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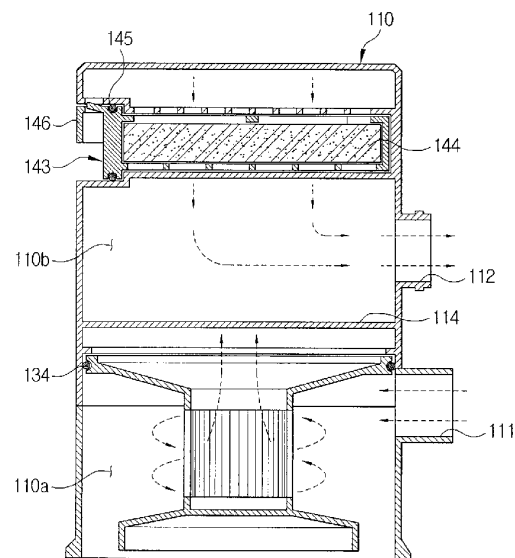
(56) Documents Cited:
GB 2389034 A **WO 2002/078506 A1**
WO 2002/078505 A2 **US 6269518 B1**
US 20030066273 A

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UK CL (Edition W) **A4F, B2P**
INT CL⁷ **A47L, B01D**
Other: **ONLINE: WPI, EPODOC, PAJ**

(54) Abstract Title: **Cyclone-type dust collecting apparatus for a vacuum cleaner**

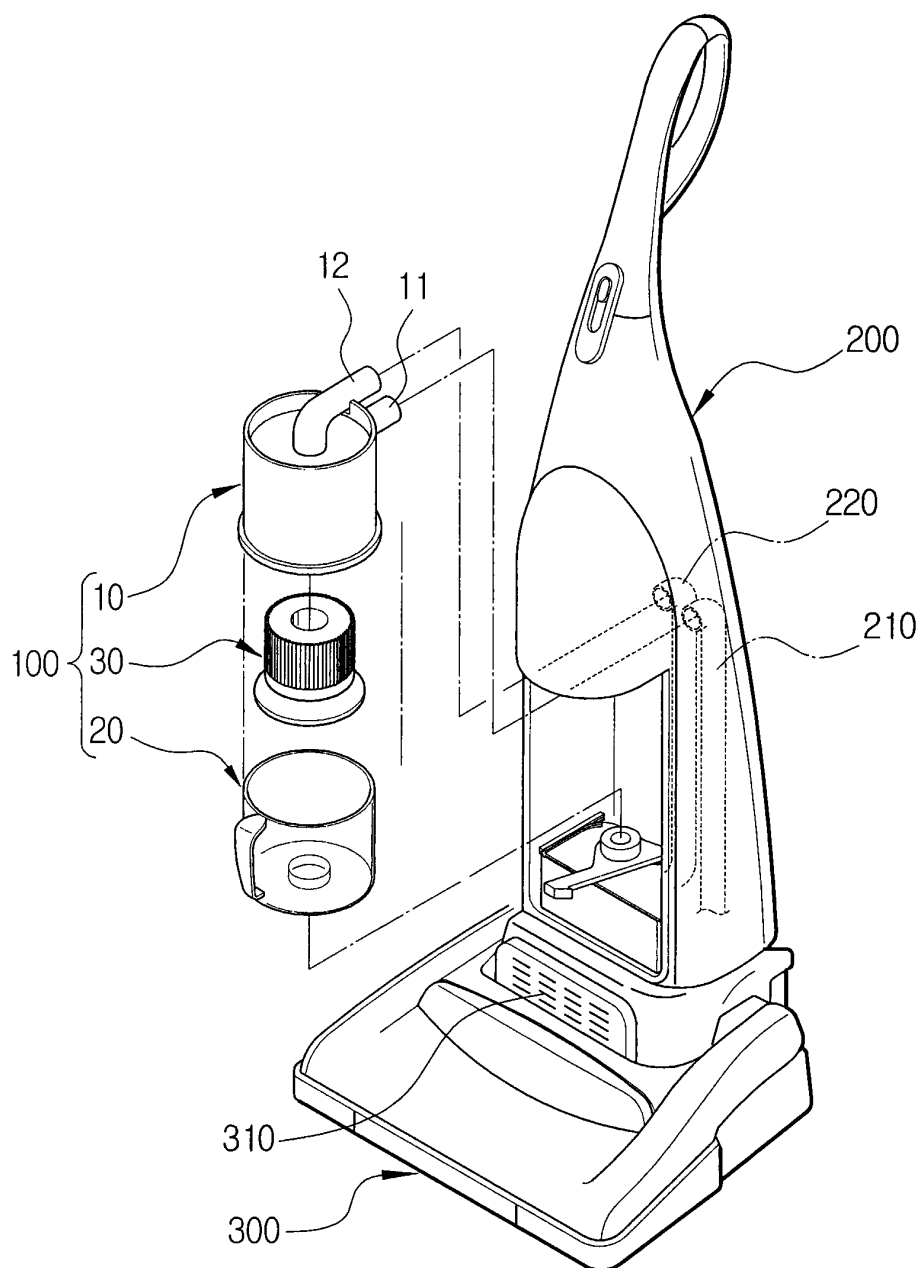
(57) A cyclone-type dust collecting apparatus (100) for a vacuum cleaner comprises a cyclone body (110) having an air inlet port (111) and an air outlet port (112). The cyclone body (110) forms a vortex current of air which is introduced through the air inlet port (14) and contains dust. A dust-collecting container (120) is removably coupled to the cyclone body (110) so as to collect the dust separated by the centrifugal force of the vortex current in the cyclone body. A grill (130) is disposed upstream of the air outlet port (112) in the cyclone body (111) to prevent air from flowing back through the air outlet port. A filter (140) is disposed downstream of the grill (130) in the cyclone body (110) to collect fine dust which passes through the grill. The cyclone body (100) comprises a vortex chamber (110a) formed with the air inlet port (111), and a pressure drop chamber (110b) formed with the air outlet port (112). A path forming member (114) defines an air outlet guide path (113) along which air containing fine dust passed through the grill (130) flows from an upstream portion towards a downstream portion of the filter (140), and is then exhausted through the air outlet port (112), thereby preventing a backflow of the fine dust and increasing the dust collecting efficiency of the vacuum cleaner.

FIG. 6



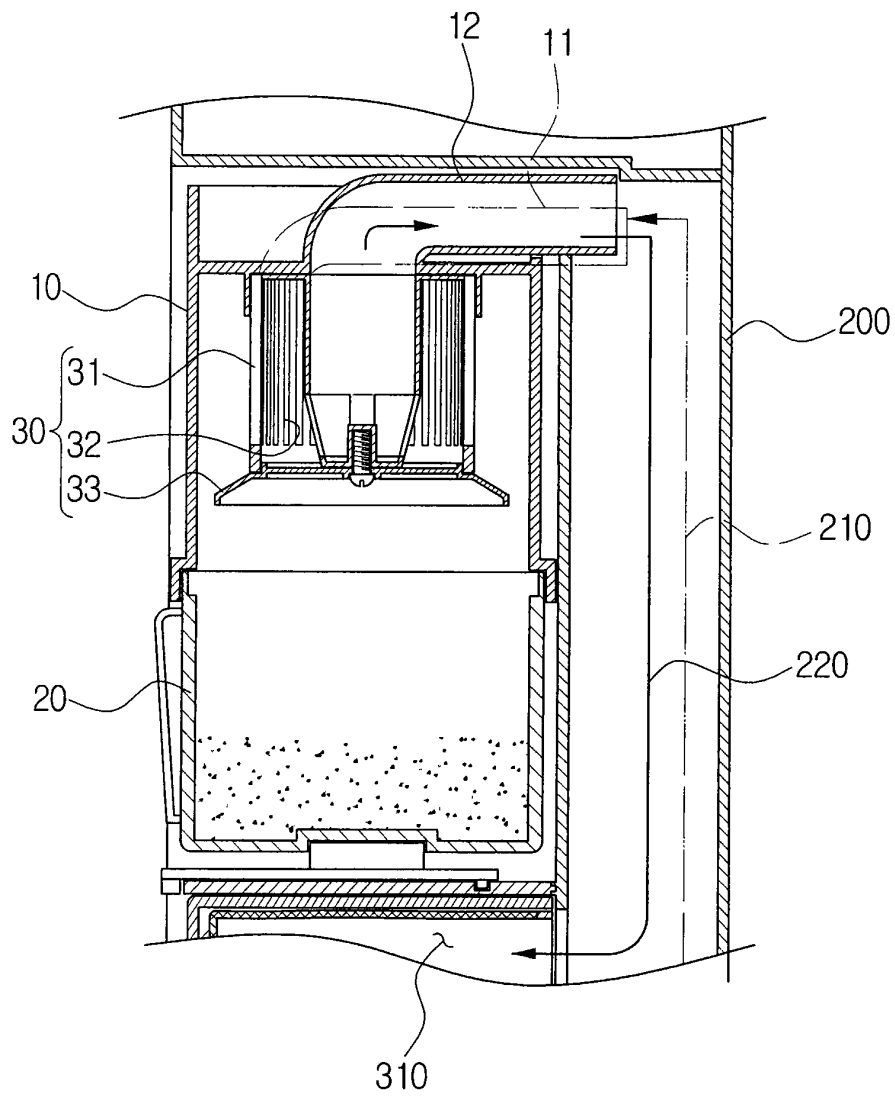
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FIG. 1



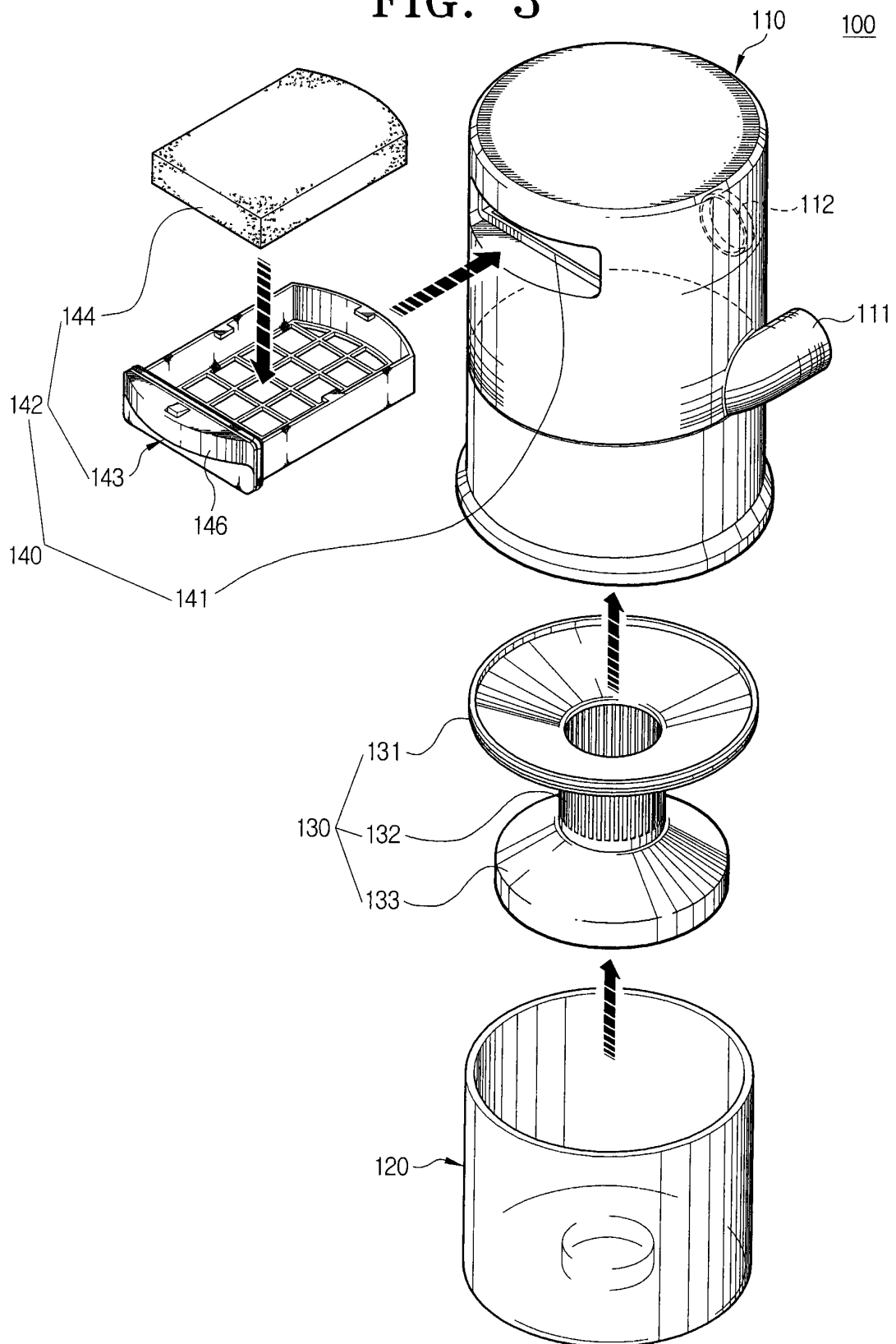
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FIG. 2



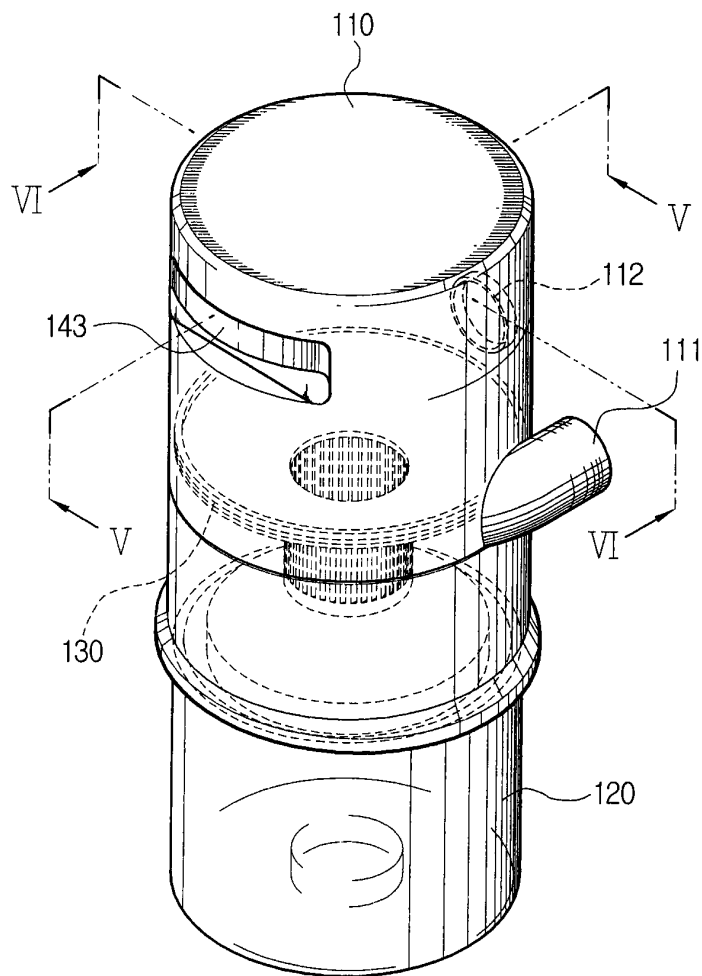
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FIG. 3



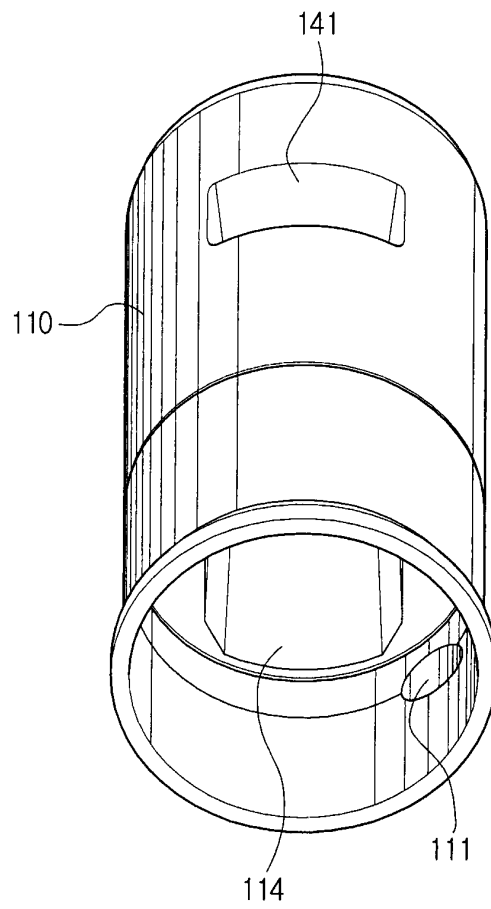
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FIG. 4



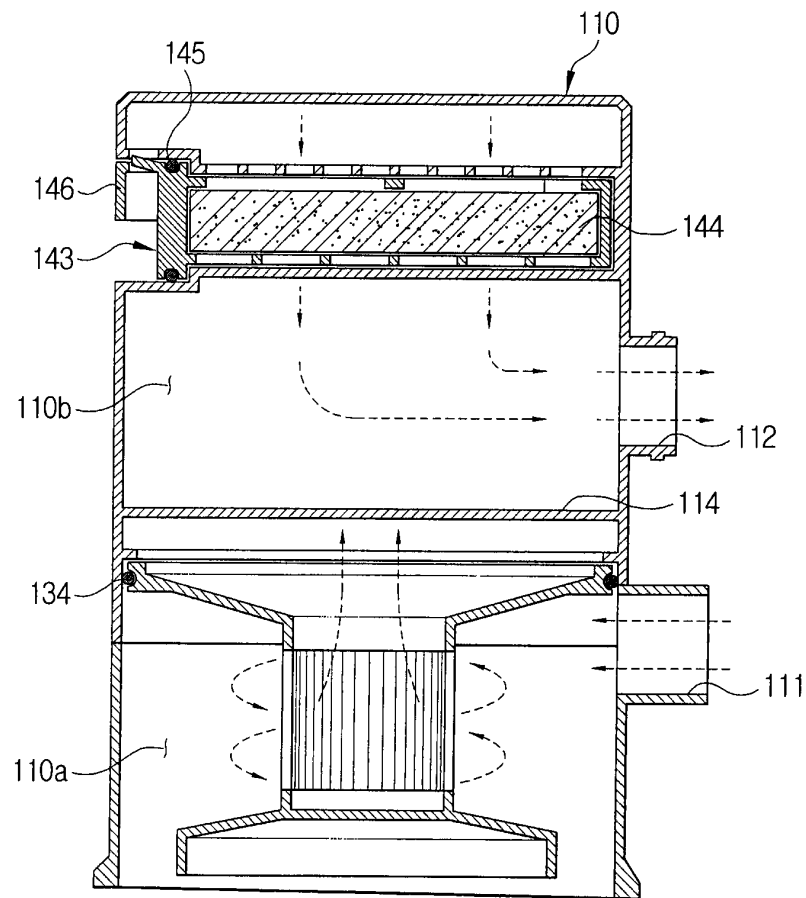
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FIG. 5



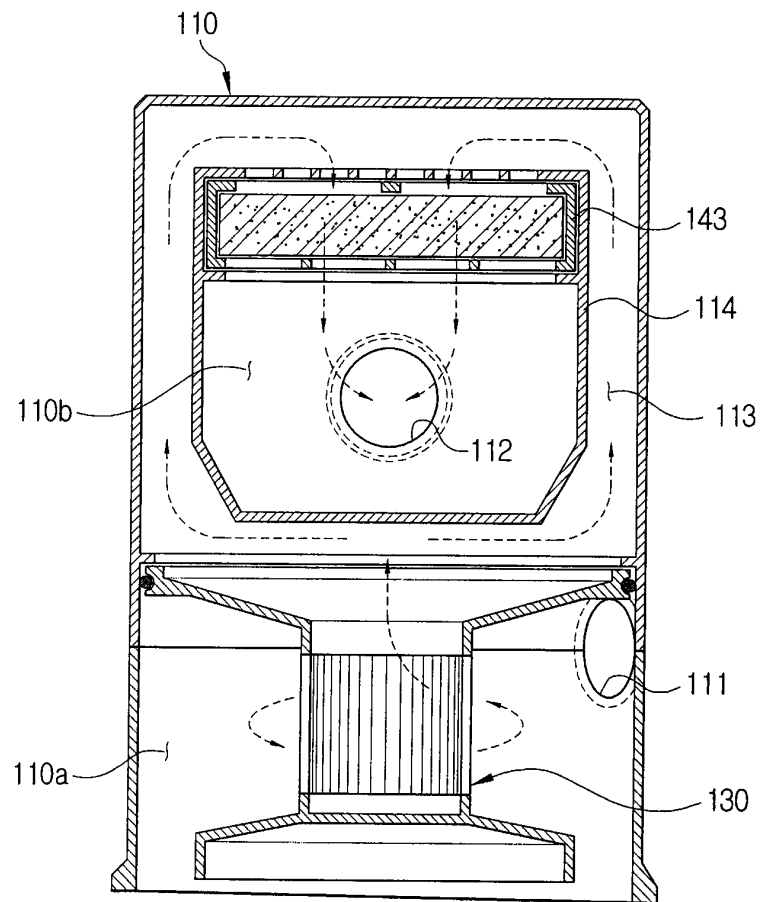
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FIG. 6



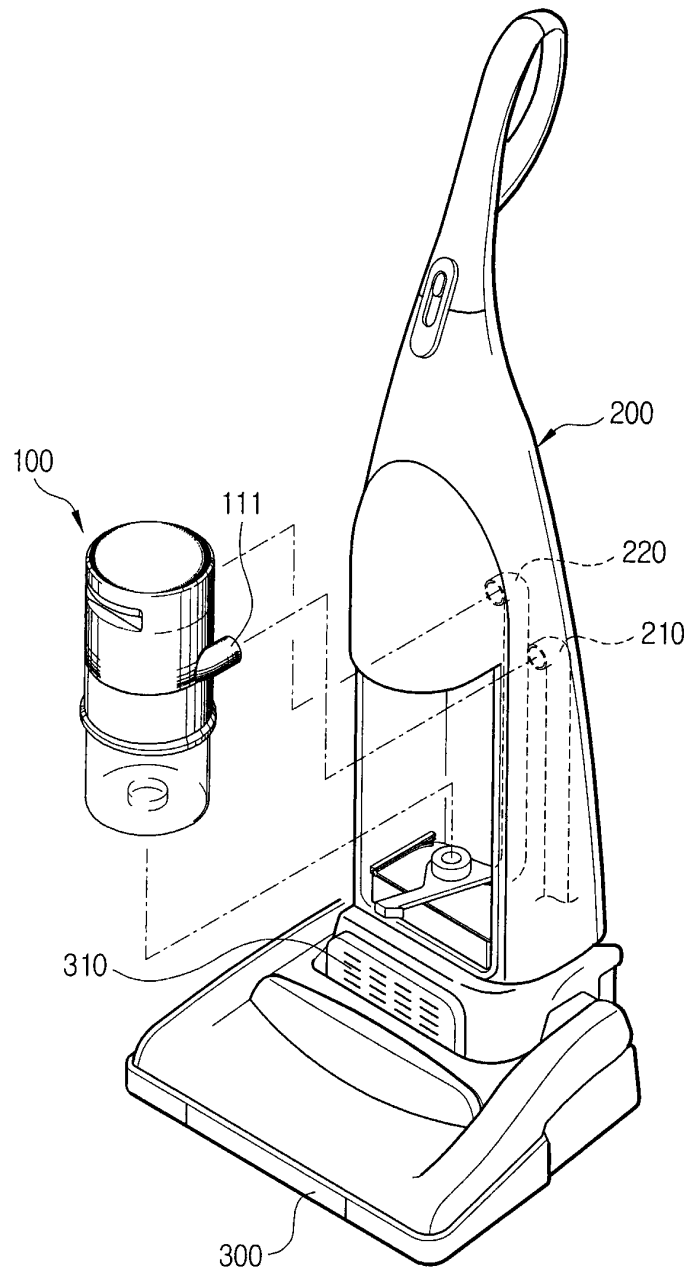
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FIG. 7



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FIG. 8



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Cyclone-Type Dust Collecting Apparatus for A Vacuum Cleaner

This invention relates to a cyclone-type dust collecting apparatus, and more particularly to a cyclone-type dust collecting apparatus for an upright vacuum cleaner, which allows
5 air containing various dusts and foreign substances (hereinafter called "dust") to form a vortex current, thereby collecting the dust from the vortex current of air by centrifugal force.

Figures 1 and 2 schematically show a typical known cyclone-type dust collecting
10 apparatus for a vacuum cleaner.

As shown in Figures 1 and 2, a cyclone-type dust collecting apparatus 100 for a vacuum cleaner generally comprises a cyclone body 10, a dust-collecting container 20 and a grill
30.

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The cyclone body 10 is provided with an air inlet port 11 and an air outlet port 12. The air inlet port 11 is connected to a side of the cyclone body 10, and the air outlet port 12 is connected with a central portion of an upper face of the cyclone body. The cyclone-type dust collecting apparatus 100 is disposed in a main body 200 of the vacuum cleaner, so that the air inlet port 11 is connected to an air inlet path 210 which
20 is disposed in the main body and in communication with a suction brush 300. The air outlet port 12 is connected to an air outlet path 220 which is disposed in the main body 200 of the vacuum cleaner to be in communication with a motor drive chamber 310. Air introduced through the suction brush 300 and containing the dust enters the air inlet
25 path 210 of the main body 200 of the vacuum cleaner and the air inlet port 11, and flows into the cyclone body 10 in a tangential direction. Thus, a vortex current of air is formed in the cyclone body 10, and the dust contained in the vortex current is separated by centrifugal force. Clean air is then exhausted through the air outlet port 12, the air outlet path 220 of the main body 200 of the vacuum cleaner and the motor drive
30 chamber 310.

The dust collecting container 20 is removably coupled to a lower portion of the cyclone body 10 so as to collect the dust separated from the air by the vortex current.

5 The grill 30 is disposed at an entrance of the air outlet port 12 in the cyclone body 10, so that the dust separated from the vortex current does not flow backwards through the air outlet port 12. The grill 30 is provided with a grill body 31, and a plurality of paths 32 formed at an outer surface of the grill body communicate with the air outlet port 12. The grill 30 also has a dust-preventing member 33 disposed at a lower portion of the grill body 31.

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The conventional cyclone-type dust collecting apparatus described above is mounted in a dust chamber 230 of the main body 200 of the vacuum cleaner, so that the air inlet port 11 and the air outlet port 12 of the cyclone body 10 are connected to the air inlet path 210 and the air outlet path 220 of the main body.

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When starting a cleaning operation, a suction force is generated at the suction brush 300 due to operation of a motor (not shown) in the motor drive chamber 310. Air containing dust on a surface of an object to be cleaned is introduced through the suction brush 300, the air inlet path 210 and the air inlet port 11 into the cyclone body 10 due to the suction force. At this time, the introduced air is induced from the air inlet port 11 along an internal surface of the cyclone body 10 in an oblique direction, thereby forming the vortex current of air. Therefore, the dust contained in the air is separated by the centrifugal force, and collected in the dust-collecting container 20. The purified air is then exhausted through the paths 32 of the grill 30, the air outlet port 12, the air outlet path 220 and the motor drive chamber 310 to the outside.

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However, in the conventional cyclone-type dust collecting apparatus described above, there is a problem that fine dust which is smaller than the size of the paths 32 of the grill 30 flows back through those paths together with the air, thereby leading to a deterioration in dust-collecting efficiency.

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It is an aim of the present invention to provide a cyclone-type dust collecting apparatus for a vacuum cleaner, which can filter and collect fine dust contained in air which is exhausted through a path of a grill, thereby, preventing a backflow of the fine dust.

5 The present invention provides a cyclone-type dust collecting apparatus for a vacuum cleaner, the apparatus comprising:

a cyclone body having an air inlet port and an air outlet port, for forming a vortex current of dust-containing air which is introduced through the air inlet port;

a dust-collecting container removably coupled to the cyclone body so as to collect
10 the dust separated by the centrifugal force of the vortex current in the cyclone body;

a grill disposed at an upstream portion of the air outlet port in the cyclone body to prevent air from flowing back through the air outlet port; and

a filter disposed at a downstream portion of the grill in the cyclone body to collect fine dust which passes through the grill.

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Preferably, the cyclone body comprises a vortex chamber formed with the air inlet port, a pressure drop chamber formed with the air outlet port, and a path forming member defining an air outlet guide path along which air containing fine dust passed through the grill flows from an upstream portion towards a downstream portion of the filter, and is
20 then exhausted through the air outlet port.

Advantageously, the filter comprises a filter mounting portion formed at an upper end of the path forming member and having a front opening and a plurality of upper and lower through holes for connecting the air outlet guide path and the air outlet port, and a
25 filter assembly detachably coupled to the filter mounting portion. Preferably, the filter assembly is slidably mounted within the filter mounting portion.

In a preferred embodiment, the filter assembly comprises a filter case having a shape corresponding to the size and structure of the filter mounting portion, and a fine filter
30 disposed in the filter case.

Conveniently, the fine filter is a sponge.

The apparatus may further comprise a packing member disposed in a portion of the filter case, the packing member being in contact with the front opening, and a handle provided at a front face of the filter case.

5

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

Figure 1 is a perspective view of a conventional cyclone-type dust collecting apparatus and a vacuum cleaner having the cyclone-type dust collecting apparatus;

10 Figure 2 is a cross-sectional view showing a dust separating and collecting process of the conventional cyclone-type dust collecting apparatus of Figure 1;

Figure 3 is an exploded perspective view of a cyclone-type dust collecting apparatus for a vacuum cleaner according to an embodiment of the present invention;

15 Figure 4 is a perspective view showing the apparatus of Figure 3 in an assembled state;

Figure 5 is a perspective view showing a grill of the apparatus of Figure 3 separated therefrom;

Figure 6 is a cross-section taken on the line V-V of Figure 4;

Figure 7 is a cross-section taken on the line VI-VI of Figure 4; and

20 Figure 8 is a perspective view showing the cyclone-type dust collecting apparatus mounted in a vacuum cleaner.

Referring to the drawings, Figures 3 to 7 show a cyclone-type dust collecting apparatus 100 for a vacuum cleaner, the apparatus comprising a cyclone body 110, a 25 dust-collecting container 120, a grill assembly 130 and a fine dust filter 140.

The cyclone body 110 is cylindrical and has a closed upper end. The cyclone body 110 also has a vortex chamber 110a (see Figure 6) at its lower end, and a pressure drop chamber 110b between the filter 140 and the vortex chamber. The vortex chamber 30 110a is formed with an air inlet port 111, and the pressure drop chamber 110b is formed with an air outlet port 112. The air inlet port 111 is disposed so that air is introduced along an inner surface of the vortex chamber 110a in a tangential direction, and the air

outlet port 112 is disposed in the same direction as the air inlet port 111. As shown in Figure 8, when the cyclone-type dust collecting apparatus 100 is disposed in a main body 200 of the vacuum cleaner, the air inlet port 111 is connected with an air inlet path 210 which is formed in the main body so as to communicate with a suction brush 300.

5 The air outlet port 112 is connected with an air outlet path 220 which is formed in the main body 200, and communicates with a motor drive chamber 310. Air introduced through the suction brush 300 and containing dust enters the air inlet path 210 of the main body 200 and the air inlet port 111, and flows into the cyclone body 110. Clean air, from which dust is separated by centrifugal force in the cyclone body 110, is then
10 exhausted through the air outlet port 112, the air outlet path 220 of the main body 200 and the motor drive chamber 310 to the outside.

The dust-collecting container is removably coupled to the lower end of the cyclone body 110, so as to collect the dust separated by the centrifugal force of the vortex
15 current.

The grill 130 is disposed upstream of the air outlet port 112 in the cyclone body 110, so as to prevent a backflow of the dust separated from the air. The grill 130 (see Figure 3) comprises a grill body 131, a plurality of paths 132 formed at the grill body so as
20 communicate with the air outlet port 112, and a dust-preventing member 133 disposed at the lower end of the grill body. The grill 130 is removably disposed in the cyclone body 110 by means of a plurality of protrusions (not shown) formed at an outer surface of the grill body 131 and complementary latching grooves (not shown) formed at an inner surface of the vortex chamber 110a of the cyclone body 110. A packing member
25 134 is provided at the outer surface of the grill body 131, the packing member constituting a seal between the grill body and the inner surface of the vortex chamber 110a.

The filter 140 is disposed at a downstream portion of the grill 130 in the cyclone body
30 110 so as to filter and collect the fine dust passing through the paths 132 of the grill, thereby preventing the fine dust flowing back together with the air and being exhausted

to the outside, and increasing the dust collecting efficiency of the cyclone-type dust collecting apparatus.

5 The filter 140 is provided with a filter assembly 142, which is mounted within a filter mounting portion 141 provided in the pressure drop chamber 110b of the cyclone body 110. The filter mounting portion 141 has a plurality of upper and lower through-holes and a front opening. The filter assembly 142 is detachably disposed, in the manner of a drawer, in the filter mounting portion 141 through the front opening (see Figure 3). The filter assembly has a filter case 143 and a fine filter 144. A packing member 145 is
10 provided on the filter case 143 (see Figure 6) where it contacts the front opening, the packing member constituting a seal against the front opening. A handle 146 is provided at a front face of the filter case 143. The fine filter 144 may be, for example, a sponge or a non-woven fabric.

15 A path forming member 114 is provided in the pressure drop chamber 110b of the cyclone body 110, the path forming member 114 forming an air outlet guide path 113 (see Figure 7) through which the air containing the fine dust passing through the grill 130 flows from the upstream portion towards the downstream portion of the filter 140, and is then exhausted through the air outlet port 112. The filter mounting portion 141 is
20 integrally formed at an upper portion of the path forming member 114.

As shown in Figure 8, the cyclone-type dust collecting apparatus 100 is disposed in the main body 200 of the vacuum cleaner so that the air inlet port 111 and the air outlet port 112 of the cyclone body 110 are respectively connected with the air inlet path 210 and
25 the air outlet path 220 of the main body.

When starting a cleaning operating, a suction force is generated at the suction brush 300 due to operation of a motor (not shown) in the motor drive chamber 310. Air containing dust on a surface of an object to be cleaned is introduced through the suction
30 brush 300, the air inlet path 210 and the air inlet port 111 into the vortex chamber 110a of the cyclone body 110 due to the suction force. The dust contained in the air is separated by the centrifugal force of the vortex current in the vortex chamber 110a, and

is then collected in the dust-collecting container 120. The air is then introduced through the paths 132 of the grill 130 into the pressure drop chamber 110b of the cyclone body 110. At this time, the air flows along the air outlet guide path 113 provided in both sides of the pressure drop chamber 110b by the path forming member 114 as shown by the arrows of Figure 7, and then flows from the upper portion towards the lower portion of the filter 140, and is finally exhausted through the air outlet port 112 to the outside. As described above, the fine dust which is not collected by the grill 130 during the flow of the air is filtered and collected by the fine filter 144 of the filter 140, and thus only the purified air is exhausted to the outside.

10

According to the present invention as described above, since the fine dust contained in the air is filtered and collected by the fine filter 144 which is disposed downstream of the grill 130, fine dust is prevented from being exhausted together with the air to the outside, thereby increasing the dust collecting and cleaning efficiency of the vacuum cleaner.

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Moreover, the cyclone-type dust collecting apparatus 100 of the present invention has a structure such that air passes from an upper portion of the fine filter 144 towards a lower portion of the fine filter, thereby facilitating removal of the fine dust. That is, the filter 140 has a structure such that air is passed from the lower portion of the fine filter 144 towards the upper portion of the fine filter. In this case, however, since the dust collecting on a lower surface of the fine filter 144, when disassembling the filter 140 to remove the collected fine dust, the dust may be dropped on a floor, thereby contaminating the floor.

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Claims

1. A cyclone-type dust collecting apparatus for a vacuum cleaner, the apparatus comprising:
 - 5 a cyclone body having an air inlet port and an air outlet port, for forming a vortex current of dust-containing air which is introduced through the air inlet port;
a dust-collecting container removably coupled to the cyclone body so as to collect the dust separated by the centrifugal force of the vortex current in the cyclone body;
a grill disposed at an upstream portion of the air outlet port in the cyclone body to
10 prevent air from flowing back through the air outlet port; and
a filter disposed at a downstream portion of the grill in the cyclone body to collect fine dust which passes through the grill.
2. Apparatus as claimed in claim 1, wherein the cyclone body comprises a vortex
15 chamber formed with the air inlet port, a pressure drop chamber formed with the air outlet port, and a path forming member defining an air outlet guide path along which air containing fine dust passed through the grill flows from an upstream portion towards a downstream portion of the filter, and is then exhausted through the air outlet
20 port.
3. Apparatus as claimed in claim 2, wherein the filter comprises a filter mounting
portion formed at an upper end of the path forming member and having a front opening and a plurality of upper and lower through holes for connecting the air outlet guide path and the air outlet port, and a filter assembly detachably coupled to the filter mounting
25 portion.
4. Apparatus as claimed in claim 3, wherein the filter assembly is slidably
mounted within the filter mounting portion.
- 30 5. Apparatus as claimed in claim 3 or claim 4, wherein the filter assembly comprises a filter case having a shape corresponding to the size and structure of the filter mounting portion, and a fine filter disposed in the filter case.

6. Apparatus as claimed in claim 5, wherein the fine filter is a sponge.
7. Apparatus as claimed in claim 5 or claim 6, further comprising a packing
5 member disposed in a portion of the filter case, the packing member being in contact with the front opening.
8. Apparatus as claimed in any one of claims 5 to 7, further comprising a handle provided at a front face of the filter case.

Amendments to the claims have been filed as follows

Claims

1. A cyclonic dust-collecting apparatus for a vacuum cleaner, the apparatus comprising:
 - 5 a cyclone body having an air inlet port and an air outlet port, the cyclone body defining a vortex chamber for forming a vortex current of dust-containing air which is introduced through the air inlet port;
 - a dust-collecting container removably coupled to the cyclone body so as to collect the dust separated by the centrifugal force of the vortex current; a grille
 - 10 disposed upstream of the air outlet port in the cyclone body, the grille being provided with means for preventing the backflow of dust; and
 - a filter disposed downstream of the grille in the cyclone body to collect fine dust which passes through the grille;
 - wherein the vortex chamber is provided with the air inlet port, and the cyclone
 - 15 body further defines a pressure drop chamber which is provided with the air outlet port, and wherein the cyclone body is provided with a path-forming member defining an air outlet guide path along which air containing fine dust passed through the grille flows to the filter for flow through the filter and exhaustion through the air outlet port.
- 20 2. Apparatus as claimed in claim 1, wherein the filter is positioned within the cyclone body at the opposite side of the air outlet port to the grille, and the path-forming member is such that the air outlet guide path terminates at that surface of the filter remote from the air outlet port.
- 25 3. Apparatus as claimed in claim 2, wherein the filter comprises a filter mounting portion formed at an upper end of the path forming member and having a front opening and a plurality of upper and lower through holes for connecting the air outlet guide path and the air outlet port, and a filter assembly detachably coupled to the filter mounting portion
- 30 4. Apparatus as claimed in claim 3, wherein the filter assembly is slidably mounted within the filter mounting portion.

5. Apparatus as claimed in claim 3 or claim 4, wherein the filter assembly comprises a filter case having a shape corresponding to the size and structure of the filter mounting portion, and a fine filter disposed in the filter case.
5
6. Apparatus as claimed in claim 5, wherein the fine filter is a sponge.
7. Apparatus as claimed in claim 5 or claim 6, further comprising a packing member disposed in a portion of the filter case, the packing member being in contact
10 with the front opening.
8. Apparatus as claimed in any one of claims 5 to 7, further comprising a handle provided at a front face of the filter case.



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Application No: GB 0317873.8
Claims searched: 1-8

Examiner: Rhodri Evans
Date of search: 26 January 2004

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	GB2389034 A (Samsung) figure 2, grill 350, filter 360 and air outlet 373.
X	1	WO 02/078506 A1 (Polar) figure 2, filter 40 and outlet 62.
X	1	WO 02/078505 A2 (GBD) figure 5, grill F, filter 40 and outlet 62.
X	1	US 20030066273 A1 (Choi) figure 2, grill 110, filter 132, outlet 22.
X	1	US 6269518 B1 (Yung) figure 9, filter 80, outlet 84.

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^w:

A4F; B2P

Worldwide search of patent documents classified in the following areas of the IPC⁷:

A47L; B01D

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

WPI, EPODOC, PAJ