vacuum cleaner includes a suction nozzle for drawing in air containing impurities such as dust; a main body coupled with the suction nozzle and having suction means for generating a suction force therein; a dust collector formed in a cylindrical form and detachably provided at the main body, into which the air drawn in by the suction nozzle is introduced; a suction tube provided on an outer surface of the dust collector for guiding the air drawn in by the suction nozzle to an inside of the dust collector; a separation plate for dividing an inside of the dust collector into an upper inner space and a lower inner space; a filter provided in the upper inner space of the dust collector divided by the separation plate, filtering the air drawn into the dust collector, and guiding the filtered air to the lower inner space of the dust collector; and a lower cover for discharging the air downward by selectively opening and closing a lower surface of the dust collector, the air guided by the filter.

[0017] A dust collector mounting member is provided at a central portion of a front surface of the main body and having the dust collector inserted and fixed thereto, and separate cleaning tools for cleaning corners are detachably provided on the outer surface of the main body.

[0018] An agitator is provided in the suction nozzle for scratching the impurities stuck on a floor.

[0019] Meanwhile, the lower cover includes a first end rotatably coupled with the dust collector by a hinge and a second end detachably provided at the dust collector by coupling means having a projection and a hook.

[0020] It is desirable that the filter is a pleated-surface filter, and an opening having the filter inserted therein is provided on an upper surface of the dust collector.

[0021] The filter is detachably provided at the opening. A coupling rib is provided on an upper surface of the filter, and a coupling lever coupled with the coupling rib is provided at one side of the opening.

[0022] A first discharge tube is provided in the filter for guiding the filtered air to the lower inner space of the dust collector, and a second discharge tube is provided at the lower cover, the second discharge tube passing through the separation plate and communicating with the first discharge tube.

[0023] The second discharge tube may be formed as a single body with the lower cover. A discharge tube cover is detachably provided on an upper surface of the second discharge tube for preventing impurities from being entered thereto.

[0024] The filter is provided on an upper surface of the separation plate.

[0025] In the mean time, a pass through hole may be formed on a circumference of the separation plate, and an outside diameter of the separation plate is formed to be smaller than an inside diameter of the dust collector.

[0026] The separation plate is formed as a single body with the lower cover, and a second discharge tube is provided between the separation plate and the lower cover for discharging the air guided by the filter in a downward direction.

[0027] Meanwhile, in another aspect of the present invention, a vacuum cleaner includes a suction nozzle for drawing in air containing impurities such as dust; a main body coupled with the suction nozzle and having suction means generating a suction force therein; a handle provided at an upper part of the main body; a dust collector formed in a cylindrical form and detachably provided at the main body, the dust collector into which the air drawn in by the suction nozzle is entered; a separation plate for dividing an inside of the dust collector into an upper inner space and a lower inner space; a filter provided in the upper inner space of the dust collector for filtering the drawn air; a first discharge tube provided in the filter for guiding the filtered air toward the lower inner space of the dust collector; a lower cover for selectively opening and closing the lower surface of the dust collector; and a second discharge tube provided at an upper part of the lower cover and communicated with the first discharge tube for discharging the filtered air in a downward direction of the dust collector.

[0028] Yet, in another aspect of the present invention, a vacuum cleaner includes a suction nozzle including a lower plate provided on a lower surface of an inlet that draws in air containing impurities, and an upper plate covering the lower plate and protecting parts provided therein; a main body coupled with the suction nozzle and having suction means for generating a suction force; a wheel provided at both sides of the lower plate; a dust collector formed in a cylindrical form and detachably provided at the main body, into which the air drawn in by the suction nozzle is entered; a filter provided in the dust collector for filtering the drawn air; and a lower cover for selectively opening and closing the lower surface of the dust collector.

[0029] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings;

[0031] FIG. 1 illustrates a perspective view of a related art vacuum cleaner;

[0032] FIG. 2 illustrates a perspective view showing an upright vacuum cleaner in accordance with the present invention;

[0033] FIG. 3 illustrates a perspective view showing an inner structure of the suction nozzle illustrated in FIG. 2;

[0034] FIG. 4 illustrates a perspective view showing a dust collector assembly in a state of being disassembled from the upright vacuum cleaner in accordance with the present invention;

[0035] FIG. 5 illustrates a disassembled perspective view showing a dust collector assembly in accordance with a first embodiment of the present invention;

[0036] FIG. 6 illustrates a cross-sectional view showing a dust collector assembly in accordance with the first embodiment of the present invention;

[0037] FIG. 7 illustrates a cross-sectional view showing a lower cover of the dust collector assembly in accordance with the first embodiment of the present invention;

[0038] FIG. 8 illustrates a disassembled perspective view showing a dust collector assembly in accordance with a second embodiment of the second embodiment of the present invention;

[0039] FIG. 9 illustrates a cross-sectional view showing the dust collector assembly in accordance with the second embodiment of the present invention;

[0040] FIG. 10 illustrates a cross-sectional view showing an opened state of the lower cover of the dust collector in accordance with the second embodiment of the present invention;

[0041] FIG. 11 illustrates a perspective view showing an inner structure of the dust collector in accordance with the second embodiment of the present invention; and

[0042] FIG. 12 illustrates a disassembled perspective view showing a canister type vacuum cleaner in accordance with the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0043] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0044] FIG. 2 illustrates a perspective view showing an upright vacuum cleaner in accordance with the present invention, FIG. 3 illustrates a perspective view showing an inner structure of the suction nozzle illustrated in FIG. 2, and FIG. 4 illustrates a perspective view showing the dust collector assembly in a state of being disassembled from the upright vacuum cleaner in accordance with the present invention.

[0045] As illustrated in FIG. 2, the upright type vacuum cleaner in accordance with the present invention includes a suction nozzle 60 moving along a floor and drawing in air containing impurities such as dust, a main body 70 coupled with the suction-nozzle 60 and provided with suction means generating a suction force therein, and a handle 80 provided at an upper part of the main body 70.

[0046] The suction nozzle 60 includes an upper plate 61 and a lower plate 62 forming an exterior thereof, and parts provided therein. Wheels 63 are provided at both sides of the

lower plate **62**, and an inlet **62a** (refer to **FIG. 3**) is formed on a lower surface thereof for drawing air therein. The upper plate **61** covers the lower plate **62** so as to protect the parts provided therein.

[0047] In the mean time, an agitator **64** is provided in the suction nozzle **60** for scraping the impurities stuck on the floor as illustrates in **FIG. 3**.

[0048] In more detail, the agitator **64a** includes a rotary body formed in a cylindrical form, and a brush formed in a spiral form on an outer surface of the rotary body **64a** for removing impurities being stuck on the floor. The brush **64b** comes into contact with a floor to be cleaned through the inlet **62a**.

[0049] The agitator **61** is coupled with a rotary axis (Ms) of a motor (Not shown) provided at a lower end of the main body **70** by means of a coupling belt (V). Accordingly, the agitator is rotated together with the rotary axis when the rotary axis is rotated in accordance with an operation of the motor.

[0050] At this time, the brush **64b** scrapes off the impurities on the floor, and the impurities scraped off by the brush **64b** are drawn in through the inlet **62a**.

[0051] In this case, it is desirable that the rotary axis (Ms) and the agitator **64** are provided to be parallel to each other for a smooth power transmission, and the coupling belt (V) is made of a flexible material such as a rubber.

[0052] Meanwhile, a temperature sensor (Not shown) is mounted at a side of the motor. The temperature sensor operates on a bimetal principle and automatically cuts off power supply to the motor when the motor is overheated and a temperature of the motor is raised to a temperature higher than a predetermined temperature.

[0053] The main body **70** includes a motor (Not shown) for generating the suction force, and suction means such as a suction fan (Not shown) therein. The main body **70** is rotatably provided to be able to rotate in a rear direction within a predetermined angle by a rotary lever **65** provided at a rear of the suction nozzle **60**.

[0054] In other words, when a user holds the handle **80** with a hand and pulls the main body rearward in a state of steeping on the rotary lever, the main body **70** is inclined rearward. Accordingly, the user can adjust the angle of the main body **70** to be suitable for the height of the user by manipulating the rotary lever **65** when the user cleans the floor.

[0055] An electric wire reel **71** is provided at a rear surface of the main body **70** for winding the electric wire thereon. It is desirable that a couple of the electric wire reels **71** are provided respectively at an upper rear part and a lower rear part of the main body **70** to be symmetric to each other.

[0056] In the mean time, a lamp (L) is provided at a front end of the main body **70** for lightening the front of the vacuum cleaner, and an exhaust cover **70a** is provided at an upper part of the lamp (L) through which the air being discharged to an outside thereof is passed finally.

[0057] An exhaust filter (Not shown) is provided in the exhaust cover **70a**. The exhaust filter filters the air to be discharged to the outside (Interior space) and discharges

refreshed air. A motor (Not shown) is located at a rear of the exhaust filter for providing a driving force for drawing air.

[0058] Meanwhile, a dust collector assembly **100** is provided in a front center of the main body **70** for filtering the impurities contained in the air drawn in through the suction nozzle **60**.

[0059] The dust collector assembly **100** filters impurities by using a cyclone using centrifugal force, or a separate filter. The dust collector assembly can of course filter impurities by using both the cyclone and the filter at the same time.

[0060] The dust collector assembly **100** includes a dust collector **110** formed in a cylindrical form for drawing air therein, the air drawn in by the suction nozzle **60**, a filter **152**, and a lower cover **180** as illustrated in **FIG. 4**.

[0061] The dust collector **110** is detachably provided at the main body **70**. In more detail, the dust collector **110** is detachably provided at the dust collector mounting member **72**. A coupling loop **79** is formed at the main body **70**, and a coupling groove the coupling loop is coupled thereto is formed at the dust collector **110**. A dust collector handle **130** is provided at an outer surface of the dust collector **110**.

[0062] Accordingly, the dust collector **110** is easily separated from the dust collector **110** when the user separates the coupling loop **78** from the coupling groove **79** and pulls the dust collector handle **130**.

[0063] The abovementioned process is of course inversely performed when the dust collector **110** is coupled to the dust collector mounting member **72**.

[0064] Meanwhile, an inflow tube **74** is formed at the dust collector mounting member **72**. A first end of the inflow tube **74** is coupled with the dust collector **110**, and a second end thereof is coupled with the inlet **62a** of the suction nozzle **60**. Therefore, the air drawn in by the suction nozzle **60** is guided into the dust collector **110** along the inflow tube **74**.

[0065] An outflow tube **76** is formed at a lower surface of the dust collector mounting member **72**. The outflow tube **76** guides the air being discharged from the dust collector **110** to an outside (Room). In this case, the air flowed along the outflow tube **76** is discharged to the outside thorough the exhaust filter and the exhaust cover **70a**.

[0066] Hereinafter, each component of the dust collector assembly is described in more detail referring to the accompanying drawings.

[0067] **FIG. 5** illustrates a disassembled perspective view showing the dust collector assembly in accordance with a first embodiment of the present invention, **FIG. 6** illustrates a cross-sectional view showing the dust collector in accordance with the first embodiment of the present invention, and **FIG. 7** illustrates a cross-sectional view showing a lower cover of the dust collector assembly in accordance with the first embodiment of the present invention.

[0068] As illustrated in **FIGS. 5 to 7**, a suction pipe **112** is provided on an outer surface of the dust collector **110** for guiding the air drawn in by the suction nozzle **60** into the dust collector **110**.

[0069] The suction pipe **112** is provided in a tangential direction such that the air drawn into the dust collector **110** spirally flows along an inner wall of the dust collector **110**.

[0070] A separation plate 120 is provided at the dust collector 110 for dividing an inner space into an upper inner space and a lower inner space. The separation plate 120 plays a role of dividing the impurities contained in the air drawn into the dust collector 110 according to masses.

[0071] In more detail, the impurities with relatively large masses drawn into the dust collector 110 drop down toward the lower inner space of the dust collector 110 by gravity. In this case, a pass through hole 120a is formed on a circumference of the separate plate 120 for communicating with both the upper inner space and the lower inner space of the dust collector 110 such that impurities with large masses pass therethrough.

[0072] Accordingly, impurities with large masses drop down toward the lower inner space of the dust collector 110, pass through the pass through hole 120a, and accumulate in the lower inner space of the dust collector 110. In the end, small mass of impurities accumulates in the upper inner space of the dust collector 110 that is divided by the separation plate 120, and impurities with large masses accumulate in the lower inner space thereof.

[0073] Meanwhile, the filter 152 is provided in the upper inner space of the dust collector 110 that is divided by the separation plate so as to filter the air drawn into the dust collector 110. It is desirable that the filter 152 includes a pleated-surface filter that enlarges an area in contact with air to the utmost.

[0074] The filter 152 is made of a material having stiffness more than predetermined stiffness with due regard to strong airflow so as to maintain the form during washing.

[0075] An opening 142 is provided on an upper surface of the dust collector 110. The opening 142 has a same form as a section of the filter 152 so as to insert the filter therein. In other words, when the filter has a round section, the opening is also formed in a round form.

[0076] In this case, the filter 152 is detachably provided at the opening 152. For this, a coupling rib 156 is provided on an upper surface of the filter 152, and a coupling lever 148 coupled with the coupling rib 156 is rotatably provided at one side of the opening 142.

[0077] In more detail, an upper end fixing member 157 is formed on the upper surface of the filter 152, and the coupling rib 156 is formed at one side of the upper end fixing member 157. A downwardly recessed loading portion 146 is formed at one side of the opening 142 and the coupling lever 146 is rotatably provided at the downwardly recessed loading portion 146.

[0078] The upper end fixing member 156 is fastened to the circumference of the opening 142, and the coupling lever 148 is rotated on a lever hinge 149 at one side thereof and coupled with the coupling rib 156 so as to fix the filter to the opening 142.

[0079] A filter handle 158 is provided at the upper end fixing member 156 for the user to easily hold the filter 150. It is desirable that a couple of the filter handles 158 are formed on the upper surface of the upper end fixing member 156.

[0080] In the mean time, the lower cover 180 selectively opens/closes a lower surface of the dust collector 110. For

this, as illustrated in FIGS. 6 and 7, a first end of the lower cover 180 is rotatably coupled with the dust collector 110 by the cover hinge 182, and a second end thereof is detachably coupled with the dust collector 110.

[0081] In this case, the coupling means 190 includes a projection 192 formed at the lower cover 180, a hook 194 coupled with the projection 192, and a support 196 formed on an outer surface of the dust collector 110.

[0082] The hook 192 includes a first coupling member 194a and a second coupling member 194b, and coupled with the support 196 by the hinge axis 198. Accordingly, when the user presses the first coupling member 194a, the first and second coupling members 194a, 194b rotate on the hinge axis 198.

[0083] A compression spring (S) is provided between the first coupling member 194a and the dust collector 110. The compression spring (S) returns the first and second coupling members 194a and 194b to original places when an external force applied to the first coupling member 194a is removed. It is obvious that the projection 192 is formed at the dust collector 110, and the support 196 and the hook 194 are formed at the lower cover 180.

[0084] The lower cover 180 includes an anti-rotation plate 185 as illustrated in FIG. 7. The anti-rotation plate 185 supports a lower surface of the separation plate 120. The anti-rotation plate 185 blocks a convection current and prevents the impurities accumulated in the lower inner space of the dust collector 110 from scattering.

[0085] In the mean time, as illustrated FIG. 6, the filter 152 filters the air drawn into the dust collector 110 and guides the air to the lower inner space of the dust collector 110, and the lower cover 180 discharges the air guided by the filter 152 toward the lower portion of the dust collector 110.

[0086] For this, a first discharge tube 152a is provided in the filter 152 for guiding the filtered air toward the lower inner space of the dust collector 110, and a second discharge tube 178 passing thorough the separation plate 120 and communicating with the first discharge tube 152a is provided at the lower cover 180.

[0087] In this case, it is desirable that an inside diameter of the second discharge tube 178 is same as that of the first discharge tube 152a, and the second discharge tube 178 and the lower cover 180 are formed as a single body.

[0088] A discharge tube cover 178a is detachably provided on an upper surface of the second discharge tube 178. The discharge tube cover 178a is made of a flexible material such as rubber, and is radially incised a plurality of times.

[0089] The outflow cover 178a prevents the impurities stuck on the filter 152 and the impurities accumulated up in the upper inner space of the dust collector 110 from being flowed into the second discharge tube 178 when the filter 152 is separated from the opening 142 of the dust collector 110. The second discharge tube 178 communicates with an outflow tube 76 (Refer to FIG. 4) formed at the dust collector mounting member 72.

[0090] In the mean time, a liquid sprayer 160 is provided on an inner surface of the dust collector 110 for preventing static electricity. The liquid sprayer 160 includes a body 162 formed in a cylindrical form and having liquid therein, a

spray button **164** provided at an upper end of the body **162**, and an injection pipe **166** extended from the body **162** toward the filter **152**. In this case, the spray button **164** is passed through the upper surface of the dust collector **110** and is projected to the outside thereof.

[0091] Accordingly, when the user presses the spray button **164**, the liquid stored in the body **162** is raised along a passage (Not shown) therein and sprayed through the injection pipe **166**.

[0092] In this case, water is normally used for the liquid, and the liquid has an insecticide or germicide aromatic agent, or the like added thereto.

[0093] The liquid sprayer **160** is fixed to the dust collector **110** by a sprayer fixing member **170**. The sprayer fixing member **170** includes a first supporting plate **172** for supporting the body **162** of the liquid sprayer **160**, a second supporting plate **174** for supporting a lower surface of the liquid sprayer **160**, and a holder **176** extended from a central portion on both sides of the first supporting plate **172** for covering the body **162** of the liquid sprayer **160**.

[0094] In this case, the first supporting plate **172** is formed in an up and down direction with a long length and adhered on an inner surface of the dust collector **110**, and the second supporting plate **174** is formed in a round plate so as to support the lower surface of the liquid sprayer **160**.

[0095] The holder **176** is formed to be a little smaller than the body **162** of the sprayer **160** so as to tightly cover the central portion of the body **162** of the liquid sprayer **160**. It is desirable that the first and second supporting plates **172** and **174** are formed as a single body with the holder **176**.

[0096] FIG. 8 illustrates a disassembled perspective view showing a dust collector assembly in accordance with a second embodiment of the second embodiment of the present invention, FIG. 9 illustrates a cross-sectional view showing the dust collector assembly in accordance with the second embodiment of the present invention, FIG. 10 illustrates a cross-sectional view showing an opened state of the lower cover of the dust collector in accordance with the second embodiment of the present invention, and FIG. 11 illustrates a perspective view showing an inner structure of the dust collector in accordance with the second embodiment of the present invention.

[0097] As illustrated in FIGS. 8 to 10, the dust collector assembly in accordance with the second embodiment of the present invention includes a dust collector **110**, a filter **52**, and a lower cover **180**.

[0098] In this case, an outside diameter of the separation plate **220** is formed to be smaller than the inside diameter of the dust collector **110**. Accordingly, a gap **220a** is formed between the separation plate **220** and the dust collector **110**. The gap **220a** plays the same role as the pass through hole **120a**. In other words, impurities with large masses among the impurities drawn into the dust collector **110** are accumulated in the lower inner space of the dust collector **110**.

[0099] It is desirable that the separation plate **220** and the lower cover **180** are formed as a single body. In this case, as illustrated in FIG. 10, the separation plate **220** rotates together with the lower cover **180** and escapes to the outside of the dust collector **110** when the lower surface of the dust collector **110** is opened. At this time, for preventing

the separation plate **220** from being in contact with the inner surface of the dust collector **110**, the outside diameter of the separation plate **220** is formed to be smaller enough than the inside diameter of the dust collector **110**. The separation plate **220** may of course be detachably coupled with the lower cover **180**.

[0100] A second discharge tube **178** for discharging the air guided by the filter **152** toward a bottom of the dust collector **110** is provided between the separation plate **220** and the lower cover **180**. In this instance, the separation plate **220** is formed as a single body with the second discharge tube **178**, or detachably coupled with an upper surface of the second discharge tube **178**.

[0101] As illustrate in FIG. 11, a discharge tube cover **178a** is provided on the upper surface of the second discharge tube **178**. The discharge tube cover **178a** has a same structure as that in the aforementioned first embodiment.

[0102] Hereinafter, the operation of the vacuum cleaner in accordance with the present invention will be described as follows.

[0103] First, when the vacuum cleaner is operated, a suction force is transmitted to a suction nozzle **60** by the operation of a motor (Not shown) built in the body **70**. Accordingly, air with impurities is drawn in through an inlet **62a** of the suction nozzle **60**.

[0104] The air is flowed into the dust collector **110** through an inflow tube **74** coupled with the inlet **62a** and a suction pipe **112** formed on an outer surface of the dust collector.

[0105] In this case, impurities with large masses among the impurities contained in the air are accumulated in the lower inner space of the dust collector **120** through the pass through hole **120a** or the gap **220a**, and the impurities with relatively small masses are filtered while being entered into the filter **152**, and accumulated in the upper inner space of the dust collector **110**. Therefore, the impurities with large masses are accumulated on the upper surface of a lower cover **180** and the impurities with a small mass on an upper surface of the separation plate **120** and **220**.

[0106] The air passed through the filter **150** is discharged toward a bottom of the dust collector **100** along the first discharge tube **152a** and the second discharge tube **178**. The air is then discharged to the outside through the exhaust filter and the exhaust cover **70a** after being passed through a motor (Not shown) along the outflow tube **76** formed at the main body **70**.

[0107] In the mean time, when the vacuum cleaner is operated for a predetermined time and the large amount of impurities are accumulated in the dust collector **110**, a user opens a lower surface of the dust collector **110** for cleaning the inside of the dust collector **110**.

[0108] Hereinafter, a process of opening the lower surface of the dust collector **110** is as follows. First, as illustrated in FIGS. 7 and 10, when the user presses the first coupling member **194a** of the hook **194**, the second coupling member **194b** is rotated around the hinge **198** and separated from the projection **192**. Accordingly, the lower cover **180** is rotated around the cover hinge **182** so as to open the lower surface of the dust collector **110**.

[0109] When the lower cover **180** is opened, the user can easily remove the impurities accumulated in the lower inner space, i.e., on the upper surface of the lower cover **180**.

[0110] In this case, as illustrated in **FIG. 10**, when the separation plate **220** having an outside diameter smaller than an inside diameter of the dust collector **110** is formed as a single body with a lower cover **180**, or fixed to the second discharge tube **178**, the separation plate **220** rotates together with the lower cover **180** and escapes to an outside of the dust collector **110**. Accordingly, the user can remove not only the impurities accumulated on the upper surface of the lower cover **180** but also the impurities accumulated on the upper surface of the separation plate **220**.

[0111] When the user releases pressure on the first coupling member **194a**, the first coupling member **194a** and the second coupling member **194b** are returned to original places by the compression spring (S).

[0112] A process of coupling the lower cover **180** with the dust collector **110** is described as follows. First, when the lower cover **180** is lifted upward, the lower cover **180** rotates around the axis of the cover hinge **182** and closely adhered to the dust collector **110**. In this instance, the user needs to continuously presses the lower cover **180** upwardly with a stronger power than elasticity of the compression spring (S) such that the projection **192** is coupled with the second coupling member **194b** of the hook **194**.

[0113] As aforementioned, when the projection **192** is coupled with the second coupling member **194b** of the hook **194**, the lower cover **186** closes the lower surface of the dust collector **110**.

[0114] In the mean time, the filter **152** has been supposed as a pleated-surface filter. However, the filter **152** may include a net filter, or a filter in a form of a combination net filter and the pleated-surface filter.

[0115] Instead of the pleated-surface filter, the filter **152** may be formed not only in a form wherein the net filter is coupled with a sponge, but also in a form wherein a plurality of the pleated-surface filters or the net filters are overlapped.

[0116] Although the filter **152** is mounted at an opening **142** formed on the upper surface of the dust collector **110** in the abovementioned embodiment, the filter **152** may be mounted on the upper surface of the separation plate **120**. A separate structure for fixing the filter may be installed in the dust collector **110**.

[0117] **FIG. 12** illustrates a disassembled perspective view showing a canister type vacuum cleaner in accordance with the present invention. As illustrated in **FIG. 12**, the canister type vacuum cleaner in accordance with the present invention includes a suction nozzle **310**, a main body **300** coupled with the suction nozzle **310** and having suction means for generating a suction force therein, and a dust collector assembly **100**.

[0118] The main body **300** includes a lower body **300a** having suction means, and an upper body **300b** for protecting the suction means built in the lower body **300a** and collecting electric parts (Not shown) controlling the vacuum cleaner.

[0119] A dust collector mounting member **302** having the dust collector **110** inserted and fixed thereto is formed between the lower main body **300a** and the upper main body **300b**. The dust collector mounting member **302** is formed in a size corresponding to the dust collector **110**, and an

outflow tube **302a** is formed on a lower surface thereof for guiding air discharged from the lower surface of the dust collector **110**.

[0120] A coupling button **304** is provided at the upper body **300b** for coupling the dust collector with the main body **300**. The coupling button **304** is coupled with a coupling groove **79** formed on an upper surface of the dust collector **110** and secures the dust collector **110** to the main body. The coupling button **304** performs the same role as the coupling rib **78** formed at the main body **70** of the aforementioned upright type vacuum cleaner.

[0121] Meanwhile, wheels (W) are provided on both rear sides of the lower body **300a** so as to smoothly move the main body **300** on a floor. An outlet **306** is formed on the wheels (W) for discharging the air filtered by passing through the filter of the dust collector assembly **100**. The outlet **306** is communicated with the outflow tube **302a**. A suction hose **320**, an operating member **330**, and an extension tube **340** are provided between the main body **300** and the suction nozzle **310**.

[0122] In this case, the suction nozzle **320** is coupled with a coupling tube **360**. The coupling tube **360** is communicated with the suction pipe **112** formed on the outer surface of the dust collector **110**.

[0123] On a rear surface of the main body **300**, a power cord **350** is provided for supplying power source to the suction means received in the main body **300**.

[0124] The operation of the canister type vacuum cleaner in accordance with the present invention is described as follows. First, when the power source is supplied to the suction means received in the main body **300** through the power cord **350** provided on a rear surface of the main body **300**, the vacuum cleaner is in a standby mode, and when the user operates a button of the operating member **330**, a suction force is generated by the suction means built in the main body **300**.

[0125] In this instance, the suction force is transmitted to the suction nozzle **310** through the suction hose **320** and the extension tube **340** coupled with the coupling tube **360** of the main body **300**. Accordingly, the impurities such as dust or shag are drawn into the main body together with air through the suction nozzle **310** and accumulated at the dust collector assembly **100**. The air from which the impurities are removed is discharged to an outside thereof through the outflow tube **302a** and a discharging member **306** formed at the lower body **300a**.

[0126] When the process is repeated, impurities are accumulated at the dust collector assembly **100**. Accordingly, after a predetermined period of time of using the vacuum cleaner, the dust collector assembly **100** is separated from the dust collector mounting member **302** and the impurities therein are removed.

[0127] The process of removing the impurities accumulated at the dust collector assembly is described in the embodiment of the upright type vacuum cleaner and will be omitted hereinafter.

[0128] The vacuum cleaner in accordance with the present invention has following effect. First, since the vacuum cleaner in accordance with the present invention has a filter detachably provided at the dust collector, it is easy to clean and replace the filter.

[0129] Second, since the vacuum cleaner in accordance with the present invention has a sprayer provided on an inner surface of the dust collector, humidity in the dust collector is constantly maintained. Therefore, static electricity generated when the filter is separated from the dust collector is prevented from generating.

[0130] Third, the vacuum cleaner in accordance with the present invention enables to maximize work efficiency because an appropriate filter such as pleated-surface filter and a net filter is selectively used according to the kind of impurities.

[0131] Fourth, the vacuum cleaner in accordance with the present invention enables selectively opening and closing a lower surface of the dust collector by a lower cover, and therefore it is easy to remove impurities accumulated in the dust collector.

[0132] When a separation plate is formed as a single body with the lower cover, the separation plate is separated from the dust collector together with the lower cover. In this case, the impurities accumulated on the upper surface of the lower cover as well as the impurities accumulated on the upper surface of the separation plate are removed together.

[0133] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A vacuum cleaner comprising:
 - a suction nozzle for drawing in air containing impurities such as dust;
 - a main body coupled with the suction nozzle and having suction means for generating a suction force therein;
 - a dust collector formed in a cylindrical form and detachably provided at the main body, the dust collector into which the air drawn in by the suction nozzle is entered;
 - a suction tube provided on an outer surface of the dust collector for guiding the air drawn in by the suction nozzle to an inside of the dust collector;
 - a separation plate for dividing the inside of the dust collector into an upper inner space and a lower inner space;
 - a filter provided in the upper inner space of the dust collector divided by the separation plate for filtering the air drawn into the dust collector and guiding the filtered air to the lower inner space of the dust collector; and
 - a lower cover for discharging the air downward by selectively opening and closing a lower surface of the dust collector, the air guided by the filter.
2. The vacuum cleaner of claim 1, wherein a dust collector mounting member is provided at a central portion of a front surface of the main body and having the dust collector inserted and fixed thereto.
3. The vacuum cleaner of claim 1, wherein separate cleaning tools for cleaning corners are detachably provided on the outer surface of the main body.

4. The vacuum cleaner of claim 1, wherein an agitator is provided in the suction nozzle for scratching the impurities stuck on a floor.

5. The vacuum cleaner of claim 1, wherein the lower cover includes a first end rotatably coupled with the dust collector by a hinge and a second end detachably provided at the dust collector by coupling means having a projection and a hook.

6. The vacuum cleaner of claim 1, wherein the filter is a pleated-surface filter.

7. The vacuum cleaner of claim 1, wherein an opening having the filter inserted therein is provided on an upper surface of the dust collector.

8. The vacuum cleaner of claim 7, wherein the filter is detachably provided at the opening.

9. The vacuum cleaner of claim 7, wherein a coupling rib is provided on an upper surface of the filter, and a coupling lever coupled with the coupling rib is provided at one side of the opening.

10. The vacuum cleaner of claim 1, wherein a first discharge tube is provided in the filter for guiding the filtered air to the lower inner space of the dust collector.

11. The vacuum cleaner of claim 10, wherein a second discharge tube is provided at the lower cover, the second discharge tube passing through the separation plate and communicating with the first discharge tube.

12. The vacuum cleaner of claim 11, wherein the second discharge tube is formed as a single body with the lower cover.

13. The vacuum cleaner of claim 11, wherein a discharge tube cover is detachably provided on an upper surface of the second discharge tube for preventing impurities from being entered thereto.

14. The vacuum cleaner of claim 1, wherein the filter is provided on an upper surface of the separation plate.

15. The vacuum cleaner of claim 1, wherein a pass through hole is formed on a circumference of the separation plate.

16. The vacuum cleaner of claim 1, wherein an outside diameter of the separation plate is formed to be smaller than an inside diameter of the dust collector.

17. The vacuum cleaner of claim 1, wherein the separation plate is formed as a single body with the lower cover.

18. The vacuum cleaner of claim 17, wherein a second discharge tube is provided between the separation plate and the lower cover for discharging the air guided by the filter in a downward direction.

19. A vacuum cleaner comprising:

- a suction nozzle for drawing in air containing impurities such as dust;
- a main body coupled with the suction nozzle and having suction means generating a suction force therein;
- a handle provided at an upper part of the main body;
- a dust collector formed in a cylindrical form and detachably provided at the main body, into which the air drawn in by the suction nozzle is entered;
- a separation plate for dividing an inside of the dust collector into an upper inner space and a lower inner space;
- a filter provided in the upper inner space of the dust collector for filtering the drawn air;

a first discharge tube provided in the filter for guiding the filtered air toward the lower inner space of the dust collector;

a lower cover for selectively opening and closing the lower surface of the dust collector; and

a second discharge tube provided at an upper part of the lower cover and communicated with the first discharge tube for discharging the filtered air in a downward direction of the dust collector.

20. A vacuum cleaner comprising:

a suction nozzle including a lower plate provided on a lower surface of an inlet that draws in air containing impurities, and an upper plate covering the lower plate and protecting parts provided therein;

a main body coupled with the suction nozzle and having suction means for generating a suction force;

a wheel provided at both sides of the lower plate;

a dust collector formed in a cylindrical form and detachably provided at the main body, into which the air drawn in by the suction nozzle is entered;

a filter provided in the dust collector for filtering the drawn air; and

a lower cover for selectively opening and closing the lower surface of the dust collector.

* * * * *