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(54) Abstract Title: **Cyclonic vacuum cleaner**

(57) A vacuum cleaner 100 includes a nozzle unit 200, a motor M generating a suction force at the nozzle unit, and a cyclonic dust collecting device 300 for centrifugally separating dust from air drawn in through the nozzle unit and the motor in sequence. The cyclonic dust-collecting device 300 includes an air discharge port 350 penetratingly formed on the outer circumference of the cyclonic dust-collecting device, and exposed to the outside of the cleaner body, for guiding the air discharged to the outside. Accordingly, since the air discharge port 350 is disposed in the cyclonic dust-collecting device 300 not in the cleaner body, a discharge channel for connecting the cyclonic dust-collecting device and the cleaner body is not required, thereby leading to a simplified vacuum cleaner structure.

FIG. 2

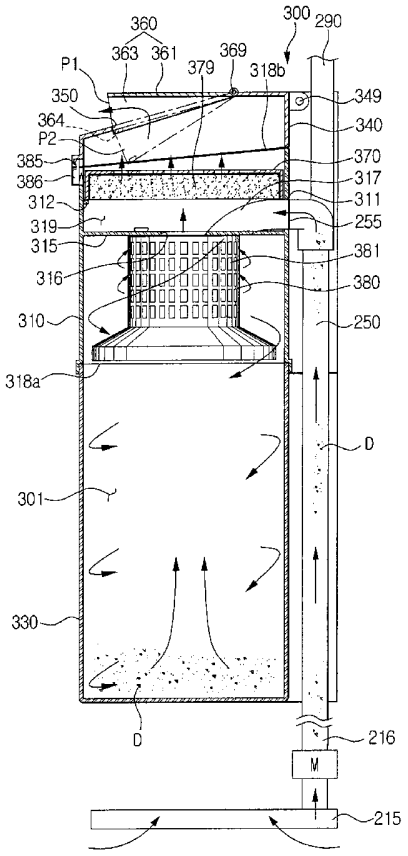

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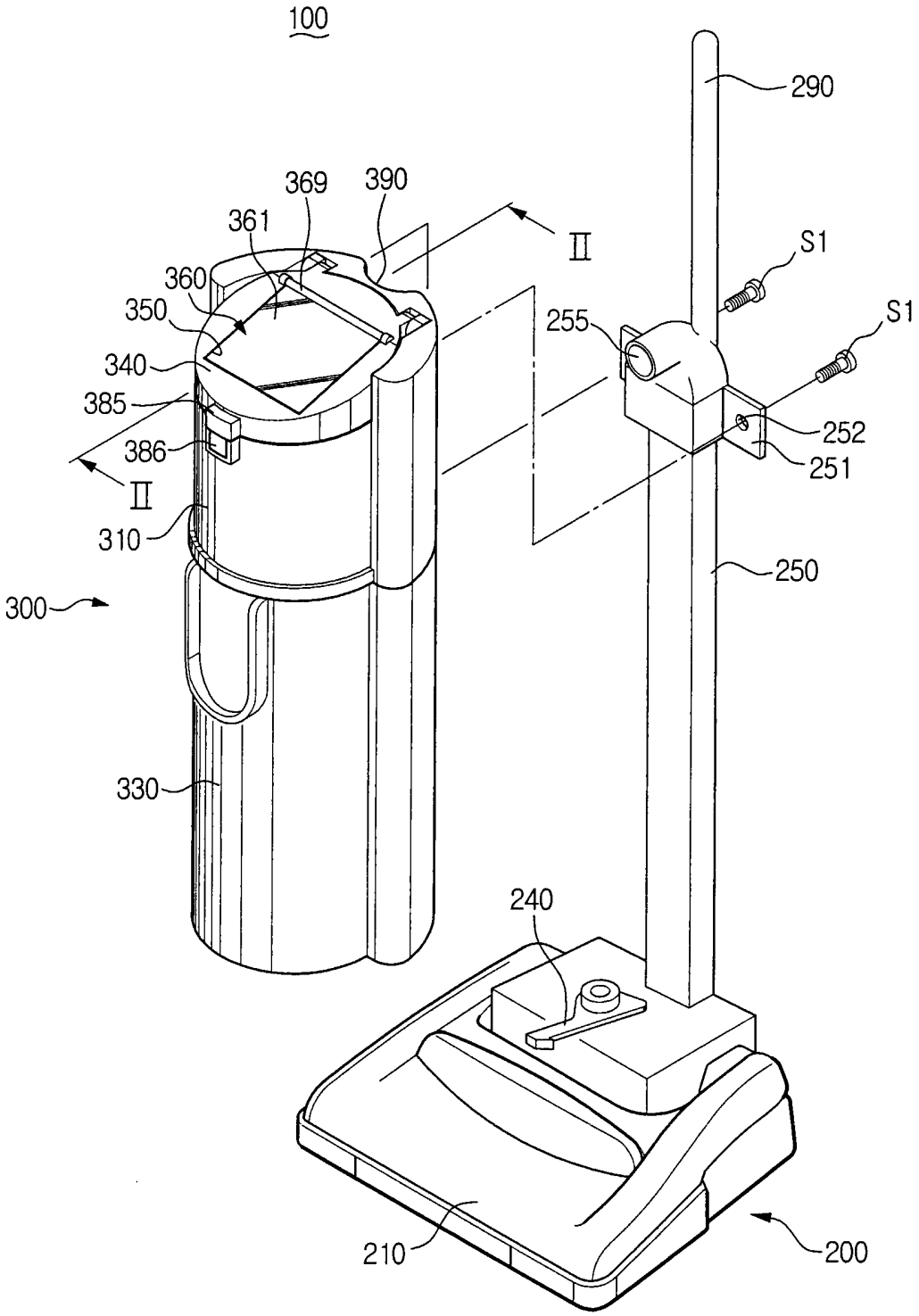
FIG. 1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369
390
361
II
S1
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S1
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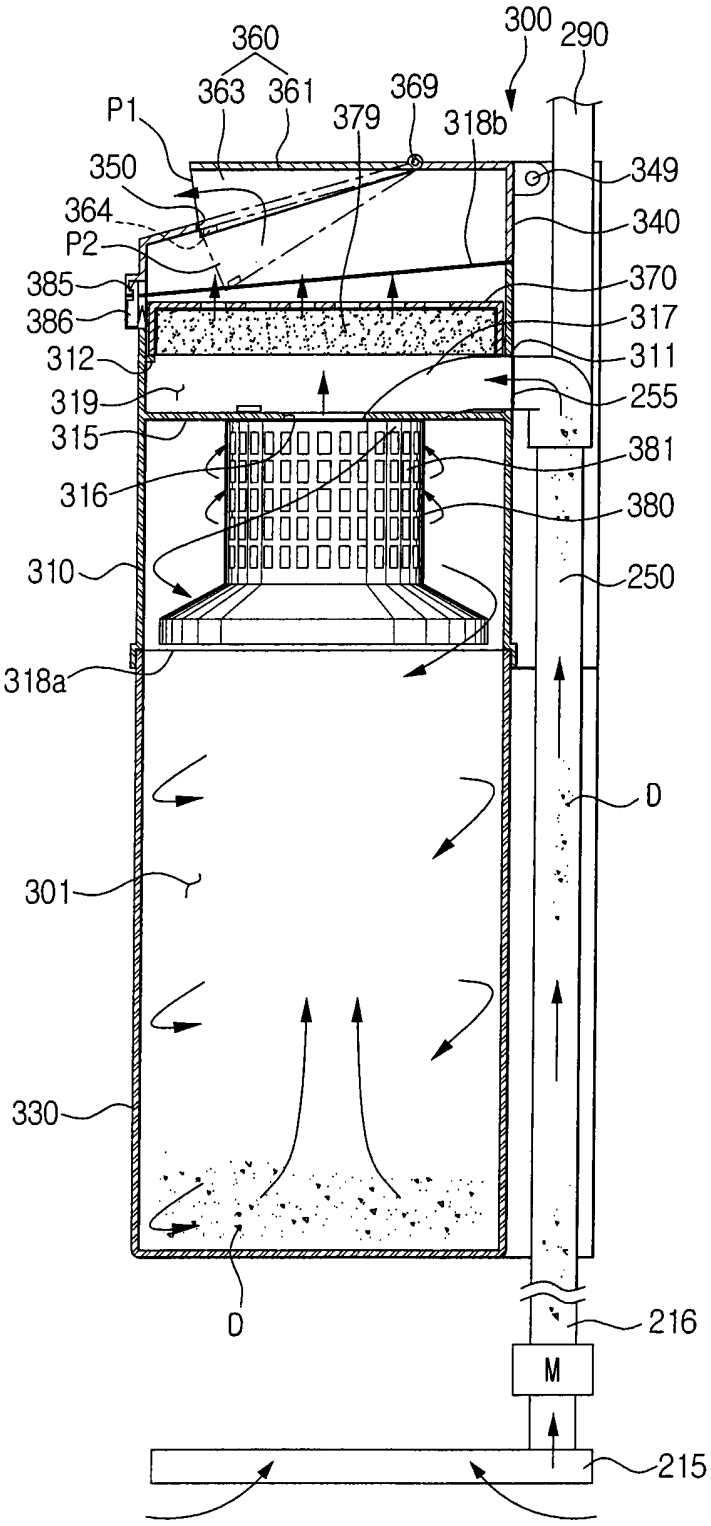
385
252
386
251
II
310
250
300
330
240
210
200

FIG. 2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318b
300
290
P1
350
364
P2
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386
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319
315
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318a
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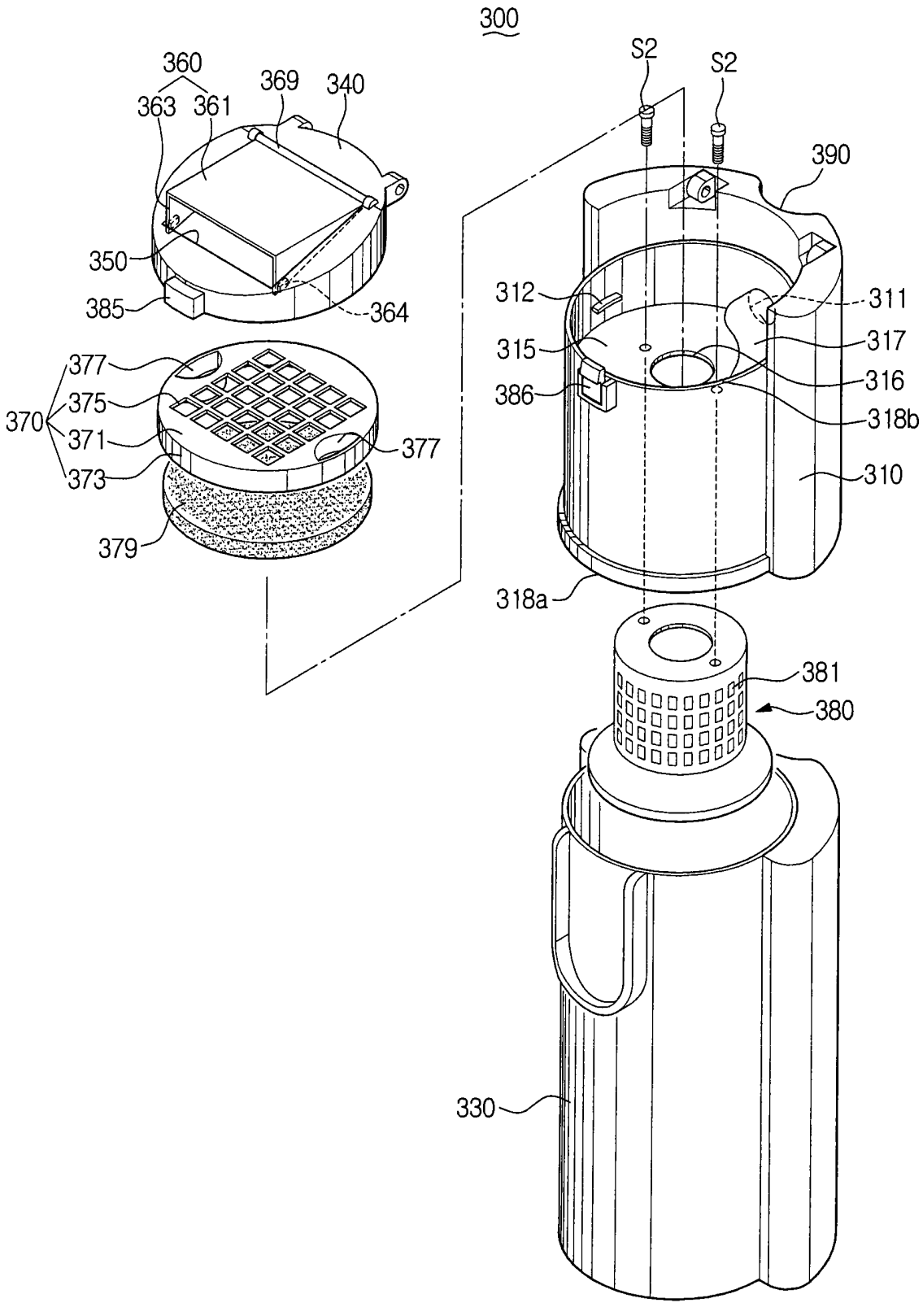
317
311
255
381
380
250
D
301
330
D
216
M
215

FIG. 3


300
360
363
361
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340
350
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371
373
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S2
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318b
310
318a
381
380
330

FIG. 4

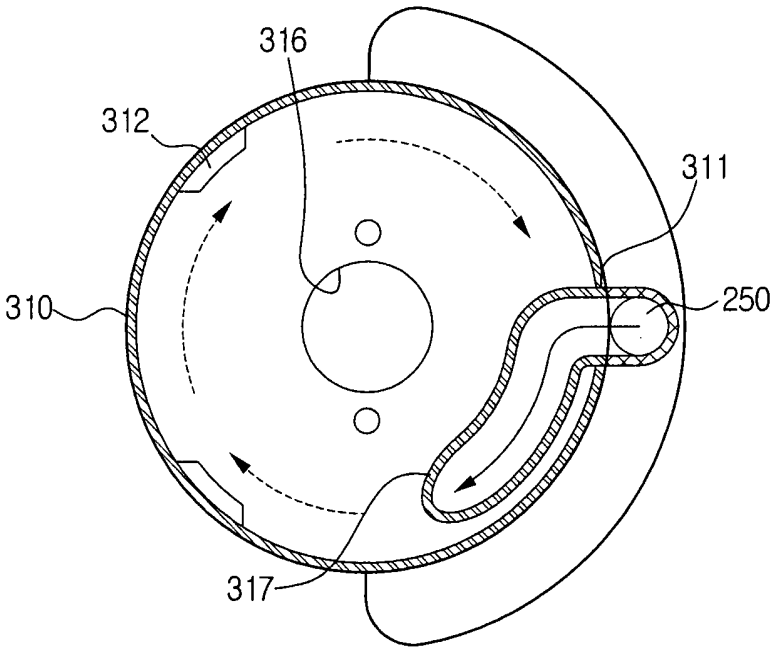
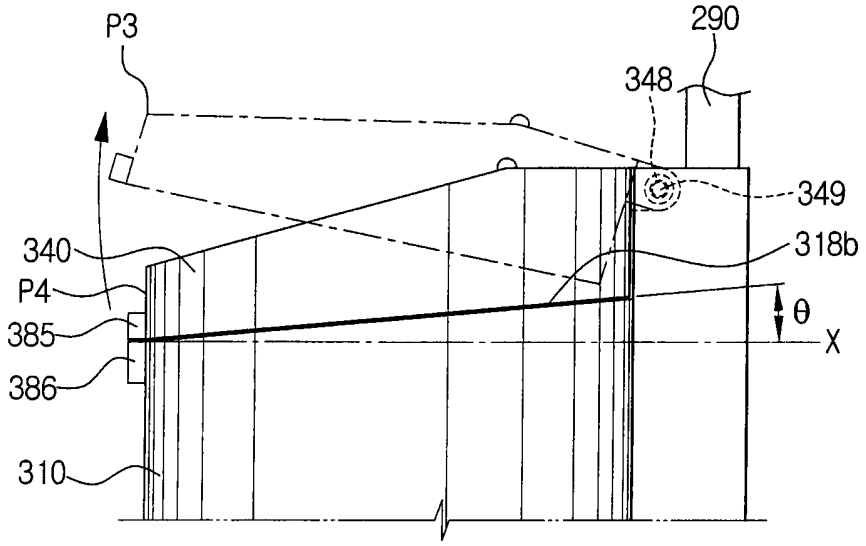


FIG. 5



Cyclonic Dust-Collecting Device

This invention relates to a cyclonic dust-collecting device for separating dust from drawn-in air, and to a vacuum cleaner having the same.

A vacuum cleaner draws in dust from a surface to be cleaned together with ambient air, and separates the dust from the drawn-in air. A known vacuum cleaner employs a cyclonic dust-collecting device which separates dust from drawn-in air using a centrifugal force.

When such a cyclonic dust-collecting apparatus collects a predetermined amount of dust, a user removes a dust receptacle from the vacuum cleaner, empties the dust receptacle, and then re-mounts the empty dust receptacle. Such a cyclonic dust-collecting device is advantageous over a dust-collecting device using a bag for collecting dust for sanitary reasons, and is convenient to use.

However, a conventional vacuum cleaner includes not only a suction passage from a dust suction port to the cyclonic dust-collecting device, but also a discharge passage from the cyclonic dust-collecting device to an air discharge port of the vacuum cleaner. Owing to the presence of the discharge passage, the conventional vacuum cleaner has a complicated structure, and has an increased manufacturing cost which results from a large number of manufacturing processes. Moreover, it is not easy to maintain the vacuum cleaner in good condition, or repair the vacuum cleaner.

An aim of the invention is to provide a cyclonic dust-collecting device having a simplified and improved structure, and to provide a vacuum cleaner having the same.

The present invention provides a vacuum cleaner comprising:

a cleaner body having a suction port through which dust-carrying air can be drawn from a surface to be cleaned, and a suction pipe fluidly communicating with the suction port; and

a cyclonic dust-collecting device having a cyclone chamber for centrifugally separate dust from the air drawn in through the suction pipe, and an air discharge port to discharge cleaned air which is separated from the dust in the cyclone chamber.

The invention also provides a vacuum cleaner comprising: a dust suction port disposed at a lower end of a cleaner body to face a surface to be cleaned; a cyclonic dust-collecting device having a cyclone chamber for centrifugally separating dust from the air drawn in through the dust suction port; a motor disposed in an air channel between the cyclonic dust collecting device and the dust suction port to draw in dust-carrying air from said surface through the dust suction port, and also to force the drawn-in air towards the cyclone chamber; and an air discharge port penetratingly formed on an outer circumference of the cyclonic dust-collecting device and exposed to the outside of the cleaner body, the drawn-in air passing by the cyclone chamber and then being discharged to the outside of the cleaner body through the discharge opening.

Since the air discharge port is disposed in the cyclonic dust-collecting device, not in the cleaner body, a discharge channel for connecting the cyclonic dust-collecting device

and cleaner body is not required, and thus the structure of the vacuum cleaner is simplified.

In a preferred embodiment, the cyclonic dust-collecting device comprises a discharge cover pivotable between a first position and a second position, the discharge cover opening the air discharge port when in the first position, and covering the air discharge port when in the second position, and the discharge cover is pivoted, in use, towards the first position by the air discharged through the air discharge port, and pivoted back towards the second position by its own weight.

Preferably, the discharge cover is provided with a protrusion protruding therefrom, the protrusion contacting an inside edge of the air discharge port when the discharge cover is pivoted to the first position by the discharged air, thereby restricting the pivotal movement of the discharge cover, wherein first position is such that the discharge cover reverts to the second position by its own weight when the motor is not driven.

Preferably, the cyclonic dust-collecting device comprises a cyclone head disposed in the cleaner body and having an open upper end fluidly communicating with an outlet of the cyclone chamber, and a cover pivotably disposed at an open upper end of the cyclone head to open and close the upper end of the cyclone head, and the air discharge port and the discharge cover are disposed on the cover.

Accordingly, air is prevented from being discharged towards a user or towards the surface to be cleaned. Therefore, dust on that surface is prevented from being scattered

due to the air discharged from the vacuum cleaner, and the cleaning efficiency can be improved. Also, users do not feel unpleasant when using the vacuum cleaner. Also, the discharge cover prevents dust from flowing into the cyclonic dust-collecting device through the air discharge port.

Preferably, the discharge cover is inclined such that the free end of the discharge cover is positioned under the pivotal axis of the discharge cover when the discharge cover is positioned in the second position. Accordingly, the discharge cover is prevented from pivoting to open the air discharge port when the motor is not driven.

Advantageously, the cyclonic dust-collecting device comprises a filter chamber disposed in an air passage connecting an outlet of the cyclone chamber and the air discharge port, an upper end of the filter chamber being openable and closable by the cover; a cylindrical filter case removably mounted in the filter chamber and having an upper wall; and a filter member disposed inside the filter case, wherein the filter case comprises a plurality of perforations formed on the upper wall of the filter case, for guiding the air passing through the filter member towards the air discharge port, and a holding recess disposed on the upper wall of the filter case away from the perforations, the holding recess enabling a user to insert his/her fingers thereinto to hold the filter case.

Preferably, a lower end of the cover and an upper end of the cyclone head, which contact each other when the cover is closed, downwardly incline away from a pivotal axis of the cover.

Preferably, the cyclonic dust-collecting device comprises: a locking device having connection members respectively provided on the cover and the cyclone head, the connection members being selectively engagable with each other when the cover is closed; and an elastic member for elastically pressing the cover to open the cyclone head when the locking device is unlocked.

Preferably, the cyclonic dust-collecting device comprises a guide member disposed at the cyclone head to cover a downstream portion of the inlet along the air suction passage, the guide member guiding the air drawn into the cyclone chamber through the inlet in a tangential direction with respect to an inner circumference of the cyclone chamber.

Advantageously, the cyclonic dust-collecting device comprises a partition covering the upper portion of the cyclone chamber, and the guide member has a curved portion formed by curving a part of the partition upwardly. The curved portion may downwardly incline along the direction of travel of the drawn-in air.

The invention also provides a cyclonic dust-collecting device comprising:

a cyclone head disposed in a cleaner body to connect with a suction pipe, air drawn in from a surface to be cleaned through a dust suction port of the cleaner body flowing into the cyclone head through the suction pipe;

a dust receptacle removably connected to the cyclone head, thereby forming a cyclone chamber for centrifugally separating dust from the air drawn in through the suction pipe;

an air discharge port penetratingly formed through an outer circumference of the cyclone head, the air discharge port being exposed to the outside of the cleaner body to discharge the air discharged from the cyclone chamber to the outside; and

a discharge cover pivotable between a first position to open the air discharge port and a second position to close the air discharge port,

wherein the discharge cover is pivoted, in use, to the first position by the air discharged from the air discharge port.

The invention further provides a vacuum cleaner comprising:

a cleaner body having a nozzle unit and a suction pipe;

a cyclone head disposed in the cleaner body to connect with the suction pipe;

a dust receptacle connected to the cyclone head for centrifugally separating dust from the air drawn in through the suction pipe;

a motor disposed in the cleaner body and located in an air passage between the cyclone chamber and the nozzle unit, for generating a suction force at the suction port during a driving operation, and for conveying the air drawn in through the nozzle unit to the cyclone chamber;

an air discharge port penetratingly formed through an outer circumference of the cyclone head, the air discharge port being exposed to the outside of the cleaner

body, for discharging cleaned air which is centrifugally separated from dust in the cyclone chamber to the outside; and

a discharge cover disposed on the cyclone head to open and close the air discharge port,

wherein the discharge cover is pivoted, in use, to open the air discharge port by the air discharged when the motor is driven, and is pivoted to close the air discharge port by its own weight when the motor is not driven.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:

Figure 1 is an exploded perspective view illustrating a vacuum cleaner constructed according to the invention;

Figure 2 is a cross-section, taken on the line II-II of Figure 1;

Figure 3 is an exploded perspective view illustrating the cyclonic dust-collecting device of Figure 1;

Figure 4 is a part-sectional plan view of the cyclone head of the device of Figure 3; and

Figure 5 is a side view illustrating an operable cover of the device of Figure 3.

Referring to the drawings, Figures 1 and 2 show a vacuum cleaner 100 comprising a cleaner body 200 and a cyclonic dust-collecting device 300.

The cleaner body 200 comprises a nozzle unit 210 having a suction port 215 formed on the base thereof, a motor M generating a suction force at the suction port, a suction pipe 250 and a handle 290. The motor M is disposed in a channel 216 connecting the suction port 215 and the suction pipe 250, and is a bypass motor. When the motor M is driven, dust D (see Figure 2) is drawn in from a surface to be cleaned through the suction port 215 together with ambient air, passes through the motor, and then is forced into the suction pipe 250. The dust-carrying air is guided to the cyclonic dust-collecting device 300 via the suction pipe 250.

The cyclonic dust-collecting device 300 centrifugally separates the dust D from the air drawn in through the suction pipe 250. Referring to Figures 2 and 3, the cyclonic dust-collecting device 300 comprises a cyclone head 310, a dust receptacle 330 and a cover 340. The cyclonic dust-collecting device 300 further comprises a recess 390 for receiving parts of the suction pipe 250 and the handle 290 which face the cyclonic dust-collecting device 300 when the cyclonic dust-collecting device is mounted in the cleaner body 200. The dust receptacle 330 is removably connected to an open lower end 318a of the cyclone head 310, and defines a cyclone chamber 301 in which the drawn-in air is centrifugally separated. The dust receptacle 330 is connected to the cyclone head 310 by any suitable means. In this embodiment, an auxiliary connection device, such as a lever 240 (see Figure 1) is provided on the cleaner body 200. The

lever 240 supports the dust receptacle 330, thereby connecting the dust receptacle to the cyclone head 310 .

The cyclone head 310 comprises a cylindrical inner space 319 (see Figure 2) having an open upper end 318b and an open lower end 318a, an inlet 311, an outlet 316 and a partition 315. The inlet 311 fluidly communicates with an outlet 255 (see Figure 1) of the suction pipe 250 when the cyclone head 310 is secured to the suction pipe 250. The cyclone head 310 is secured to the cleaner body 200 by any suitable means. Thus, as shown, first screws S1 passes through a first holes 252 formed in a securing piece 251 (see Figure 1) of the suction pipe 250 to engage with the cyclone head 310 to secure the head to the cleaner body 200.

The partition 315 is disposed inside the cyclone head 310 to divide the inner space 301 into an upper space 319 and a lower space. A grille 380 is secured to a lower surface of the partition 315 by second screws S2. The grille 380 has a plurality of perforations 381 formed on its outer circumference. The grille 380 filters air that is discharged through the outlet 316 after being separated from the dust D in the cyclone chamber 301, as shown in Figure 2.

The cyclonic dust-collecting device 300 further comprises a guide member for guiding the air drawn into the cyclonic dust-collecting device 300 through the inlet 311 in a tangential direction with respect to the inner circumference of the cyclone chamber 301. Owing to the presence of the guide member, the air swirls along the inner circumference of the cyclone chamber 301, thereby increasing the centrifugal force and

improving the dust separation efficiency of the cyclonic dust-collecting device. As shown in Figures 2 to 4, the guide member includes a curved portion 317 which covers the downstream portion of the inlet 311. The curved portion 317 corresponds to the upper end of the inlet 311 which is located higher than the partition 315, and downwardly inclines from the inlet towards the bottom of the cyclone chamber 301. Accordingly, the air downwardly inclines and swirls along the inner circumference of the cyclone chamber 301. The curved portion 317 is formed by upwardly curving a part of the partition 315 adjacent to the inlet 311, which prevents the dust-collecting device 300 from being complicated due to the presence of a guide member.

Owing to the presence of the guide member, the air flowing into the cyclone chamber 301 is subjected to a constant centrifugal force, regardless of the shape of the inlet 311 and the connecting positions of the inlet and the suction pipe 250. Accordingly, as shown in Figure 4, the suction pipe 250 is connected to the inlet 311 in a perpendicular direction with respect to the inner circumference of the cyclone head 310, such that the air, drawn in through the inlet of the cyclone head 310, is guided toward the centre of the cyclone chamber 301.

A conventional cyclonic dust-collecting device has a curved suction pipe to increase the swirling force of drawn-in air in its cyclone chamber, or has a suction pipe which is connected to an inlet at an angle with respect to the inner circumference of the cyclonic dust-collecting device. Compared to the conventional dust-collecting device, the connection position of the suction pipe 250 and the cyclone head 310 is more flexible.

The filter chamber (upper space) 319 is formed above the partition 315 of the cyclone head 310. The filter chamber 319 filters the air discharged from the cyclonic dust-collecting device 300, thereby discharging the air in a cleaner condition. The filter chamber 319 can be opened and closed by the cover 340 which is pivotably disposed on the cyclone head 310. The filter chamber 319 housing a filter member 379 for filtering the air. The filter member 379 is removably mounted in a filter case 370 formed by an upper wall 371 and a sidewall 373. The filter case 370 is removably mounted on the upper portion the partition 315, and is supported by a protrusion 312 protruding from the inner circumference of the cyclone head 310, the protrusion being positioned above the partition 315. The upper wall 371 of the filter case 370 is provided with a plurality of perforations 375 for discharging the air exiting from the filter member 379 therethrough, and with a holding recess 377 shaped for a user to insert his/her fingers to hold the filter case. Owing to the presence of the recess 377, a user can easily mount or dismount the filter case 370 on, or from, the filter chamber 319 through the open upper end 318b of the cyclone head 310.

The filter chamber 319 is opened and closed by the cover 340. For this, as shown in Figure 5, the cover 340 pivots on a pivot axis 349 between a third position P3 (in which the filter chamber 319 is open), and a fourth position P4 (in which the filter chamber is closed). When the air is discharged from the cyclone chamber 301, it flows in the direction in which the cover 340 is pivoted towards the third position P3. In order to prevent the cover 340 from pivoting to the third position P3 due to the air discharged from the cyclone chamber 301 during operation of the motor M, the cyclonic dust-collecting device 300 is provided with a locking device.

As shown in Figures 1 and 2, as the locking device is constituted by a first connection member 385 and a second connection member 386 provided respectively on the cyclone head 310 and the cover 340. The first and the second connection members 385 and 386 are resiliently connectable. The cyclonic dust-collecting device 300 further comprises a resilient member 348 (see Figure 5) for resiliently pressing the cover 340 towards the third position P3. Accordingly, if the first and the second connection members 385 and 386 are released, the cover 340 automatically pivots due to the force the resilient member 348. Accordingly, since the filter chamber 319 is easily opened and closed, it is easy to maintain or repair the filter chamber 319.

Referring to Figure 5, when the cover 340 pivots to the fourth position P4, the lower end of the cover 340 and the upper end 318b (see Figure 3) of the cyclone head 310, which face to each other, define a gap therebetween with a predetermined angle θ. The upper side of the gap inclines downwardly away from the pivot axis 349. This is to prevent the lower end of the cover 340 adjacent to the pivot axis 349 from contacting the upper end 318b of the cyclone head 310 when the cover 340 is opened. Accordingly, the cover 340 can be smoothly opened. The lower end of the cover 340 downwardly inclines towards a free end of the cover 340, and defines an inclination angle of 5°.

An air discharge port 350 is formed on an outer surface of the cyclonic dust-collecting device 300, and is exposed to the outside of the cleaner body 200. As shown in Figure 2, the air discharge port 350 fluidly communicates with the cyclone chamber 301 via

the filter member 319 and the outlet 316. Therefore, the air discharged from the cyclonic dust-collecting device 300 does not flow back to the cleaner body 200. Accordingly, no extra discharge channel is required to connect the cyclonic dust-collecting device 300 and the cleaner body 200.

The air discharge port 350 is disposed at the upper end of the cyclonic dust-collecting device 300, and penetrates the upper central portion of the cover 340. Accordingly, when air is discharged through the air discharge port 350, it is not directed towards the surface to be cleaned or towards a user. Therefore, cleaning efficiency increases and the user rarely feels unpleasant owing to impact with discharged air.

The cyclonic dust-collecting device 300 is provided with a discharge cover 360 pivotably connected to a pivot axis 369 adjacent to the air discharge port 350, such that the discharge cover covers the air discharge port 350 when the motor M stops operating. The discharge cover 360 prevents foreign substances from entering the cyclonic dust-collecting device 300 when the cleaner body 200 is not driven. The discharge cover 360 can be pivoted to a first position P1 by air advancing to the air discharge port 350 such that the air discharge port 350 is opened. If the cleaner body 200 is not driven, the discharge cover 360 is pivoted to a second position P2, thereby covering the air discharge port 350.

Various methods can be used to reposition the discharge cover 360. For example, an extra resilient member can be used. However, in this embodiment, the discharge cover 360 is automatically closed due to its weight. In this case, the first position P1 is such

that the discharge cover 360 can be closed at any time that the motor M is not driven. For this, the discharge cover 360 has a locking protrusion 364 (see Figure 2) protruding from a free end thereof, such that the locking protrusion contacts an inside edge of the air discharge port 350 when the discharge cover is pivoted to the first position P1. When the motor M is driven, the locking protrusion 364 prevents the discharge cover 360 from pivoting further away from a position in which the discharge cover is closed due to its weight. It is preferable that the discharge cover 360 is not pivoted to the first position P1 when the motor M is not driven. For this, an upper surface of the cover 340 is downwardly inclined towards the front end of the discharge cover 360. The discharge cover 360 comprises an upper wall 361 and a side wall 363 such that the air is discharged through the discharge opening 350 towards the front of the cleaner body 200. Since the air discharged from the vacuum cleaner 100 is not directed towards the user, unpleasantness for the user can be reduced.

Operation of the vacuum cleaner 100 will now be described with reference to Figure 2.

When the motor M is driven, dust-carrying air is drawn in through the dust suction port 215. The drawn-in air flows into the cyclonic dust-collecting device 300 via the motor M, the suction pipe 250 and the inlet 311 in sequence. The air is guided by the curved portion 317 of the partition 315, and thus swirls downwardly along the inner circumference of the cyclone chamber 301. While the drawn-in air swirls, the dust D is separated from the drawn-in air by a centrifugal force, and the separated dust is collected on the base of the dust receptacle 330. The air separated from the dust D in the cyclone chamber 301 passes the grille 380, thereby being filtered. The filtered air

flows into the filter chamber 319 through the outlet 316. The air passes the filter member 379, thereby being filtered again. The "cleaned" air is discharged from the cyclonic dust-collecting device 300 after pivoting the discharge cover 360 to the first position P1.

According to the present invention, the motor M is disposed in the air channel connecting the dust suction port 215 and the cyclonic dust-collecting device 300, and the air discharged from the cleaner body 200 is separated by the cyclonic dust-collecting device and then discharged to the outside . Accordingly, since a dedicated discharge passage connecting the outlet 316 of the cyclone chamber 301 and the cleaner body 200 is not required, the structure of the vacuum cleaner 100 is simplified. The maintenance or repair of the vacuum cleaner is easy to do, and its manufacturing cost can be reduced.

The foregoing embodiment and advantages are merely exemplary, and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatus. Also, the description of the embodiments of the present invention is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

CLAIMS

1. A vacuum cleaner comprising:

a cleaner body having a suction port through which dust-carrying air can be drawn from a surface to be cleaned, and a suction pipe fluidly communicating with the suction port; and

a cyclonic dust-collecting device having a cyclone chamber for centrifugally separate dust from the air drawn in through the suction pipe, and an air discharge port to discharge cleaned air which is separated from the dust in the cyclone chamber.

2. A vacuum cleaner as claimed in claim 1, wherein the cyclonic dust-collecting device comprises a discharge cover pivotable between a first position and a second position, the discharge cover opening the air discharge port when in the first position, and covering the air discharge port when in the second position; and

wherein the discharge cover is pivoted, in use, towards the first position by the air discharged through the air discharge port, and pivoted back towards the second position by its own weight.

3. A vacuum cleaner as claimed in claim 2, wherein the cyclonic dust-collecting device comprises:

a cyclone head disposed in the cleaner body and connected to the suction pipe;

a dust receptacle connected to the cyclone head, thereby forming the cyclone chamber; and

a cover pivotably disposed at an open upper end of the cyclone head for opening and closing the upper end of the cyclone head,

wherein the air discharge port and the discharge cover are disposed on the cover.

4. A vacuum cleaner as claimed in claim 3, wherein the discharge cover is inclined such that the free end of the discharge cover is positioned under the pivotal axis of the discharge cover when the discharge cover is positioned in the second position.

5. A vacuum cleaner as claimed in any one of claims 1 to 4, wherein the cleaner body houses a motor disposed in a suction passage connecting the suction port and the cyclonic dust-collecting device.

6. A vacuum cleaner as claimed in claim 5 when appendent to claim 2, wherein the discharge cover is provided with a protrusion protruding therefrom, the protrusion contacting an inside edge of the air discharge port when the discharge cover is pivoted to the first position by the discharged air, thereby restricting the pivotal movement of the discharge cover, and

wherein the first position is such that the discharge cover reverts to the second position by its own weight when the motor is not driven.

7. A vacuum cleaner as claimed in any one of claims 1 to 6, wherein the cyclonic dust-collecting device comprises:

a filter chamber disposed in an air passage connecting an outlet of the cyclone chamber and the air discharge port, an upper end of the filter chamber being openable and closable by the cover;

a cylindrical filter case removably mounted in the filter chamber and having an upper wall; and

a filter member disposed inside the filter case,

wherein the filter case comprises a plurality of perforations formed on the upper wall of the filter case, for guiding the air passing through the filter member towards the air discharge port, and a holding recess disposed on the upper wall of the filter case away from the perforations, the holding recess enabling a user to insert his/her fingers thereinto to hold the filter case.

8. A vacuum cleaner as claimed in claim 7, wherein the air discharge port is penetratingly formed on the cover for fluid communication with the filter chamber.

9. A vacuum cleaner as claimed in claim 1, wherein the cyclonic dust collecting device comprises:

a cyclone head disposed on the cleaner body and having an open upper end in fluid communication with the suction pipe;

a dust receptacle removably connected to the lower end of the cyclone head, and forming the cyclone chamber fluidly communicating with an upper end of the cyclone head and the suction pipe; and

a cover pivotably disposed at an upper end of the cyclone head to open and close the open upper end of the cyclone head, and

wherein a lower end of the cover and an upper end of the cyclone head, which contact each other when the cover is closed, downwardly incline away from a pivotal axis of the cover.

10. A vacuum cleaner as claimed in claim 9, wherein the cyclonic dust-collecting device comprises:

a partition disposed inside the cyclone head to cover an upper portion of the cyclone chamber, an outlet of the cyclone chamber being penetratingly formed through the partition;

a filter chamber disposed on an upper portion of the partition and being openable and closeable by the cover;

a cylindrical filter case removably mounted in the filter chamber, and having an inner space covered by the upper wall; and

a filter member disposed in an inner space of the filter case, and

wherein the filter case comprises a plurality of perforations formed on an upper wall of the filter case, for guiding the air passing through the filter member towards the air discharge port, and a holding recess disposed on the upper wall of the filter case away from the perforations, the holding recess enabling a user to insert his/her fingers thereinto to hold the filter case.

11. A vacuum cleaner as claimed in claim 10, wherein the air discharge port is penetratingly formed through the cover.

12. A vacuum cleaner as claimed in any one of claims 9 to 11, wherein the cyclonic dust-collecting device comprises:

a locking device having connection members respectively provided on the cover and the cyclone head, the connection members being selectively engagable with each other when the cover is closed; and

an elastic member for elastically pressing the cover to open the cyclone head when the locking device is unlocked.

13. A vacuum cleaner as claimed in claim 1, wherein the cyclonic dust-collecting device comprises:

a cyclone head mounted in the cleaner body and having an inlet fluidly communicating with the suction pipe to guide the air drawn in through the suction pipe toward the centre of the cyclone chamber;

a dust receptacle removably connected to the lower end of the cyclone head, thereby forming the cyclone chamber; and

a guide member disposed at the cyclone head to cover a downstream portion of the inlet along the air suction passage, the guide member guiding the air drawn into the cyclone chamber through the inlet in a tangential direction with respect to an inner circumference of the cyclone chamber.

14. A vacuum cleaner as claimed in claim 13, wherein the cyclonic dust-collecting device comprises a partition covering the upper portion of the cyclone chamber, and the guide member has a curved portion formed by curving a part of the partition upwardly.

15. A vacuum cleaner as claimed in claim 14, wherein the curved portion downwardly inclines along the direction of travel of the drawn-in air.

16. A vacuum cleaner as claimed in any one of claims 13 to 15, further comprising a cover to open and close an upper end of the cyclonic dust-collecting device which is connected to an outlet of the cyclone chamber, wherein the air discharge port is penetratingly formed through the cover.

17. A cyclonic dust-collecting device comprising:

a cyclone head disposed in a cleaner body to connect with a suction pipe, air drawn in from a surface to be cleaned through a dust suction port of the cleaner body flowing into the cyclone head through the suction pipe;

a dust receptacle removably connected to the cyclone head, thereby forming a cyclone chamber for centrifugally separating dust from the air drawn in through the suction pipe;

an air discharge port penetratingly formed through an outer circumference of the cyclone head, the air discharge port being exposed to the outside of the cleaner body to discharge the air discharged from the cyclone chamber to the outside; and

a discharge cover pivotable between a first position to open the air discharge port and a second position to close the air discharge port,

wherein the discharge cover is pivoted, in use, to the first position by the air discharged from the air discharge port.

18. A vacuum cleaner comprising:

a cleaner body having a nozzle unit and a suction pipe;

a cyclone head disposed in the cleaner body to connect with the suction pipe;

a dust receptacle connected to the cyclone head for centrifugally separating dust from the air drawn in through the suction pipe;

a motor disposed in the cleaner body and located in an air passage between the cyclone chamber and the nozzle unit, for generating a suction force at the suction port during a driving operation, and for conveying the air drawn in through the nozzle unit to the cyclone chamber;

an air discharge port penetratingly formed through an outer circumference of the cyclone head, the air discharge port being exposed to the outside of the cleaner body, for discharging cleaned air which is centrifugally separated from dust in the cyclone chamber to the outside; and

a discharge cover disposed on the cyclone head to open and close the air discharge port,

wherein the discharge cover is pivoted, in use, to open the air discharge port by the air discharged when the motor is driven, and is pivoted to close the air discharge port by its own weight when the motor is not driven.

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Application No:	GB0605266.6	**Examiner:**	Rhodri Evans
Claims searched:	1-18	**Date of search:**	5 July 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-3, 5, 6, 17, 18	GB 2389034 A (Samsung) figure 1-5 and 7 and lines 6-23 of page 11.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

A4F

Worldwide search of patent documents classified in the following areas of the IPC

A47L; B04C

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC