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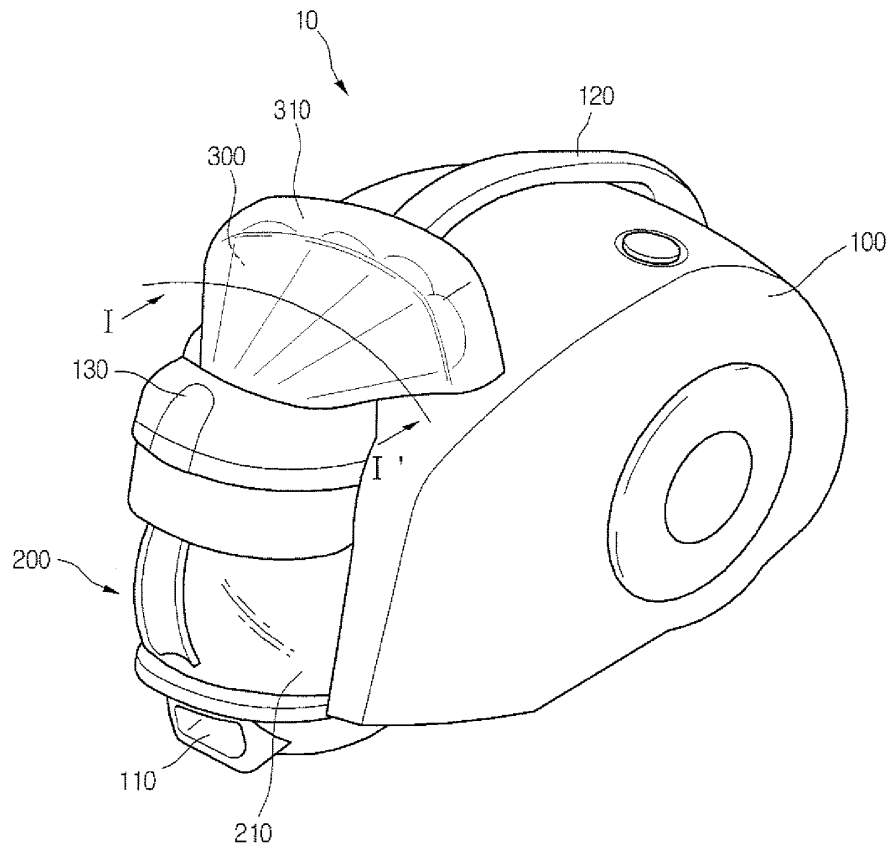
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(54) **Vacuum cleaner having decreased noise and vibration**

(57) A vacuum cleaner includes a main body; a cyclone dust separation unit provided on the main body; and a cover installed on the main body and covering at

least a portion of the cyclone dust separation unit for reducing noise generated from the cyclone dust separation unit.

Fig.1



Description

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a vacuum cleaner, and more particularly, to a vacuum cleaner for lowering noise and vibration that are generated during the separation of dusts in a cyclone dust separation unit.

Description of the Related Art

[0002] Generally, a vacuum cleaner is a device that can suck air containing dusts using suction generated by a motor mounted in a main body and filter off the dusts in a dust filtering unit.

[0003] The vacuum cleaner is classified into a canister type and an upright type. The canister type vacuum cleaner includes a main body and a suction nozzle connected to the main body by a connection pipe. The canister type vacuum cleaner includes a main body and a suction nozzle integrally formed with the main body.

[0004] Meanwhile, in recent years, a cyclone type vacuum cleaner that can separate dusts using a cyclone principle and collect the separated dusts in a dust collection unit. In order to separate the dusts using the cyclone principle, a plurality of cyclone units are provided in the dust collection unit.

[0005] The following will describe the conventional cyclone type vacuum cleaner.

[0006] When suction is generated by a suction generation unit, the air containing the dusts is sucked into the suction nozzle and is then directed into a main body through an extending pipe. The dusts contained in the sucked air are directed into the dust collection unit along a passage and spirally rotate along an inner wall of the cyclone unit.

[0007] During the above procedure, the air and the dusts receive different centrifugal forces due to weight differences between them and thus are separated from each other. The separated dusts are collected in the dust collection unit and the air separated from the dusts is discharged to an external side through a discharge portion formed on a side of the main body.

[0008] As described above, the air containing the dusts is sucked from an external side into the cyclone unit by the suction generated by a vacuum motor and separated from the dusts, in the course of which noise and vibration may be generated by, for example, the airflow.

[0009] However, no unit for reducing the noise and vibration is provided to the conventional vacuum cleaner. Therefore, the user is displeased with the noise and vibration.

SUMMARY OF THE INVENTION

[0010] Accordingly, the present invention is directed

to a vacuum cleaner that substantially obviate one or more problems due to limitations and disadvantages of the related art.

[0011] An object of the present invention is to provide a vacuum cleaner for lowering noise and vibration that are generated during the separation of dusts in a cyclone dust separation unit.

[0012] Another object of the present invention is to provide a vacuum cleaner that can solve the displeasure of the user by lowering noise and vibration that are generated in the dust separation unit.

[0013] 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.

[0014] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, there is provided a vacuum cleaner including: a main body; a cyclone dust separation unit provided on the main body; and a cover installed on the main body and covering at least a portion of the cyclone dust separation unit for reducing noise generated from the cyclone dust separation unit.

[0015] According to the present invention, since the outer circumference of the cyclone separation unit having a plurality of the small cyclones is at least partly enclosed by the cover member, noise and vibration generated during the dust separation process in the cyclone separation unit can be lowered.

[0016] Furthermore, since the cover member is spaced apart from the cyclone separation unit, a space is defined between the cover member and the cyclone separation unit and thus the noise and vibration cannot be propagated to an external side by the space.

[0017] 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

[0018] 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:

Fig. 1 is a perspective view of a vacuum cleaner having a dust separation device according to an embodiment of the present invention;

Fig. 2 is a sectional view taken along line I-I' of Fig. 1;

Fig. 3 is a sectional view taken along line I-I' according to another embodiment of the present invention; and

Fig. 4 is a sectional view taken along line I-I' according to still another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] 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.

[0020] Fig. 1 is a perspective view of a vacuum cleaner having a dust separation device according to an embodiment of the present invention.

[0021] Referring to Fig. 1, a vacuum cleaner 10 includes a main body 100 and a dust separation device for separating and storing dusts contained in air sucked into the main body 100.

[0022] A suction nozzle (not shown) for sucking the air containing the dusts and a connection pipe for connecting the suction nozzle to the main body 100.

[0023] Since the basic structure of the suction nozzle and the connection pipe are identical to those of the conventional art, the detailed description thereof will be omitted herein.

[0024] A main body suction portion 110 communicating with the suction nozzle is formed on a front-lower portion of the main body 100. A main body discharge portion (not shown) through which the air whose dusts are separated is formed on a side of the main body 100.

[0025] A main body handle is formed on a top of the main body 100 for the user convenience.

[0026] The dust separation device includes a dust collection unit for storing the dusts contained in the air and a cyclone separation unit 300 for separating the dusts contained in the air sucked into the main body 100 using a cyclone principle. The cyclone separation unit 300 is provided in the main body 100.

[0027] The dust collection unit 200 is detachably mounted on a front portion of the main body 100. At this point, in order to detachably mount the dust collection unit 200 on the main body 100, a mounting/dismounting lever 130 is provided on a front-upper portion of the main body 100.

[0028] Here, the dust collection unit 200 functions to store the dusts separated by the cyclone separation unit 300 and to primarily separate the dusts from the air introduced into the cyclone separation unit 300 using the cyclone principle.

[0029] Therefore, the dust collection unit 200 includes a dust collection body 210 generating the cyclone current and provided with a dust storing portion in which the dusts separated by the cyclone current are stored.

[0030] Therefore, in the present embodiment, the dust

collection body 210 becomes a primary cyclone unit and the cyclone separation unit 300 becomes a secondary cyclone unit.

[0031] In order to reduce the vibration and noise generated during the dust separation process in the cyclone separation unit 300, a cover member 310 for at least partly enclosing an outer circumference of the cyclone separation unit 300 is provided in the main body 100.

[0032] As described above, the dust collection unit 200 is detachably mounted on the main body 100 and communicates with the cyclone separation unit 300 as the dust collection unit 200 is mounted in the main body 100.

[0033] The cyclone separation unit 300 includes a plurality of cone-shaped small cyclones 301 arranged fan-wise. The cyclone separation unit 300 is provided on a front-upper portion of the main body 100. That is, the cyclone separation unit 300 is comprised of the plurality of the small cyclones 301.

[0034] A connection passage for connecting the dust collection unit 200 to the cyclone separation unit 300 is provided in the main body 100. The dusts separated at the cyclone separation unit 300 are stored in the dust collection unit 200.

[0035] Therefore, in the dust collection body 210, a dust storing portion for storing the dusts separated at the cyclone separation unit 300 are formed and separated from the dust storing portion for storing the dusts separated at the first cyclone unit.

[0036] That is, the dust storing portion formed in the dust collection body 210 may include a first dust storing portion for storing the dusts separated in the dust collection body 210 and a second dust storing portion for storing the dusts separated by the cyclone separation unit 300.

[0037] The cover member 310 is detachably provided on the main body 100.

[0038] To achieve this, the cover member 310 is provided with a coupling hook and the main body 100 is provided with a hook coupling portion interlocked with the coupling hook. However, the present invention is not limited to this.

[0039] The cover member 310 may be formed of a transparent material so that the user can identify the dust separation process in the cyclone separation unit 300. Therefore, the cyclone separation unit 300 is also formed of a transparent material.

[0040] The following will briefly described the operation of the above-described vacuum cleaner 10.

[0041] First, when electric power is applied to the vacuum cleaner 10 to operate the main body 100, suction is generated by the vacuum motor disposed in the main body 100 and thus the air containing the dusts is sucked into the suction nozzle by the generated suction. The air introduced into the suction nozzle is directed into the dust collection unit 200 along the connection tube and the passage formed in the main body 100.

[0042] When the air containing the dusts is sucked into the dust collection unit 200, the dusts contained in the air is primarily separated in the dust collection body 210.

The separated dusts are stored in the dust collection body 210. Meanwhile, the air whose dusts are primarily separated is discharged from the dust collection unit 200 and introduced into the main body 100. Then, the air is directed to the cyclone separation unit 300 along the connection passage provided in the main body 100.

[0043] The dusts still contained in the air are further separated in the cyclone separation unit 300. The separated dusts are stored in the dust collection unit 200. In addition, the air whose dusts are secondarily separated flows along a passage in the main body and is finally discharged to an external side.

[0044] Fig. 2 is a sectional view taken along line I-I' of Fig. 1.

[0045] Referring to Fig. 2, the vacuum cleaner 10 is configured to lower the vibration and noise generated during the dust separation process in the cyclone separation unit 300 using the cover member 310 at least partly enclosing the outer circumference of the cyclone separation unit 300.

[0046] The cyclone separation unit 300 includes one or more small cyclones 301 arranged in parallel. Therefore, the air discharged from the dust collection unit 200 is separated into the small cyclones 301.

[0047] In Fig. 4, although four small cyclones 301 are provided, the present invention is not limited to this.

[0048] Since the air containing the dusts flows along the inside of the dust collection unit 200 and is then introduced into the cyclone separation unit 300, it can be noted that the dust collection unit 200 and the cyclone separation unit 300 are interconnected in series.

[0049] Meanwhile, the air discharged from the dust collection unit 200 is directed to the cyclone separation unit 300 through the connection passage. Then, the air, as shown in Fig. 2, is separated at the inlet of the cyclone separation unit 300 and then introduced into the small cyclones 301. The dusts contained in the air introduced into the small cyclones 301 are separated therein.

[0050] That is, the air discharged from the dust collection unit 200 passes through the small cyclones in order but simultaneously passes through the small cyclones 301.

[0051] Therefore, it can be clearly noted that the cyclone separation unit 300 is comprised of the plurality of small cyclones 301 having identical functions are arranged in parallel.

[0052] At this point, the parallel arrangement of the small cyclones 301 includes a zigzag arrangement of the small cyclones having different sizes and shapes and a parallel arrangement of the small cyclones having different sizes and shapes. In this case, the air discharged from the dust collection unit 200 is simultaneously introduced into the small cyclones 301.

[0053] The cover member 310 is formed in a shape corresponding to the cyclone separation unit 300 to at least partly enclose the outer circumference of the cyclone separation unit 300. Accordingly, the portion of the cover member 310, which encloses the cyclone separation

unit 300, defines an outer surface of the main body 100.

[0054] Therefore, the vibration and noise generated during the dust separation process in the cyclone separation unit 300 can be interrupted by the cover member 310.

[0055] As the cover member 310 is formed in a shape corresponding to the cyclone separation unit 300, the outer appearance of the cleaner can be improved.

[0056] A predetermined space 302 may be formed between the cover member 310 and the cyclone separation unit 300 to more effectively intercept the noise and vibration generated from the cyclone separation unit 300.

[0057] That is, the noise generated from the cyclone separation unit 300 is primarily intercepted by the space 302 and secondarily intercepted by the cover member 310. Therefore, the noise intercepting effect can be enhanced.

[0058] Here, although the cover member 310 is formed in the shape corresponding to the cyclone separation unit 300, the present invention is not limited to this embodiment. The cover member may be formed in a variety of shapes.

[0059] In addition, although the cover member 310 is spaced apart from the cyclone separation unit 300, the present invention is not limited to this. That is, the cover member 310 may closely contact the cyclone separation unit 300. In this case, the vibration reduction can be further improved.

[0060] Fig. 3 is a sectional view taken along line I-I' according to another embodiment of the present invention.

[0061] Referring to Fig. 3, a cover member 310 of this embodiment encloses the cyclone separation unit 300 in a state where it is spaced apart from the cyclone separation unit 300. Therefore, a space 302 is formed between the cyclone separation unit 300 and the cover member 310.

[0062] The cover member 310 is provided at an inner surface with a plurality of noise reduction grooves 312 for reducing the noise generated during the dust separation process in the cyclone separation unit 300.

[0063] That is, sound is a longitudinal wave that returns after colliding with a wall. Therefore, when the noise generated from the cyclone separation unit 300 is directed to the noise reduction grooves 312, the noise may be confined in the noise reduction groove 312 and thus disappeared, absorbed in the noise reduction groove 312, or diffused to be compensated for each other. Therefore, the noise reduction effect can be enhanced.

[0064] According to the present embodiment, the noise is primarily reduced by the space 302 defined between the cover member 310 and the cyclone separation unit 300 and secondarily reduced by the noise reduction grooves 312. Then, the noise is thirdly reduced by the cover member 310. Therefore, the noise reduction effect can be further enhanced.

[0065] FIG. 4 is a sectional view taken along line I-I' of

FIG. 1 according to still another embodiment of the present invention.

[0066] Referring to FIG. 4, a cover member 310 according to this embodiment covers an outer portion of the cyclone separation unit 300. A noise reduction member 320 is interposed between the cover member 310 and the cyclone separation unit 300.

[0067] The noise reduction member 320 is formed in a shape corresponding to the cyclone separation unit 300 to enclose the outer circumference of the cyclone separation unit 300.

[0068] The cover member 310 covers the outer side of the cyclone separation unit 300 in a state where the noise reduction member 320 encloses the outer circumference of the cyclone separation unit 300.

[0069] The noise reduction member 320 may be formed of a sound absorption material such as a porous material or a sound shielding material for intercepting the sound.

[0070] According to this embodiment, since the noise reduction member 320 for absorbing or intercepting the noise is interposed between the cover member 310 and the cyclone separation unit 300, the noise generated from the cyclone separation unit 300 is primarily absorbed or intercepted and secondarily reduced and intercepted by the cover member 310. Furthermore, since the noise reduction member 320 is disposed to enclose the cyclone separation unit 300, the vibration generated from the cyclone separation unit 300 can be also reduced.

[0071] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention. 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.

Claims

1. A vacuum cleaner comprising:

a main body;
a cyclone dust separation unit provided on the main body; and
a cover installed on the main body and covering at least a portion of the cyclone dust separation unit for reducing noise generated from the cyclone dust separation unit.

2. The vacuum cleaner according to claim 1, wherein the cyclone dust separation unit comprises a plurality of small cyclones.

3. The vacuum cleaner according to claim 2, wherein the plurality of small cyclones is parallelly arranged.

4. The vacuum cleaner according to claim 2, wherein the plurality of small cyclones is arranged in a fan-

shape.

5. The vacuum cleaner according to claim 1, wherein the cover is formed in a shape corresponding to the cyclone dust separation unit.

6. The vacuum cleaner according to claim 1, further comprising a space formed between the cyclone dust separation unit and the cover, for reducing the noise generated from the cyclone dust separation unit.

7. The vacuum cleaner according to claim 1, further comprising a reducing unit provided between the cyclone dust separation unit and the cover, for absorbing the noise and vibration generated from the cyclone dust separation unit.

8. The vacuum cleaner according to claim 1, further comprising a plurality of noise reducing holes formed in an inner surface of the cover.

9. The vacuum cleaner according to claim 1, further comprising a dust collecting unit removably installed on the main body, for storing dust.

10. The vacuum cleaner according to claim 1, further comprising a main cyclone dust separation unit, wherein the cyclone dust separation unit includes a secondary cyclone dust separation unit, and air that enters the main body passes the main cyclone dust separation unit and then the secondary cyclone dust separation unit.

11. The vacuum cleaner according to claim 10, further comprising a dust collection body removably attached to the main body, wherein the dust collection body stores dust that is separated by the main cyclone dust separation unit and the secondary cyclone dust separation unit.

Fig.1

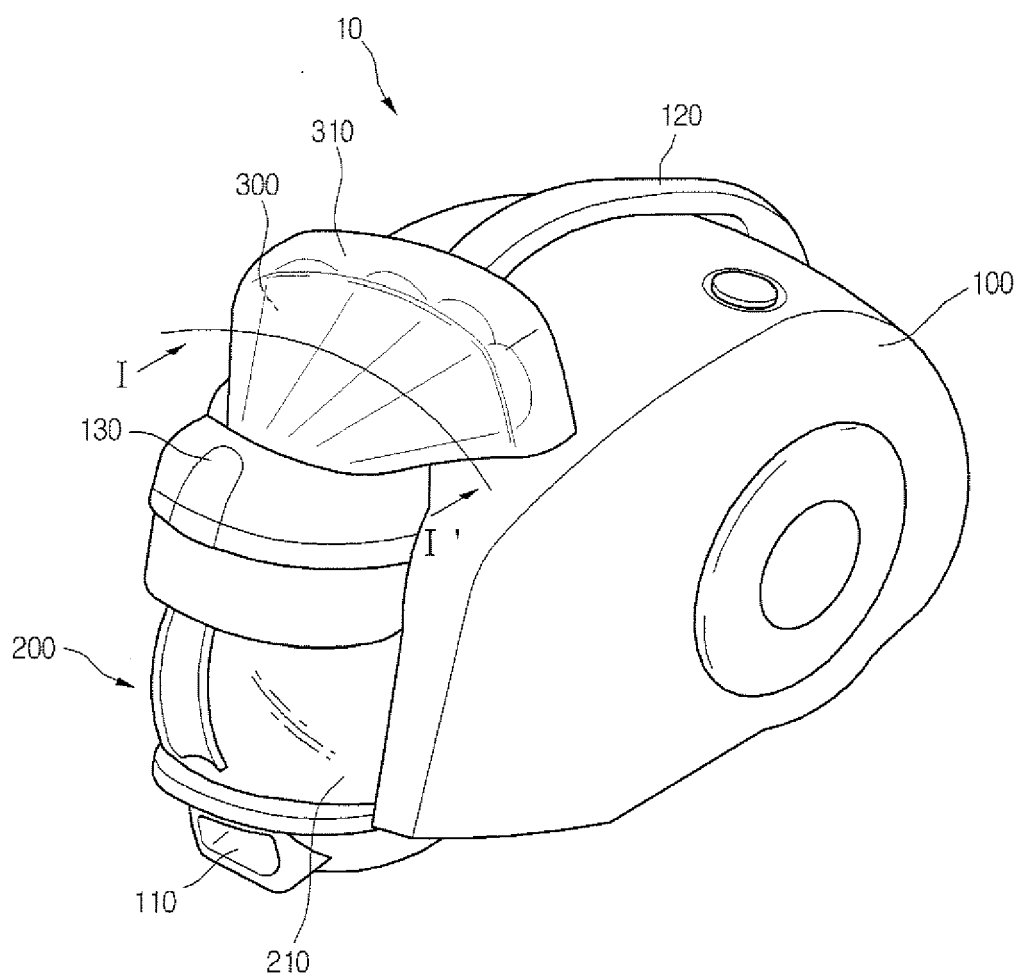


Fig.2

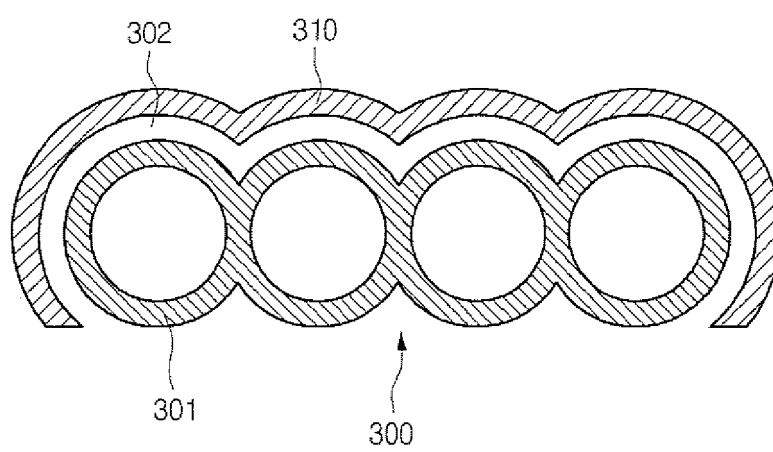


Fig.3

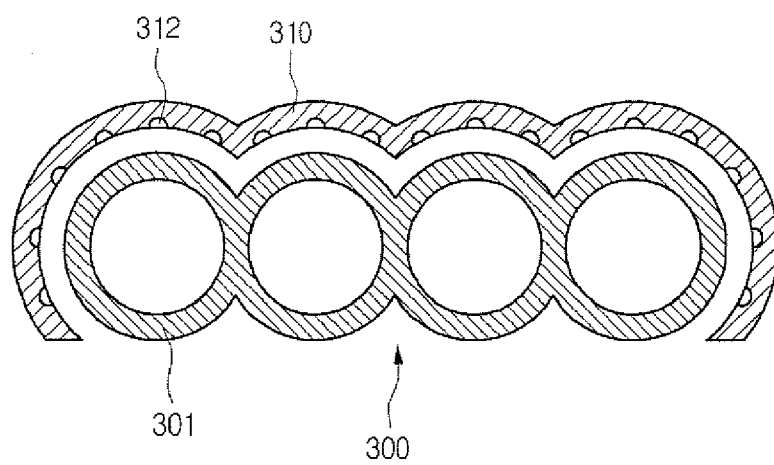


Fig. 4

