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(54) **WIND-GUIDING COVER**

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(57) **ABSTRACT**

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A wind-guiding cover is applicable to an electronic apparatus having a dissipating fan, a first heat-generating device and a second heat-generating device sequentially disposed along a straight line. The electronic apparatus further includes an upper lid. The wind-guiding cover includes a cover board for covering the first heat-generating device, and a plurality of side boards disposed on two sides of the cover board. The cover board is formed with a wind-guiding opening corresponding in position to the first heat-generating device. The side boards and the cover board form a first passageway. The wind-guiding opening and the upper lid form a second passageway. Therefore, airflow generated from the dissipating fan will be guided through the first passageway to dissipate heat generated from the first heat-generating device, and further through the second passageway to dissipate heat generated from the second heat-generating device.

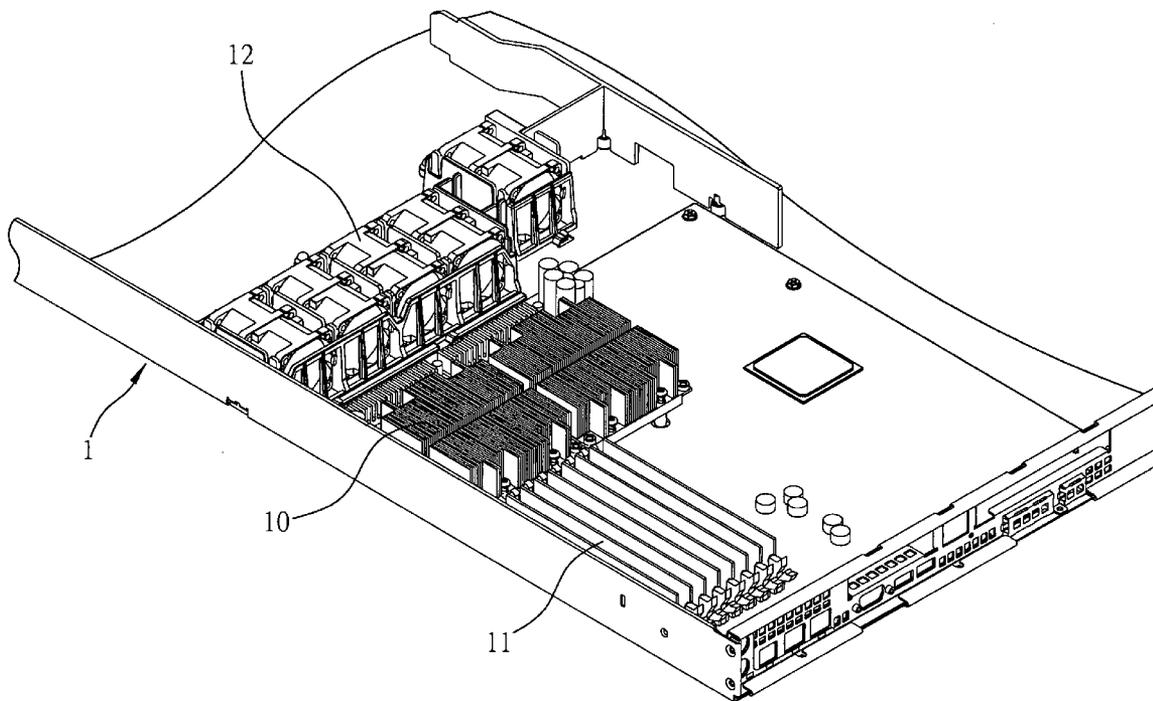
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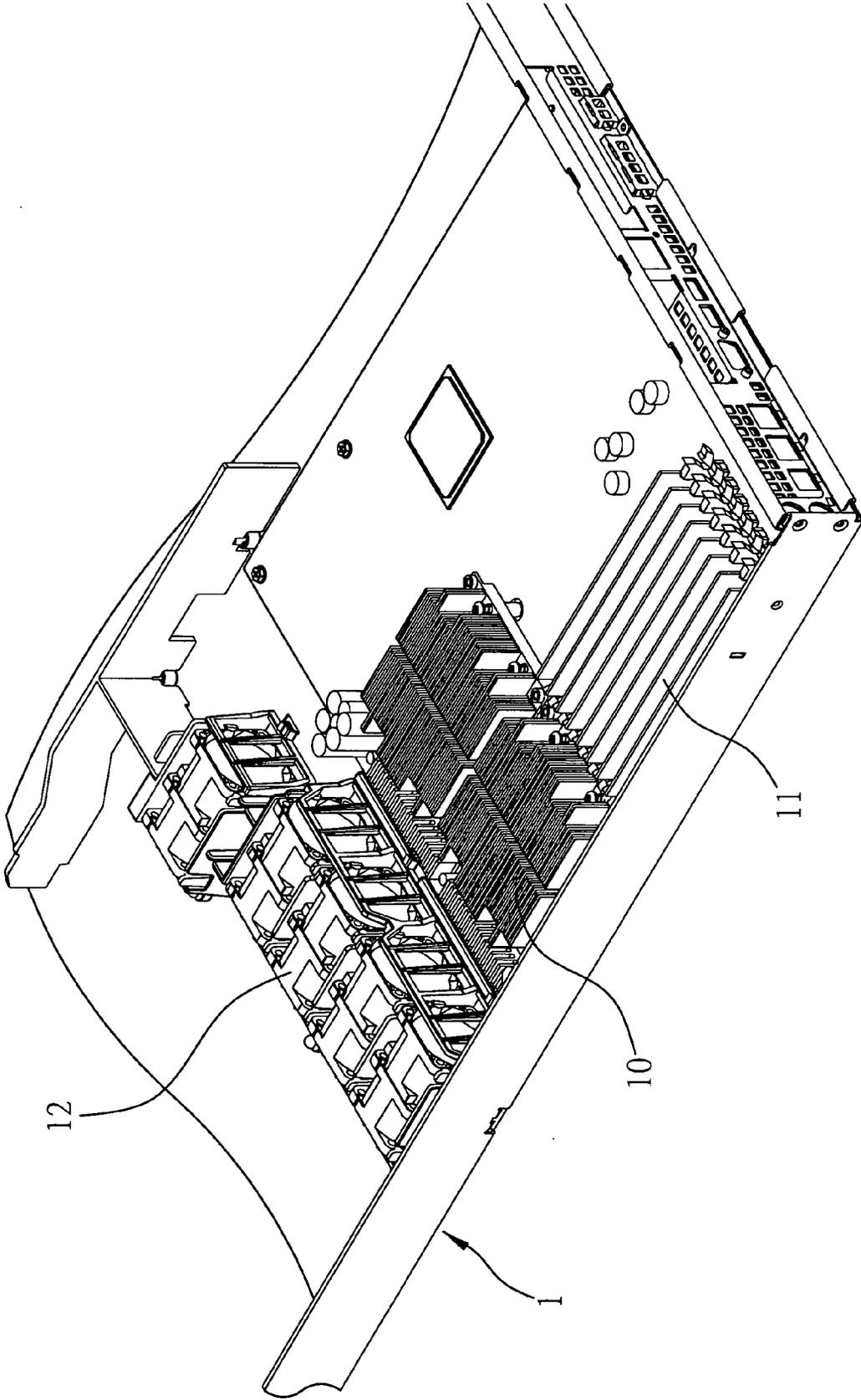


FIG. 1

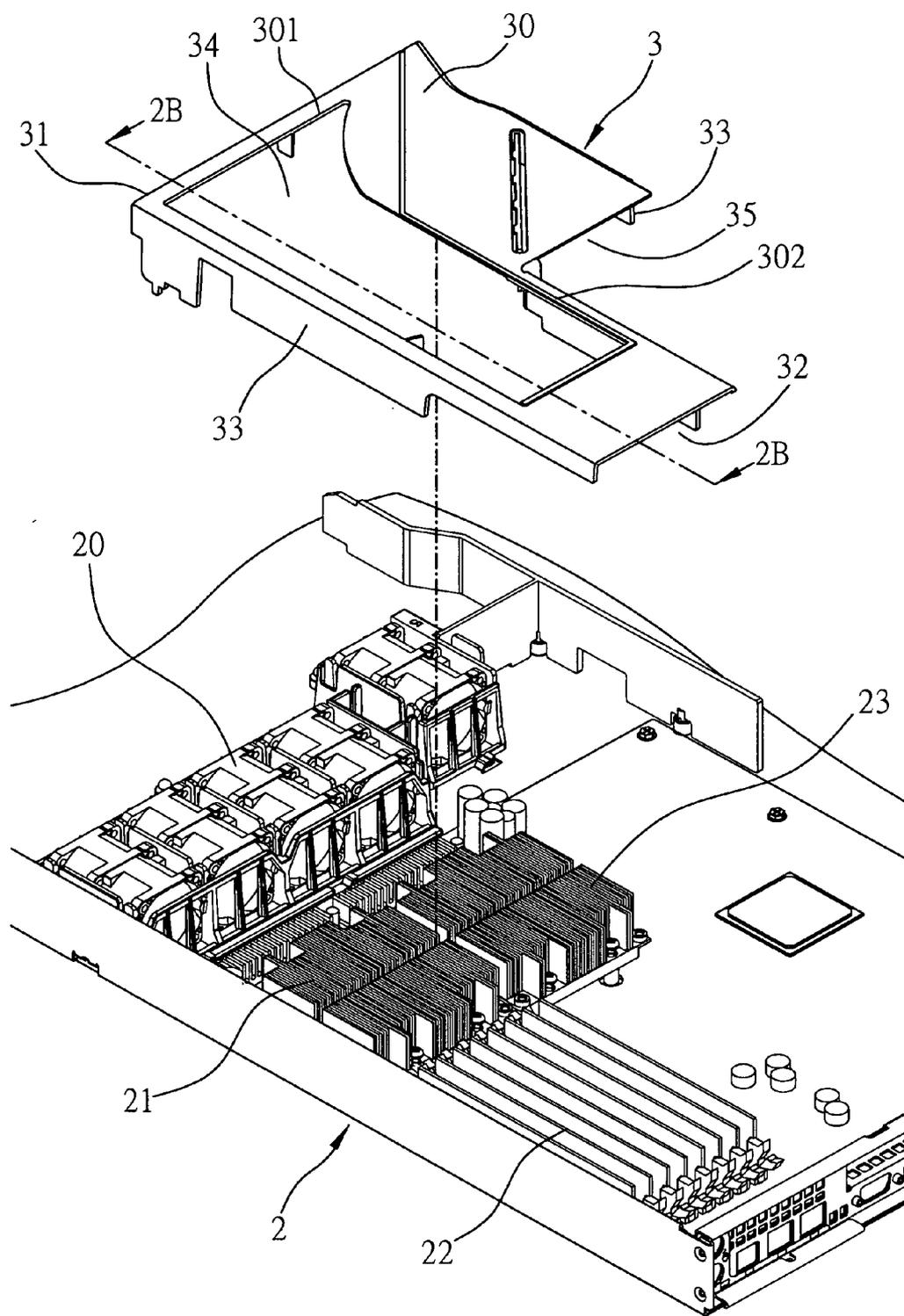


FIG. 2A

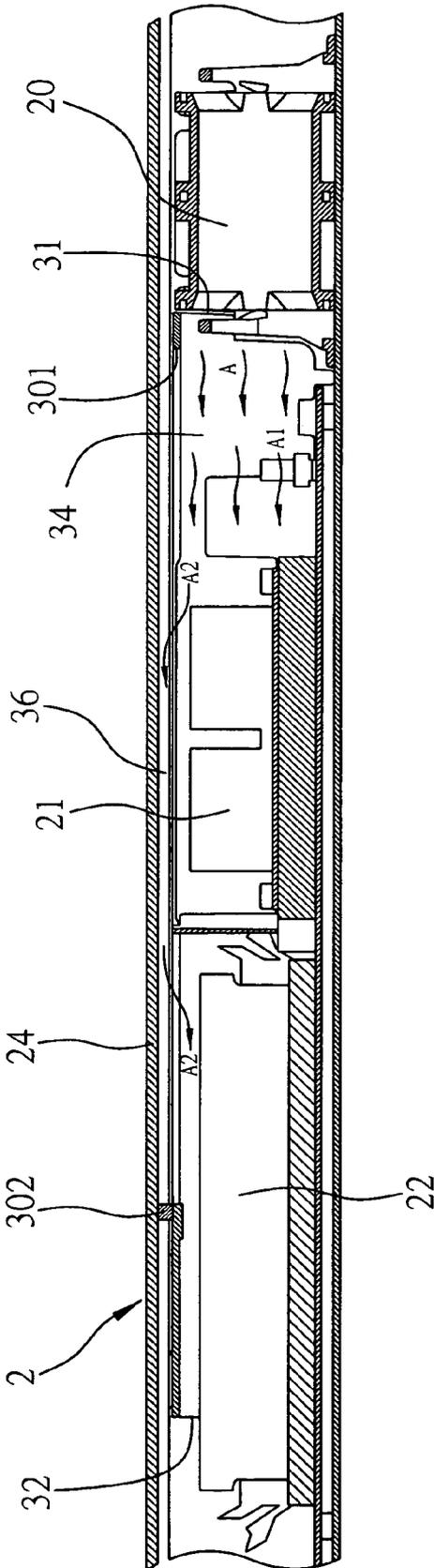


FIG. 2B

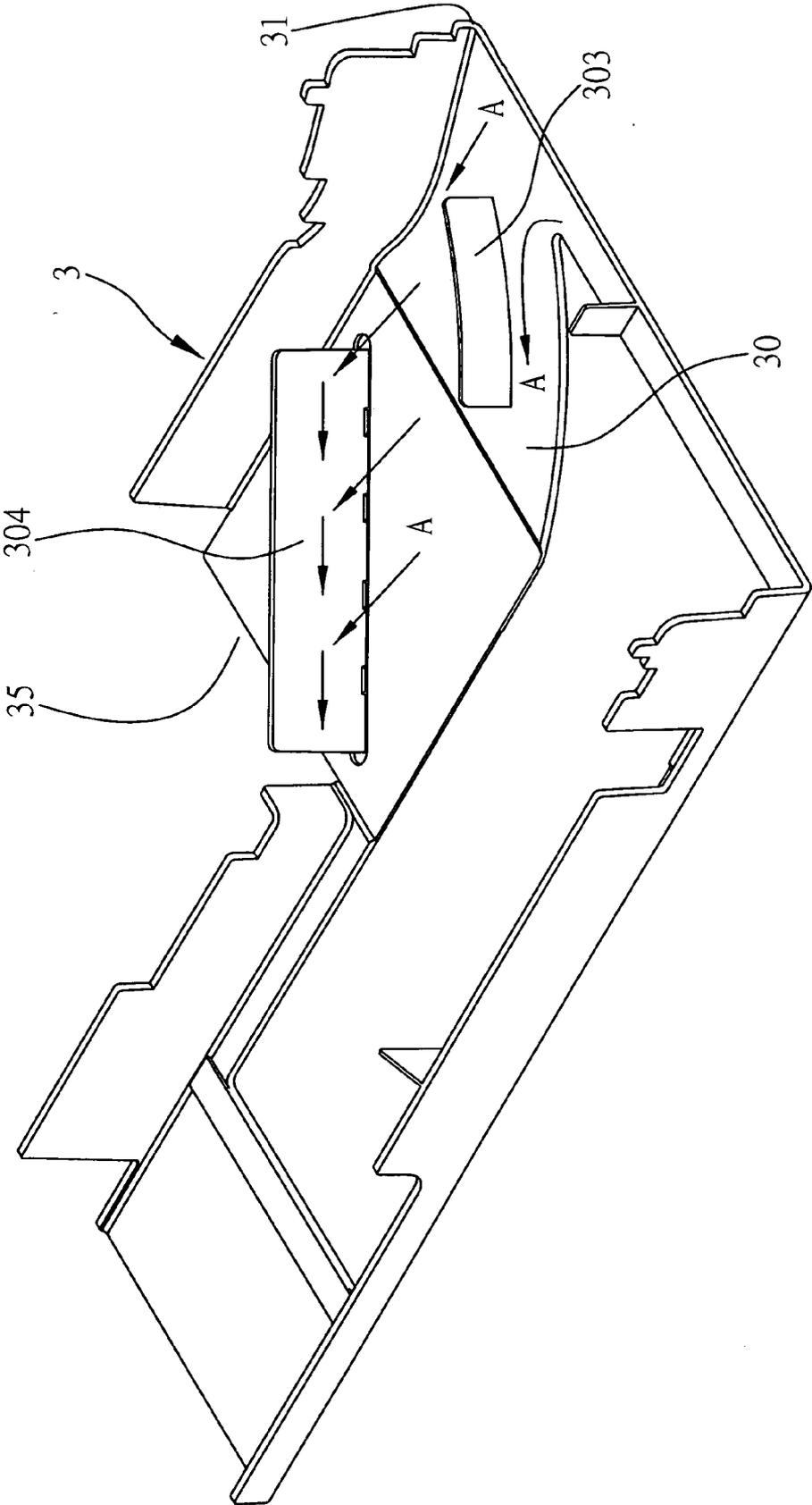


FIG. 2C

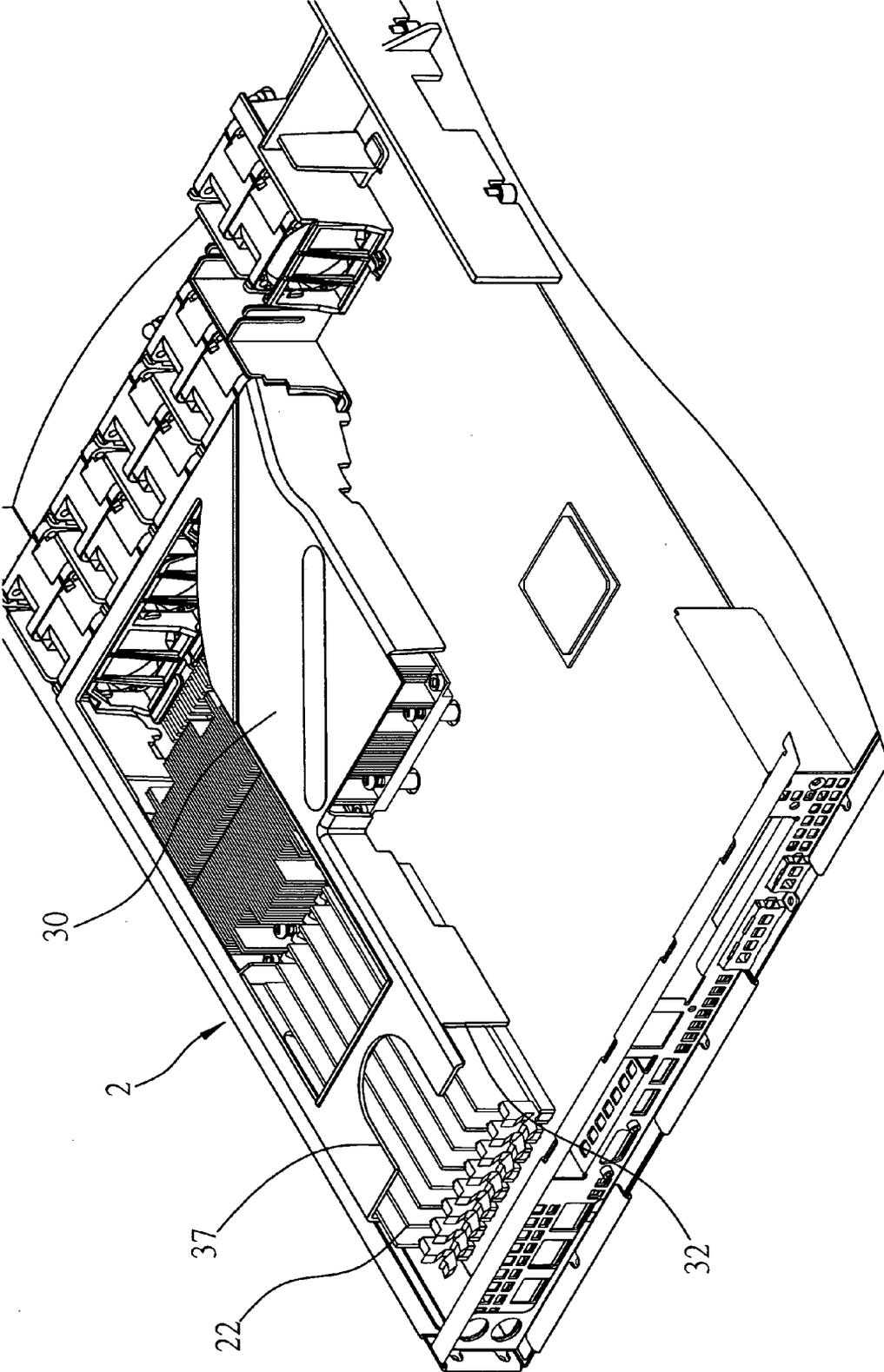


FIG. 3

WIND-GUIDING COVER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to wind-guiding covers, and more particularly, to a wind-guiding cover for guiding the airflow of dissipating fans to heat-generating devices.

[0003] 2. Description of Related Art

[0004] As is well known, an electronic computing apparatus having a large number of electronic component devices installed therein is required to conduct high-speed processing, as its integration component devices generate considerable heat during high-speed processing, such computing apparatuses must include a scheme for radiating the heat.

[0005] Heat-dissipating devices, also termed radiators or chillers, are used to conduct heat away from a heat source such as an electrical component directly or indirectly and into a passing fluid such as air. A typical heat-dissipating device generally may include a plurality of fans to provide heat convection to electrical components and component devices installed in an electronic apparatus. However, due to the limited inner space as well as the dense configuration of electrical components and devices installed in the electronic apparatus, the effect of heat dissipation by dissipating fans are often unsatisfactory and require improvements, particularly of high heat sources like CPUs and memory units as internal components may be easily damaged by the accumulated high heat and even cause a breakdown to the apparatus as a result of poor heat radiation over a continuous period of time.

[0006] Referring to FIG. 1, a server 1 containing a radiating block 10 disposed on the CPU (not shown) and a plurality of memory units 11 is illustrated. The server 1 also includes a plurality of dissipating fans 12 configured to disperse the heat generated by operating the CPU and the memory units 12, by blowing the wind directly through the radiating block 10 and further to the memory unit 11, such configuration taking into account that the memory unit 11 is the secondary heat source and the CPU is the primary heat source in the server 1.

[0007] However, where a server is small, for example, has an 1U thickness, the heat generated and accumulated within the limited space of the 1U server cannot be effectively dispersed and thus becomes overheated over time.

[0008] To solve the drawback discussed above, there is disclosed a wind-guiding cover for covering the radiating block 10 to thereby guide the airflow produced by the fans 12 to the memory units 11. In a server of an 1U thickness, however, the radiating block 10 disposed on the CPU is about the size of the top of the server and thus it impedes most of the airflow flowing therethrough, and also the airflow that can get passed and flow through the memory units 11 became heated after heat convection with the heat-dissipating fins that are disposed on the radiating block 10, therefore, the wind-guiding cover can help a little by collecting and reinforcing the airflow but fails to noticeably improve on the poor heat-dissipation.

[0009] Moreover, the configuration of the memory units 11 in a server is typically designed to abreast from one another, leading to heat-accumulation at the central region thereof due to the difficulty in dispersing the heat accumulated therein.

[0010] Therefore, there exists a need for a novel mechanism and technique to improve on the drawbacks of prior

techniques by effectively guiding the airflow of dissipating fans to heat-generating devices installed in an electronic apparatus.

SUMMARY OF THE INVENTION

[0011] The present invention has been achieved in view of the foregoing problems and its object is to provide a wind-guiding cover, thereby facilitating and ensuring a favorable degree of heat radiation of a secondary heat generating device often impeded by a primary heat-generating device.

[0012] Another object of the present invention is to provide a wind-guiding cover for radiating the heat generated and accumulated at the central region of the memory units.

[0013] According to one aspect of the present invention, there is provided a wind-guiding cover in an electronic apparatus comprising: a wind-guiding cover applicable to an electronic apparatus having an upper lid and at least one dissipating fan configured in longitudinal sequence, a first heat-generating device and a second heat-generating device, the wind-guiding cover consisting of: at least a cover board configured to cover up the first heat-generating device, wherein a wind-guiding opening is formed with the cover board at a position corresponding to the first heat-generating device; and a plurality of side boards disposed on two opposite sides of the cover board. A first passageway is formed by the plurality of side boards and the cover board while a second passageway is constituted by the wind-guiding opening and the upper lid, wherein the airflow generated by the dissipating fan flows through the first passageway to dissipate the heat generated from the first heat-generating device, in addition to that, the airflow can further be guided to pass through the second passageway to the second heat-generating device to dissipate the heat generated from the second heat-generating device.

[0014] The electronic apparatus may be a server equipment having a thickness unit of 1U. The first heat-generating device may be a radiating block disposed on the top surface of the central processing unit (CPU) while the second heat-generating device may be a random-access memory (RAM). The two opposite ends of the wind-guiding cover are provided with an intake opening and a first outlet opening that respectively connect with the first passageway, thereby enabling the wind-guiding cover to guide the airflow into the first passageway from the intake opening and out and away from the first outlet opening.

[0015] In contrast to the prior technique in which memory units often suffer from poor heat radiation as a result of an airflow blockage caused by a radiating block disposed on the CPU, the wind-guiding cover of the invention features using a wind-guiding opening to allow the airflow to be guided from the second passageway to the second heat-generating unit to thereby ensure an effective heat dissipation.

[0016] The wind-guiding cover is dimensioned to cover up the first heat-generating device and a part of the second heat-generating device, and the wind-guiding opening at least covers up the first heat-generating device. Preferably, the wind-guiding opening extends to cover up the top of the second heat-generating device. Further, the cover board may be provided with a ventilation gap that connects to the first outlet opening, wherein the ventilation gap can at least cover up the central region of the second heat-generating device so as to reduce the wind resistance at the central region to rapidly collect and dispel the heat generated from the central region. Typically, the first outlet opening is disposed at a position

close to an air opening disposed at the rear of an electronic apparatus, thereby allowing the ambient cool air to flow through and into the ventilation gap to further facilitate heat dissipation at the central region of the second heat-generating device. Compared to the known technique in which the central region of memory units is susceptible to heat-accumulation, the wind-guiding cover of the invention includes a ventilation gap to help dispel the heat accumulated at the central region of memory units efficiently.

[0017] In addition, the wind-guiding further includes a second outlet opening opposite to the intake opening and penetrating through the first passageway, and a third heat-generating device may be provided to install by the first heat-generating device (the radiating block) and it may also be a radiating block disposed on the CPU. Accordingly, the present invention offers advantages over prior techniques and thus possesses high industrial applicability.

[0018] Note that this summary of the invention does not necessarily describe all necessary features so that the invention may also be a sub-combination of these described features.

BRIEF DESCRIPTION OF DRAWINGS

[0019] The wind-guiding cover of the present invention can be fully understood by reading the following detailed description of the preferred embodiments, with reference made to the accompanying drawings, wherein:

[0020] FIG. 1 (PRIOR ART) is a perspective view showing a plurality of dissipating fans and the primary heat-dissipating devices installed in a server equipment;

[0021] FIGS. 2A to 2C are perspective views illustrating one preferred embodiment of the wind-guiding cover in accordance with the present invention; and

[0022] FIG. 3 is a perspective view showing another preferred embodiment of the wind-guiding cover in accordance with the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0023] The present invention is described in the following so that one skilled in the pertinent art can easily understand other advantages and effects of the present invention. The present invention may also be implemented and applied according to other embodiments, and the details may be modified based on different views and applications without departing from the spirit of the invention.

[0024] FIGS. 2A to 2C illustrate one preferred embodiment of a wind-guiding cover 3 according to the present invention. Referring to FIG. 2A, the wind-guiding cover 3 is applicable to an electronic apparatus 2 having at least a dissipating fan 20 configured in longitudinal sequence, a first heat-generating device 21, and a second heat-generating device 22. The dissipating fan 20 is configured to dispel the heat generated from the first and second heat-generating devices 21, 22. The wind-guiding cover 3 comprises at least a cover board 30 for covering the first heat-generating device 21, and a wind-guiding opening 301 formed corresponding in position to the first heat-generating device 21; and a plurality of side boards 33 disposed on two opposed sides of the cover board 30, side boards 33 and the cover board 30 forming a first passageway 34. The wind-guiding cover 3 is provided with an intake opening 31 and a first outlet opening 32 disposed at two opposite ends of the wind-guiding cover 3 and connected with

the first passageway 34, thereby guiding the airflow into the first passageway 34 from the first intake opening 31 and out and away from the first outlet opening 32 to dispel the heat generated by the first heat-generating device 21. Moreover, an airtight strip 302 is provided on an upper surface of the cover board 30 adjacent to the edge of the wind-guiding opening 301 to further seal the opening 301. The airtight strip 302 is made of rubber.

[0025] The electronic apparatus 2 is a server having a thickness unit of 1U. The first heat-generating device 21 is a heat-radiating block disposed on a central processing unit (CPU) while the second heat-generating device 22 comprises a plurality of the random-access memories (RAM) configured abreast from one another in the electronic apparatus 2. Note that the configuration of the electronic apparatus 2, the first and second heat-generating devices 21, 22 is not limited to what disclosed in this embodiment but can have variations to suit differing applications and needs. For example, the electronic apparatus 2 is a blade bracket for a blade server, the first heat-generating device 21 is a hardware module, and the second heat-generating device 22 is a chip module.

[0026] In addition, a third heat-generating device 23 such as a radiating block disposed on the CPU (not shown) is further provided at a position by the first heat-generating device 21 (a radiating block) of the electronic apparatus 2, that is, the electronic apparatus 2 may be an 1U server having a dual-CPU construction, so that the wind-guiding cover 3 may further comprise a second outlet opening 35 opposite to the intake opening 31 and conducting through the first passageway 34 in order to accommodate the third heat-generating device 23 in between the intake opening 31 and the second outlet 35, thereby allowing the airflow of the dissipating fan 20 to be used to dispel the heat generated by the third heat-generating device 23.

[0027] Viewing together with FIG. 2B, the electronic apparatus 2 includes an upper lid 24. A second passageway 36 is constituted by the wind-guiding opening 31 and the upper lid 24. The airflow A generated by the dissipating fan 20 can be guided into the first passageway 34 via the wind-guiding opening 31 and divided into an airflow A1 to dispel the heat generated by the first heat-generated device 21, and another airflow A2 that flows through the second passageway 36 to dissipate the heat generated by the second heat-generating device 22.

[0028] In contrast to the prior technique in which memory units often suffer from poor heat radiation as the airflow produced by dissipating fans is blocked up by the radiating block disposed on the CPU, the wind-guiding cover 3 of the present invention features using a wind-guiding opening 301 to allow the another airflow A2 to be guided from the second passageway 36 to the second heat-generating unit 22 to rapidly dispel the heat generated therefrom.

[0029] The cover board 30 is dimensioned to cover the first heat-generating device 21 and a part of the second heat-generating device 22, and the wind-guiding opening 301 at least covers up the first heat-generating device 21. Preferably, the wind-guiding opening 301 can extend to cover up the top surface of the second heat-generating device 22 so that airflow A2 can be easily guided to the second heat-generating device 22.

[0030] Also, the airtight strip 302 that is disposed on the cover board 30 affixes tightly to the upper lid 24 of the electronic apparatus 2, such that airflow A2 can be collected and guided to the second heat-dissipating device 22 and thus

prevented from dispelling to the electronic apparatus 2 that could adversely affect the heat dissipation of the second heat-generating device 22.

[0031] Turning now to FIG. 2C, as discussed above, the electronic apparatus 2 may further include a third heat-generating device 23 that is disposed at a position by the first heat-generated device 21 and also depends on the dissipating fan 20 for heat dissipation. However, since the second heat-generated device 22 is disposed on the back of the first heat-generated device 21, a large proportion of airflow A generated by the fan 20 is being guided to the first heat-generated device 21, therefore, a flow-guiding board 303 can be disposed on a lower surface of the cover board 30 near the intake opening 31 to guide the most airflow A to the first heat-generated device 21. Where the electronic apparatus 2 does not include a third heat-generating device 23, the lower surface of the cover board 30 may be provided with a shielding board 304 to block the second outlet opening 35, such that airflow A can be concentrated to flow to the first heat-generated device 21, wherein the shielding board 304 and the flowing direction of airflow A is in an oblique angle to facilitate guiding the airflow A to the first heat-generated device 21. The shielding board 304 does not completely cover up the second outlet opening 35 and leaves a gap to allow some of the airflow A to flow beyond the second outlet opening 35 to a chip module (not shown) via the second outlet opening 35.

[0032] FIG. 3 is depicts another preferred embodiment of the wind-guiding cover 3 according to the present invention. The wind-guiding cover 3 of this embodiment is substantially the same as the foregoing embodiment, and only differs in that the cover board 30 of this embodiment is further provided with a ventilation gap 37 that related connects with the first outlet opening 32, wherein the ventilation gap 37 at least covers up the central region of the second heat-generating device 22 to reduce the wind resistance at the central region to rapidly collect and dispel the heat generated from the central region. Typically, the first outlet opening 32 is disposed at predetermined positions near an air opening located at the rear of the electronic apparatus 2, thereby allowing the ambient cool air to flow through and into the ventilation gap 37 to further facilitate heat dissipation at the central region of the second heat-generating device 22. Compared to the known technique in which the central region of memory units is susceptible to accumulation of heat, the wind-guiding cover 3 of the invention features using a ventilation gap 37 to help dispelling the heat accumulated at the central region of memory units efficiently. Accordingly, the present invention offers advantages over prior techniques and thus has high industrial applicability.

[0033] The aforementioned examples are only exemplary preferred embodiments of the present invention. The scope of the claims as stated below should be accorded the broadest interpretation so as to encompass various modifications and similar arrangements made to the herein described invention that fall within the spirit of the basic principles and technology of the present invention.

1. A wind-guiding cover applicable to an electronic apparatus comprising a dissipating fan, a first heat-generating device and a second heat-generating device disposed sequentially along a straight line, the electronic apparatus further comprising an upper lid, wherein the wind-guiding cover is located below the upper lid, the wind-guiding cover comprising;

a cover board configured to cover the first heat-generating device and formed with a wind-guiding opening corre-

sponding in position to the first heat-generating device, wherein a space is between the cover board and the upper lid; and

a plurality of side boards disposed on two opposite sides of the cover board, wherein the side boards and the cover board form a first passageway, the wind-guiding opening and the upper lid form a second passageway disposed above the first passageway and passing through the space airflow generated by the dissipating fan flows through the first passageway to dissipate heat generated from the first heat-generating device, and the airflow is further guided to pass through the second passageway to the second heat-generating device to dissipate heat generated from the second heat-generating device.

2. The wind-guiding cover of claim 1 further comprising two opposite ends, and an intake opening and a first outlet opening disposed on the two opposite ends respectively and connected with the first passageway, thereby guiding the airflow into the first passageway from the intake opening and out and away from the first outlet opening.

3. The wind-guiding cover of claim 2 further comprising a second outlet opening opposite to the intake opening and penetrating through the first passageway, wherein the electronic apparatus further comprises a third heat-generating device disposed between the intake opening and the second outlet opening.

4. The wind-guiding cover of claim 3, wherein the third heat-generating device is a radiating block disposed on a Central Processing Unit (CPU).

5. The wind-guiding cover of claim 3 further comprising a shielding board disposed under the cover board to shield the second outlet opening.

6. The wind-guiding cover of claim 1 further comprising a flow-guiding board installed under the cover board at a position close to the intake opening, for guiding the airflow toward a direction of the first heat-generating device.

7. The wind-guiding cover of claim 1 further comprising an airtight strip installed on top of the cover board close to the edge of the wind-guiding opening to tightly connect the wind-guiding cover with the upper lid of the electronic apparatus, thereby preventing the airflow from dispersing from the second passageway.

8. The wind-guiding cover of claim 7, wherein the airtight strip is made of rubber.

9. The wind-guiding cover of claim 1, wherein the cover board is dimensioned to cover a part of the second heat-generating device and the wind-guiding opening thereof at least covers up the first heat-generating device.

10. The wind-guiding cover of claim 9, wherein the wind-guiding opening extends to cover up the upper surface of the second heat-generating device.

11. The wind-guiding cover of claim 1, wherein the cover board further comprises a ventilation gap connecting with the first outlet opening to correspond to the central region of the second heat-generating device.

12. The wind-guiding cover of claim 1, wherein the first heat-generating device is a radiating block disposed on the central processing unit (CPU) while the second heat-generating device is a plurality of the random-access memories (RAM) configured to abreast from one another in the electronic apparatus.

13. (canceled)

14. The wind-guiding cover of claim 1, wherein the wind-guiding opening extends to cover up the upper surface of the second heat-generating device.