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(54) **HEAT-DISSIPATION DEVICE HAVING DUST-DISPOSAL MECHANISM**

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(57) **ABSTRACT**

A heat-dissipation device having a dust-disposal mechanism for removing dust from cooling metallic fins is provided, which includes a heat-conducting module and a dust-disposal mechanism. The heat-conducting module has a plurality of metallic fins arranged in the same direction and apart with a gap formed therebetween. The dust-disposal mechanism has a cleaning unit corresponding to the metallic fins so as to insert into the gap between the metallic fins and clear or absorb the dust accumulated on the metallic fins, thereby enhancing the cooling efficiency of the heat-conducting module.

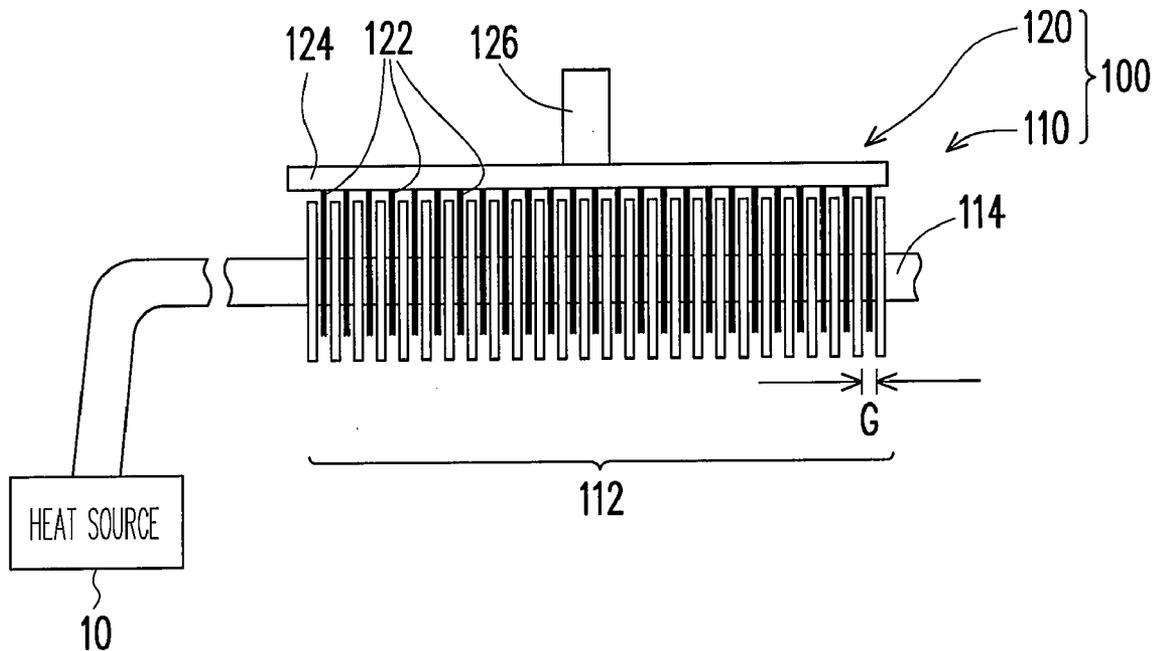
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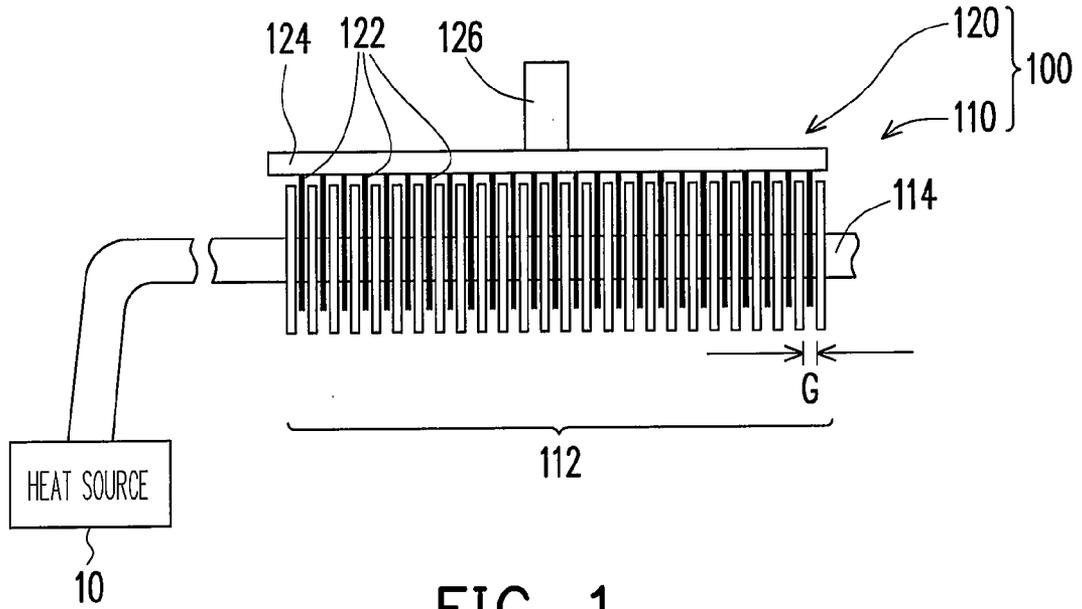


FIG. 1

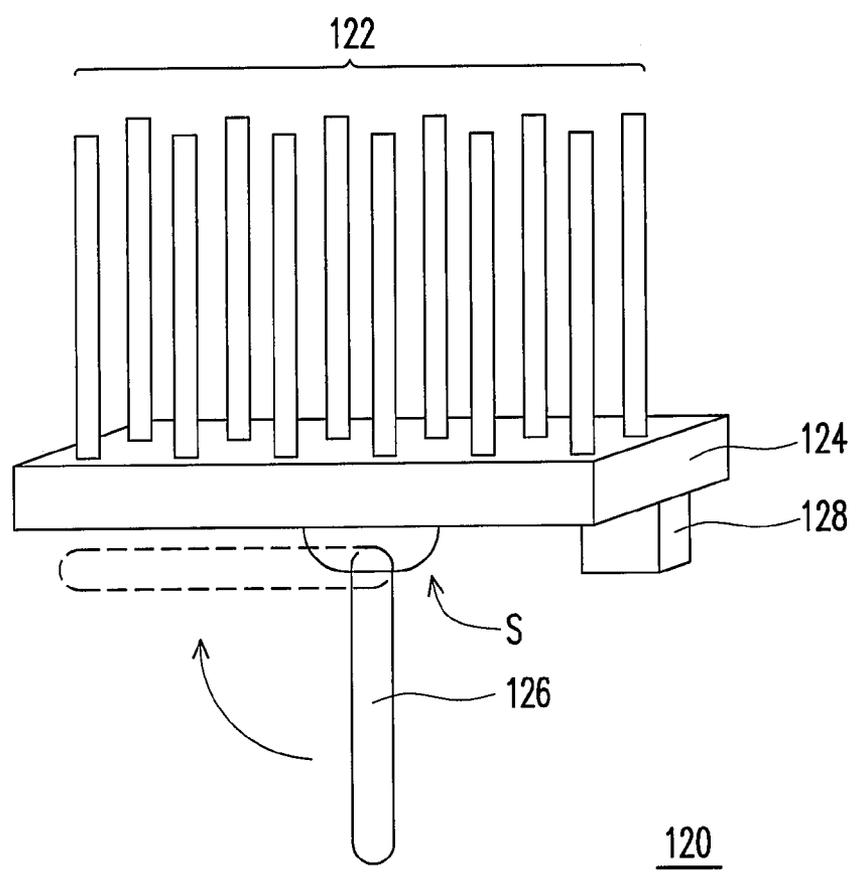


FIG. 2

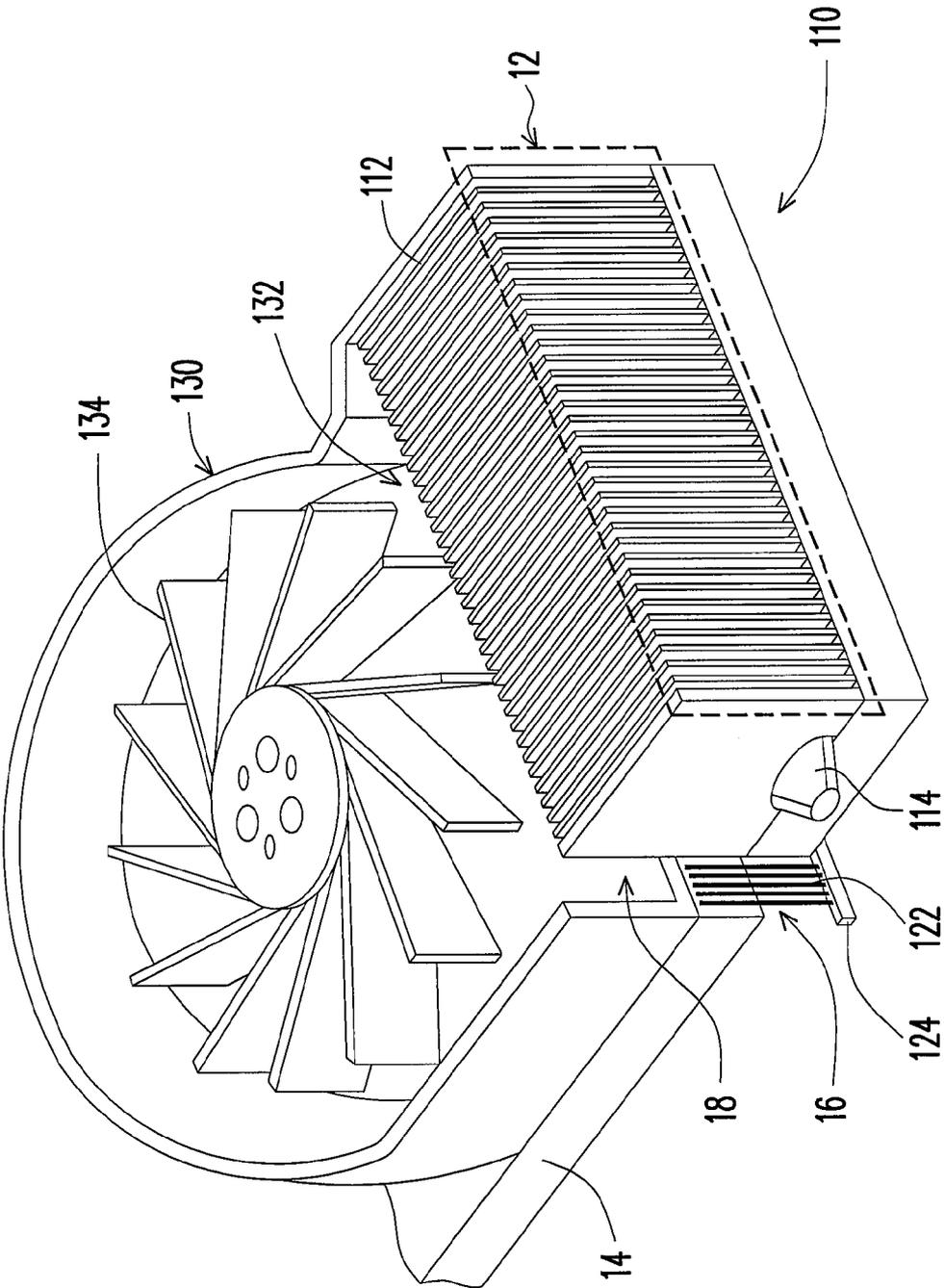


FIG. 3

HEAT-DISSIPATION DEVICE HAVING DUST-DISPOSAL MECHANISM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Taiwan application serial no. 95143314, filed Nov. 23, 2006. All disclosure of the Taiwan application is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a heat-dissipation device, and more particularly to a heat-dissipation device having a dust-disposal mechanism.

[0004] 2. Description of Related Art

[0005] Recently, with the rapid progress of computer science and technology, the operation speed of the computer is improved increasingly, and the heat-generating rate of electronic devices in the computer host is increased accordingly. In order to prevent overheat of the electronic devices in the computer host, which may result in temporary or permanent failure of electronic devices, a sufficient heat-dissipation performance must be provided for the electronic devices in the computer.

[0006] Generally speaking, a heat-dissipation device mainly includes a fan, cooling fins, and a heat pipe. The cooling fins are disposed at an air outlet of the fan, and are connected to the heat pipe, so as to absorb the waste heat conducted by the heat pipe. The cooling fins include a plurality of metallic fins arranged in the same direction with a certain gap existing between adjacent metallic fins, so as to dissipate the waste heat to air through convection. Therefore, when the fan is operating, a cooling airflow flows to the cooling fins via the air outlet and passes the gaps between the metallic fins, so as to dissipate the waste heat to the outside of the case through convection, thereby lowering the operating temperature of the internal electronic devices.

[0007] It should be noted that after the heat-dissipation device is used for a long time, dust in the air is gradually accumulated between the metallic fins of the cooling fins. If not being cleaned, excessive dust accumulated on the metallic fins may result in that the airflow blown by the fan cannot remove the waste heat from the cooling fins easily, thereby significantly reducing the heat-dissipation capability of the heat-dissipation device.

SUMMARY OF THE INVENTION

[0008] The present invention is directed to providing a heat-dissipation device having a dust-disposal mechanism that inserts between the cooling metallic fins to clear dust accumulated on the metallic fins.

[0009] The heat-dissipation device having a dust-disposal mechanism provided by the present invention comprises a heat-conducting module and a dust-disposal mechanism. The heat-conducting module comprises a plurality of metallic fins arranged in parallel and apart with a gap formed therebetween. The dust-disposal mechanism comprises a cleaning unit inserting into the gap formed between the metallic fins.

[0010] In an embodiment of the present invention, the dust-disposal mechanism further comprises a handle connected to

the cleaning unit. In addition, a pivoting portion is disposed at one end of the handle connected to the cleaning unit for a user to stretch or fold the handle.

[0011] In an embodiment of the present invention, the cleaning unit comprises a brushhead formed by a plurality of soft wipers arranged. The material of the soft wiper is, for example, fiber, cotton, or nylon.

[0012] In another embodiment of the present invention, the cleaning unit comprises a brushhead formed by a plurality of soft bristles arranged. The material of the soft bristle is, for example, fiber, cotton, or nylon.

[0013] In an embodiment of the present invention, the dust-disposal mechanism further comprises an actuator connected to the cleaning unit for providing a vibration source for the metallic fins.

[0014] In an embodiment of the present invention, the heat-conducting module further comprises at least one heat pipe with one end connected to the metallic fins and the other end connected to a heat source.

[0015] In an embodiment of the present invention, the heat-dissipation device further comprises a fan module having an air outlet corresponding to the metallic fins. In addition, an accommodating slot is disposed between the fan module and the metallic fins so as to accommodate the cleaning unit.

[0016] The present invention adopts a cleaning unit having dust-disposal function to absorb or clear the dust on the metallic fins, such that the metallic fins of the heat-conducting module can keep clean. Therefore, the airflow generated by the fan can quickly remove the waste heat from the metallic fins, thereby significantly improving the heat-dissipation capability of the heat-dissipation device.

[0017] In order to make the aforementioned and other objects, features and advantages of the present invention comprehensible, preferred embodiments accompanied with figures are described in detail below.

[0018] It is to be understood that both the foregoing general description and the following detailed description are exemplary, and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

[0020] FIG. 1 is a schematic view of a heat-dissipation device having a dust-disposal mechanism according to an embodiment of the present invention.

[0021] FIG. 2 is a schematic view of the dust-disposal mechanism in FIG. 1.

[0022] FIG. 3 is a schematic view of the arrangement of the heat-dissipation device having a dust-disposal mechanism in FIG. 1.

DESCRIPTION OF EMBODIMENTS

[0023] FIG. 1 is a schematic view of a heat-dissipation device having a dust-disposal mechanism according to an embodiment of the present invention. Referring to FIG. 1, the heat-dissipation device 100 mainly includes a heat-conducting module 110 and a dust-disposal mechanism 120, and the heat-conducting module 110 is used to dissipate heat for

electronic devices with high heat-generating rate, so as to reduce the working temperature of the electronic devices in a system. The heat-conducting module 110 is generally made of metallic material with high heat conductivity such as Cu and Al, and is disposed on the electronic devices and connected to an air-cooling heat-dissipation module or a water-cooling heat-dissipation module in the system, so as to achieve the purpose of heat-dissipation.

[0024] In this embodiment, the heat-conducting module 110 includes a plurality of metallic fins 112 arranged in parallel, and the metallic fins 112 arranged in parallel are stacked with a gap G formed therebetween, so as to increase the heat-dissipation area of the heat-conducting module 110. In addition, the heat-conducting module 110 further includes a heat pipe 114 connected between the metallic fins 112 and a heat source 10 (e.g., an integrated circuit chip). A capillary structure is provided on an inner wall of the heat pipe 114, such that the cooling water flows in the heat pipe 114 by capillary phenomenon, and the waste heat generated by the heat source 10 at one end of the heat pipe 114 is conducted to each metallic fin 112 at the other end of the heat pipe 114, so as to achieve the purpose of reducing the temperature of the heat source 10.

[0025] It should be noted that the dust-disposal mechanism 120 has a cleaning unit 122 for the heat-conducting module 110 to perform dust-disposal function, so as to absorb or clean the dust on the heat-dissipation surface of the metallic fins 112 and/or the heat pipe 114. As shown in FIG. 1, the cleaning unit 122 is, for example, a soft material of a piece shape or strip shape, and is fixed on a plate 124 and extends into the gap G between the metallic fins 112. The cleaning unit 122 can be made of materials such as artificial fiber, plant fiber, carbon fiber, hair, cotton, or nylon, and trimly arranged on the plate 124, so as to form a brushhead having soft bristles or soft wipers.

[0026] In this embodiment, with the bristles of soft material, the cleaning unit 122 can go deep into the gap G that cannot be cleaned easily, and can be rubbed with the surface of the metallic fins 112, so as to sweep off the dust accumulated on the metallic fins 112 and/or the heat pipe 114, or collect the dust on the surface of the cleaning unit 122 under the principle of electrostatic adsorption. Definitely, solvents such as ethanol and cleanser can also be absorbed on the cleaning unit 122, such that the dust or other foreign matter is absorbed thereon and then removed.

[0027] In addition, as shown in FIG. 1, the dust-disposal mechanism 120 further includes a handle 126 connected to the plate 124 and protrudes from one side of the plate 124 for the user to grasp. Referring to FIG. 2, for easy accommodation, for example, a pivoting portion S is provided at one end of the handle 126 connected to the plate 124, such that the user can fold the handle 126 and place it on the plate 124, thus saving accommodation space. When the user wants to dispose dust, the user can remove dust only by rotating and stretching the folded handle 126, which is very convenient in operation.

[0028] Referring to FIG. 2, in another embodiment, the dust-disposal mechanism 120 further includes an actuator 128, which is connected to the cleaning unit 122 through the plate 124, so as to provide the vibration source required by the cleaning unit 122. In this manner, the user can clean the dust on the metallic fins 112 by automatic timing, turning on, or turning off the actuator 128 instead of cleaning manually. The actuator 128 is, for example, a device such as micromotor and electromotor, and the cleaning unit 122 is rubbed with the

metallic fins 112 due to the vibration, such that the dust is swept off or absorbed on the cleaning unit 122.

[0029] FIG. 3 is a schematic view of the arrangement of the heat-dissipation device having a dust-disposal mechanism in FIG. 1. The heat-conducting module 110 and the fan module 130 are disposed in an electronic device (not shown), and the metallic fins 112 arranged in parallel are disposed, for example, at the air outlet 132 of the fan module 130, such that the cooling airflow generated by the blades 134 in the fan module 130 easily passes through the gap between the metallic fins 112, and is exhausted to the exterior through a heat-dissipation hole 12. In this embodiment, the dust tends to be accumulated between the metallic fins 112 and/or between the metallic fins 112 and the heat pipe 114 after a period of time, especially on the end portions of the metallic fins near the fan module 130, and thus an opening 16 is particularly formed on the housing 14 of the electronic device, such that the cleaning unit 122 can be inserted into the gaps between the metallic fins 112, so as to achieve the optimal dust-disposal effect. Definitely, the cleaning unit 122 can go deep into the gaps between the metallic fins 112 through the heat-dissipation hole 12, so as to clean the front portions of the metallic fins 112, and the drawings of the present invention is not intended to limit the present invention.

[0030] Accordingly, the opening 16 is exposed between the fan module 130 and the metallic fins 112, in addition to removing dust conveniently, after the user finishes cleaning, the cleaning unit 122 can be further placed in an accommodating slot 18 between the fan module 130 and the metallic fins 112 through the opening 16, so as to accommodate the cleaning unit 122. As shown in FIG. 2, when the cleaning unit 122 is placed in the accommodating slot 18, the handle 126 can be folded and placed on the plate 124, such that the handle 126 will not protrude out of the housing 14. Definitely, the cleaning unit 122 can also be accommodated in other methods, which is not limited to those described in the figure.

[0031] In view of the above, the present invention provides a heat-dissipation device having a dust-disposal mechanism, which can reduce the dust absorbed on the heat-conducting module and has an optimal dust-disposal efficiency in removing dust on the metallic fins (cooling fins) arranged in parallel, so as to prevent excessive dust from being accumulated on the metallic fins near the air outlet of the fan module and thus influencing the heat-dissipation performance of the metallic fins. Meanwhile, the cooling airflow generated by the fan module can easily take away the waste heat on the metallic fins, and the heat-dissipation capability of the heat-dissipation device is improved accordingly.

[0032] It will be apparent to those skilled in the art that various modifications and variations can be made to the structure of the present invention without departing from the scope or spirit of the invention. In view of the foregoing, it is intended that the present invention cover modifications and variations of this invention provided they fall within the scope of the following claims and their equivalents.

What is claimed is:

1. A heat-dissipation device having a dust-disposal mechanism, comprising:
 - a heat-conducting module, comprising a plurality of metallic fins arranged in parallel and apart with a gap formed therebetween; and
 - a dust-disposal mechanism, comprising a cleaning unit inserting to the gap formed between the metallic fins.

2. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, wherein the dust-disposal mechanism further comprises a handle connected to the cleaning unit.

3. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 2, wherein a pivoting portion is disposed at one end of the handle connected to the cleaning unit.

4. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, wherein the cleaning unit comprises a brushhead formed by a plurality of soft wipers arranged.

5. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 4, wherein the material of the soft wipers comprises fiber, cotton, or nylon.

6. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, wherein the cleaning unit comprises a brushhead formed by a plurality of soft bristles arranged.

7. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 6, wherein the material of the soft bristles comprises fiber, cotton, or nylon.

8. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, wherein the dust-disposal mechanism further comprises an actuator connected to the cleaning unit for providing a vibration source for the metallic fins.

9. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, wherein the heat-conducting module further comprises at least one heat pipe with one end connected to the metallic fins and the other end connected to a heat source.

10. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 1, further comprising a fan module having an air outlet corresponding to the metallic fins.

11. The heat-dissipation device having a dust-disposal mechanism as claimed in claim 10, wherein an accommodating slot is formed between the fan module and the metallic fins so as to accommodate the cleaning unit.

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