Abstract Title: Sloped upper wall of cyclone inflow channel

A cyclone apparatus, has a cyclone 21 which is internal to a dust collecting chamber 10, and in which the upper face 25a of an inflow channel to the cyclone 21 is sloped, such that material being processed in the dust collecting chamber 20 does not gather there, but rather, slides off due to gravity. The cyclone 21 may be off centred or eccentrically disposed within the dust collecting chamber 10. The cyclone 21 may form part of the exterior wall of the collecting chamber 10, and the assembly may be used in a vacuum cleaner.
FIG. 1
DUST-SEPARATING APPARATUS

This invention relates to a vacuum cleaner, and in particular to a dust-separating apparatus for a vacuum cleaner.

A vacuum cleaner draws in dust-carrying air from a surface to be cleaned through a nozzle unit. Such a vacuum cleaner includes a dust-separating apparatus to separate dust from the air drawn in from the surface to be cleaned and to collect the dust therein.

A dust-separating apparatus of a vacuum cleaner often uses a cyclonic separator that whirls drawn-in air in a cyclone, and separates dust from the air by centrifugal forces. Such a cyclonic separator does not require a dust bag to collect dust separated from the drawn-in air, but instead uses a dust-collecting receptacle to collect the dust. The cyclonic separator is located substantially in the centre of the dust-collecting receptacle.

In this case, however, the dust-collecting receptacle requires an additional capacity that compensates for the volume occupied by the cyclone. This increase in the capacity of the dust-collecting receptacle results in a large dust-separating apparatus.

Also, the dust-separating apparatus of the prior art has a problem in that some of the dust whirled by the cyclone and floating into the dust-collecting receptacle does not drop, and piles up on an upper surface of an inflow channel through which the drawn-in air flows into the cyclone. Consequently, the dust separated from the drawn-in air
is not all collected is the dust-collecting receptacle, and so the dust-collecting efficiency deteriorates.

An aim of the invention is to provide a dust-separating apparatus for a vacuum cleaner which is compact in configuration.

Another aim of the invention is to provide a dust-separating apparatus for a vacuum cleaner which prevents whirled dust from piling up on an upper surface of an inflow channel, thereby improving dust-collecting efficiency.

The present invention provides an apparatus, wherein the dust-collecting receptacle is configured so as to be removably mounted on a cleaner body with a region thereof protruding from the cleaner body; and wherein the cyclone is partially disposed in the protruding region of the dust-collecting receptacle.

Advantageously the apparatus, wherein the dust-collecting receptacle is configured so as to be removably mounted on a cleaner body with a region thereof protruding from the cleaner body; and wherein the cyclone is partially disposed in the protruding region of the dust-collecting receptacle. Part of the cyclone may form an apparatus, wherein part of the cyclone forms part of the exterior of the dust-collecting receptacle.

Preferably, the apparatus, wherein the dust-collecting receptacle has an upper cover provided at an upper portion thereof for selectively opening and closing the dust-collecting receptacle; and wherein a handle is formed on the upper cover.
In a preferred embodiment the dust-separating apparatus for a vacuum cleaner, the
dust-separating apparatus comprising: means for collecting dust; and a cyclone
eccentrically disposed in the means for collecting dust, and adapted to whirl air drawn
in through an inflow channel; wherein the inflow channel has an upper surface which
is inclined at a predetermined angle, downwards towards the bottom of the means for
collecting dust.

Conveniently, the apparatus, wherein the inflow channel is formed along an inner
surface of the dust-collecting receptacle.

Preferably, the apparatus a, wherein the cyclone comprises: a cyclone body having an
inlet in fluid communication with the inflow channel, and an outlet in fluid
communication with a discharge channel through which air separated from dust is
discharged; a first, spiral-shaped guide formed at a side of the inlet for whirling
drawn-in air; a second guide formed on an upper portion of the cyclone body and
facing the outlet for whirling the drawn-in air; and a grille disposed at the outlet for
filtering the air.

The invention also provides a dust-separating apparatus for a vacuum cleaner, the
apparatus comprising: a dust-collecting receptacle adapted to collect dust; a cyclone
disposed in the dust-collecting receptacle, the cyclone comprising an inlet for drawn-
in air and an outlet, and adapted to separate dust from the drawn-in air; and an inflow
channel which has an upper surface formed which is inclined, at a predetermined
angle, downwards towards the bottom of the dust-collecting receptacle, the inflow
channel, being such as to guide the drawn-in air into the inlet, wherein part of the cyclone forms part of the exterior of the dust-collecting receptacle.

The invention further provides a dust-separating apparatus for a vacuum cleaner, the dust-separating apparatus comprising: means for collecting dust; and a cyclone eccentrically disposed in the means for collecting dust, and adapted to whirl air drawn in through an inflow channel; wherein the inflow channel has an upper surface which is inclined at a predetermined angle, downwards towards the bottom of the means for collecting dust.

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

FIG. 1 is a perspective view of a dust-separating apparatus for a vacuum cleaner, the apparatus being constructed according to the present invention;

FIG. 2 is a cross section taken on the line II-II of FIG. 1;

FIG. 3 is a cross section taken on the line III-III of FIG. 1; and

FIG. 4 is a plan view of the dust-separating apparatus of FIG. 1 mounted on a vacuum cleaner body, with a cover of the apparatus removed.

In the following description, the same drawing reference numerals are used for the same elements in the different figures. The matters defined in the description, such as the detailed construction and elements, are provided to assist in a comprehensive understanding of the invention. Thus, it is apparent that the exemplary embodiment of the invention can be carried out without all this specifically-defined matter. Also,
well-known functions or constructions are not described in detail, since they would obscure the invention with unnecessary detail.

Referring to the drawings, FIGS. 1 to 3 show a dust-separating apparatus 2 for a vacuum cleaner, the apparatus including a dust-collecting receptacle 10 and a cyclone 20.

The dust-collecting receptacle 10, (see Figure 2), has a space where dust separated from air drawn in from the outside is collected; and, it is removably mounted (see Figure 4) on a cleaner body 1. The dust-collecting receptacle 10 is mounted on a depression 1a of the cleaner body 1, and partially protrudes from the cleaner body.

For the convenience of explanation, a region of the dust-collecting receptacle 10 that is concealed by the cleaner body 1 is referred to as a “back portion B”, and a region that protrudes from the cleaner body 1 is referred to as a “front portion F”.

The cleaner body 1 includes various elements such as a suction motor (not shown) and a nozzle unit (not shown) which is required to draw in dust-carrying air from a surface to be cleaned. The configuration of this cleaner body 1 will be understood from the well-known art, and so a detailed description and illustration thereof will be omitted.

The dust-collecting receptacle 10 has an upper cover 11 and a lower cover 12 which are, respectively, connected to an upper portion and a lower portion of the receptacle by hinges H.
The upper cover 11 is located on, and forms an upper surface of, the upper portion of the dust-collecting receptacle 10. The upper cover 11 can be opened to access the dust-collecting receptacle 10 for the purpose of maintenance and repair.

A handle 13 is formed on the upper cover 11. The handle 13 is inclined at a predetermined angle, as shown in FIG. 2, and also has a concave shape on its upper surface. Consequently, floating dust does not pile up on the handle 13, and drops down under gravity. The handle 13 is easy to grip.

The lower cover 12 forms the base of the dust-collecting receptacle 10, and can be opened to allow dust to be discharged from the receptacle.

As shown in FIG. 2, the cyclone 20 is eccentrically disposed at one side in the dust-collecting receptacle 10, and whirls the air flowing in through an inlet 21a to separate dust from the air using a centrifugal force.

The cyclone 20 includes a cyclone body 21, a first guide 22 and a second guide 23, and a grille 24.

As shown in FIGS. 2 and 4, the cyclone body 21 is disposed towards the front portion F of the dust-collecting receptacle 10, and forms part of the exterior of the dust-collecting receptacle 10. More specifically, the front portion of the cyclone body 21 is exposed to the outside, back portion of the cyclone body lies within the dust-collecting receptacle 10.
Accordingly, the exposed front portion of the cyclone body 21 forms part of the exterior of the dust-separating apparatus 2.

As described above, the cyclone body 21 is disposed towards the front portion F of the dust-collecting receptacle 10, so as to provide a collecting space for the dust-collecting receptacle 10 and also to provide an extra installing area for the cyclone 20. This is to be contrasted with the prior art, where a cyclone body is located in the centre of a dust-collecting receptacle.

The cyclone body 21 includes the inlet 21a, which is connected to an inflow channel 25 through which the draw-in air flows, and an outlet 21b which is connected to a discharge channel 26, through which air separated from dust by the cyclone 20 is discharged to the outside.

As shown in FIG. 4, the inflow channel 25 is formed along an inner surface of the dust-collecting receptacle 10, and is connected to the inlet 21a formed under the cyclone body 21. As shown in FIGS. 2 and 3, the inflow channel 25 has an upper surface 25a which is inclined, at a predetermined angle, towards the base of the dust-collecting receptacle 10, where the dust drops under gravity, i.e. towards the lower cover 12. Because of the inclined surface 25a of the inflow channel 25, dust discharged from the cyclone body 21 will not pile up on the upper surface of the inflow channel 25, and instead will smoothly drop down to the bottom of the dust-collecting receptacle 10.
As shown in FIGS. 2 and 4, the discharge channel 26 fluidly communicates with the outlet 21b disposed substantially in the centre of the cyclone body 21, and discharges the air separated from the air therethrough. The first guide 22 is formed adjacent to the inlet 21a in a spiral pattern to whirl of the air flowing in through the inlet 21a. The second guide 23 is formed under the upper cover 11 facing the outlet 21b, and guides the whirling of the drawn-in air. The grille 24 filters the air prior to discharging it through the discharge channel 26.

The dust-separating operation of the dust-separating apparatus 2 will now be described with reference to FIGS. 1 to 4.

When the dust-separating apparatus 2 is mounted on the depression 1a of the cleaner body 1, as shown in FIG. 4, dust-carrying air is drawn in from a surface to be cleaned through the inflow channel 25 by a suction force generated in the cleaner body.

More specifically, as shown in FIG. 2, the air drawn in through the inflow channel 25 flows into the cyclone body 21 through the inlet 21a. The drawn-in air forms a cyclone due to the first and the second guides 22 and 23 of the cyclone body 21, such that the air and the dust are separated from each other due to centrifugal forces.

The dust separated from the air in the cyclone body 21 is discharged to the dust-collecting receptacle 10. The dust discharged from the cyclone body 21 drops under gravity, and is collected on the lower cover 12 of the dust-collecting receptacle 10. The dust smoothly drops down along the inclined surface 25a.
The air separated from the dust in the cyclone body 21 is filtered by the grille 24, and is then discharged to the outside through the discharge channel 26. The dust separated and collected on the bottom of the dust-collecting receptacle 10 is discharged from the dust-collecting receptacle 10 by opening the lower cover 12.

The dust-separating apparatus has the cyclone 20 disposed in the region of the dust-collecting receptacle 10 which protrudes from the cleaner body 1, and forms part of the exterior of the dust-collecting receptacle. Accordingly, there will always be space for the dust-collecting receptacle 10 and space for the cyclone 20 in the dust-separating apparatus 2, even if it has a small capacity. Consequently, a compact dust-separating apparatus 2 is provided.

Also, the upper surface 25a of the inflow channel 25, through which the drawn-in air flows into the cyclone 20, is inclined towards the bottom of the dust-collecting receptacle 10, preventing dust from piling up on that upper surface. Consequently, the dust-collecting efficiency of the dust-collecting receptacle 10 is improved.

The foregoing exemplary embodiment and advantages are merely exemplary, and are not to be construed as limiting the present invention. The present invention can be readily applied to other types of apparatus. Also, the description of the exemplary embodiment of the 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 dust-separating apparatus for a vacuum cleaner, the dust-separating apparatus comprising of:

   a dust-collecting receptacle adapted to collect dust; and

   a cyclone eccentrically disposed in the dust-collecting receptacle, and adapted to whirl air drawn in through an inflow channel;

   wherein the inflow channel has an upper surface which is inclined, at a predetermined angle, downwards towards the bottom of the dust-collecting receptacle.

2. Apparatus as claimed in claim 1, wherein the dust-collecting receptacle is configured so as to be removably mounted on a cleaner body with a region thereof protruding from the cleaner body; and

   wherein the cyclone is partially disposed in the protruding region of the dust-collecting receptacle.

3. Apparatus as claimed in claim 2, wherein part of the cyclone forms part of the exterior of the dust-collecting receptacle.

4. Apparatus as claimed in any one of claims 1 to 3, wherein the dust-collecting receptacle has an upper cover provided at an upper portion thereof for selectively opening and closing the dust-collecting receptacle; and

   wherein a handle is formed on the upper cover.
5. Apparatus as claimed in any one of claims 1 to 4, wherein the dust-collecting receptacle has a lower cover provided at a lower position thereof and for selectively opening and closing the receptacle to discharge collected dust.

6. Apparatus as claimed in any one of claims 1 to 5, wherein the inflow channel is formed along an inner surface of the dust-collecting receptacle.

7. Apparatus as claimed in any one of claims 1 to 6, wherein the cyclone comprises:

- a cyclone body having an inlet in fluid communication with the inflow channel, and an outlet in fluid communication with a discharge channel through which air separated from dust is discharged;
  - a first, spiral-shaped guide formed at a side of the inlet for whirling drawn-in air;
  - a second guide formed on an upper portion of the cyclone body and facing the outlet for whirling the drawn-in air; and
  - a grille disposed at the outlet for filtering the air.

8. A dust-separating apparatus for a vacuum cleaner, the apparatus comprising:

- a dust-collecting receptacle adapted to collect dust;
- a cyclone disposed in the dust-collecting receptacle, the cyclone comprising an inlet for drawn-in air and an outlet, and adapted to separate dust from the drawn-in air; and
an inflow channel which has an upper surface formed which is inclined, at a
predetermined angle, downwards towards the bottom of the dust-collecting receptacle,
the inflow channel being such as to guide the drawn-in air into the inlet,
wherein part of the cyclone forms part of the exterior of the dust-collecting
receptacle.

9. Apparatus as claimed in claim 8, wherein the inflow channel is formed
along an inner surface of the dust-collecting receptacle.

10. Apparatus as claimed in claim 8 or claim 9, wherein the cyclone is
eccentrically disposed in the dust-collecting receptacle.

11. Apparatus as claimed in claim 10, wherein the dust-collecting
receptacle is configured so as to be removably mounted on a cleaner body with a
region thereof protruding from the cleaner body; and
wherein the cyclone is partially disposed in the protruding region of the dust-
collecting receptacle.

12. Apparatus as claimed in any one of claims 8 to 11, wherein the dust-
collecting receptacle has an upper cover provided at an upper portion thereof for
selectively opening and closing the dust-collecting receptacle; and
wherein a handle is formed on the upper cover.
13. Apparatus as claimed in any one of claims 8 to 12, wherein the dust-collecting receptacle has a lower cover provided at a lower portion thereof for selectively opening and closing the receptacle to discharge collected dust.

14. Apparatus as claimed in any one of claims 8 to 13, wherein the cyclone further comprises:

   a first spiral-shaped guide formed at a side of the inlet for whirling the drawn-in air;

   a second guide formed on an upper portion of the cyclone body and facing the outlet for whirling the drawn-in air; and

   a grille disposed at the outlet for filtering the air.

15. A dust-separating apparatus for a vacuum cleaner, the dust-separating apparatus comprising:

   means for collecting dust; and

   a cyclone eccentrically disposed in the means for collecting dust, and adapted to whirl air drawn in through an inflow channel;

   wherein the inflow channel has an upper surface which is inclined at a predetermined angle, downwards towards the bottom of the means for collecting dust.

16. A dust-separating apparatus substantially as hereinbefore described with reference to, and as illustrated by, the drawings.

17. A vacuum cleaner substantially as hereinbefore described with reference to, and as illustrated by, the drawings.
Application No: GB0813857.0
Examiner: Mr Michael Young
Claims searched: 1-17
Date of search: 28 November 2008

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

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Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X: [details not visible]

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

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International Classification:

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