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Lin(10) **Pub. No.: US 2009/0032220 A1**(43) **Pub. Date: Feb. 5, 2009**(54) **CLIP MODULE AND HEAT DISSIPATION
DEVICE HAVING THE SAME**(30) **Foreign Application Priority Data**

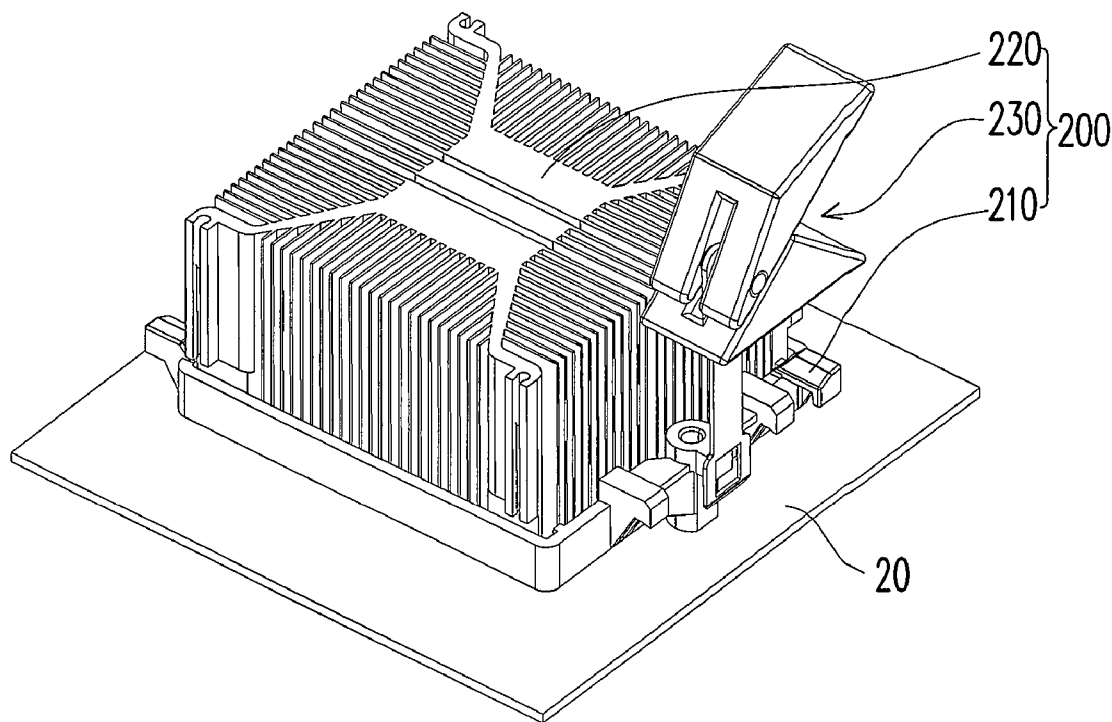
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TION 2
TAIPEI 100 (TW)**(51) **Int. Cl.**
F28F 7/00 (2006.01)(52) **U.S. Cl.** **165/80.3**(57) **ABSTRACT**

A clip module and a heat dissipation device having the same are disclosed, wherein the heat dissipation device is suitable to dissipate the heat for a heat source on a circuit board. The heat dissipation device includes a retention module, a heat sink and a clip module. The retention module is provided on the circuit board and around the heat source, and the heat sink is provided on the heat source. The clip module includes a body, a fastener fastened to the retention module and a pressing structure. The pressing structure includes a first triangle block and a second triangle block which is slidably provided on two adjacent surfaces of the first triangle block, and the fastener is pivotally provided at the second triangle block.

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(TW)**(21) Appl. No.: **12/182,136**(22) Filed: **Jul. 30, 2008**

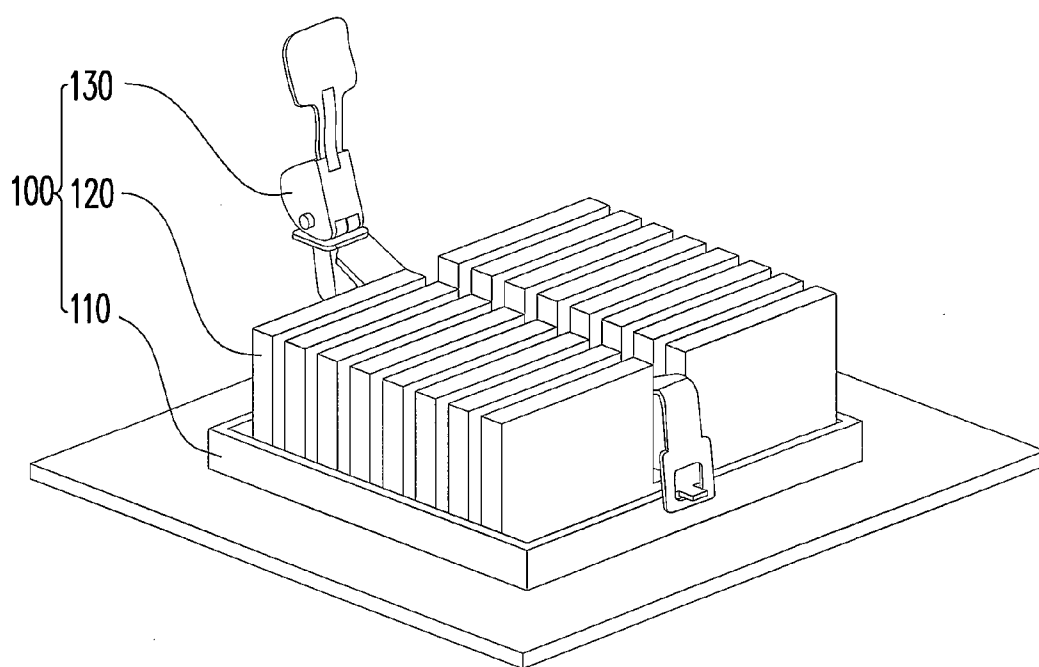


FIG. 1A (PRIOR ART)

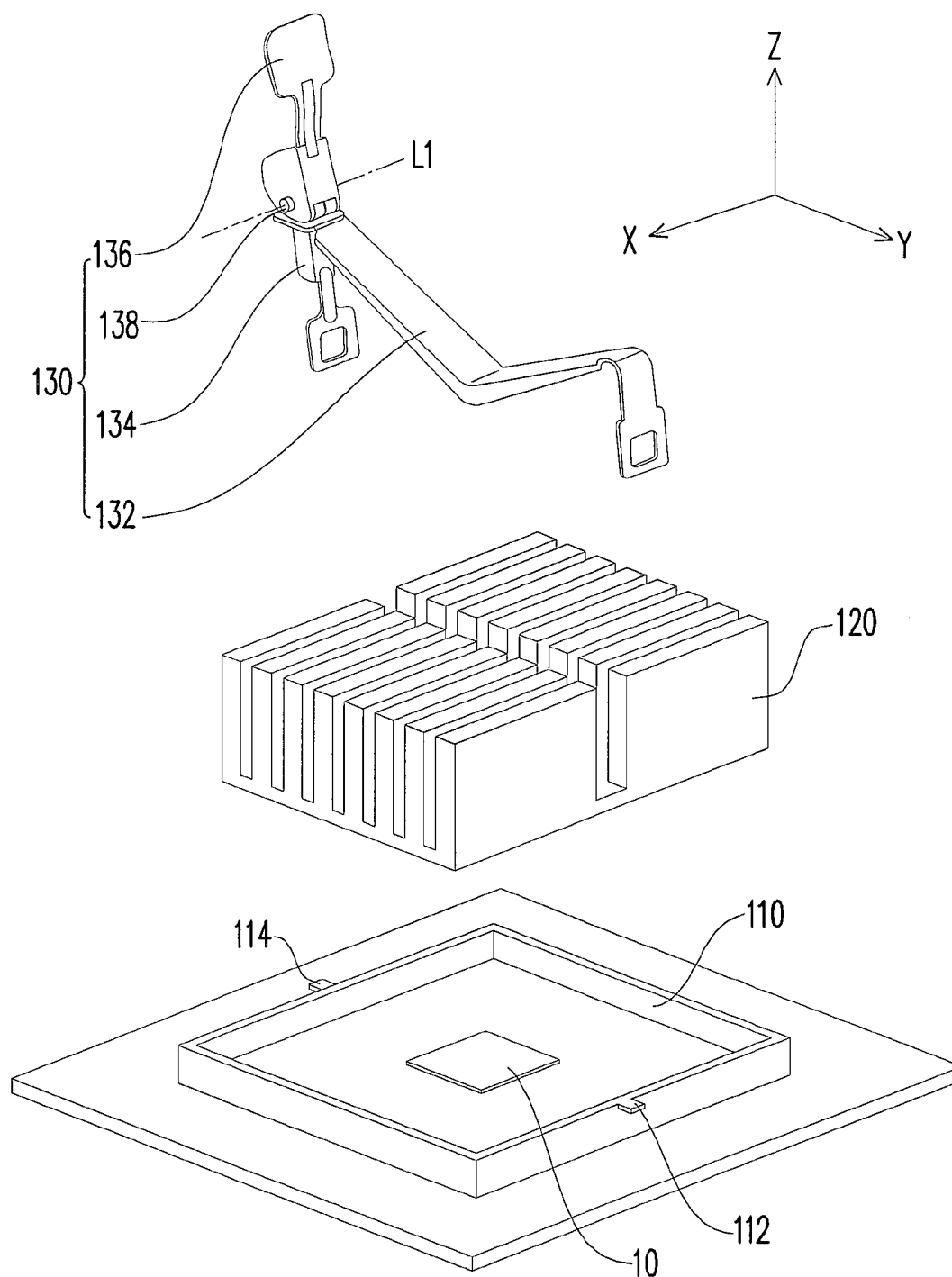


FIG. 1B (PRIOR ART)

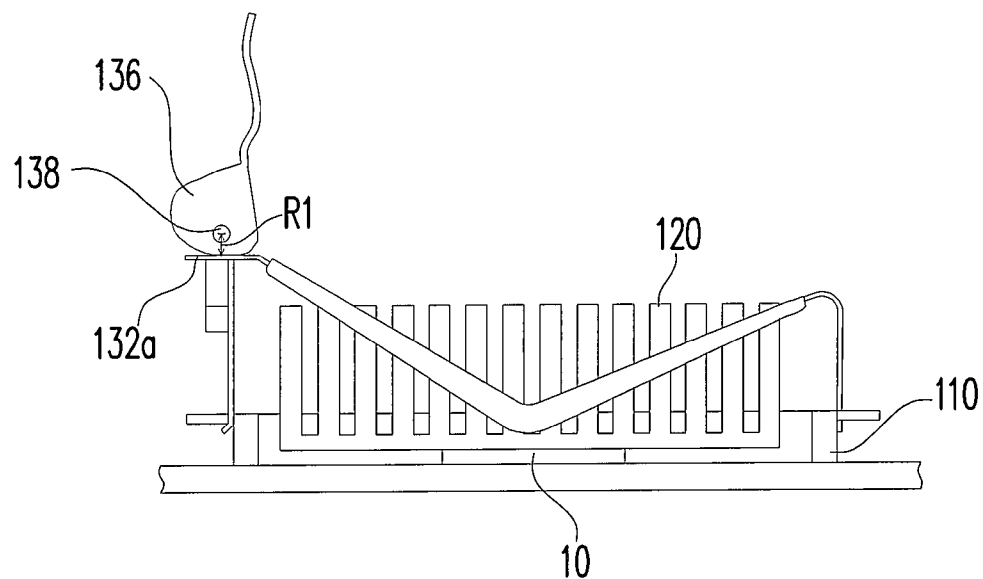


FIG. 1c (PRIOR ART)

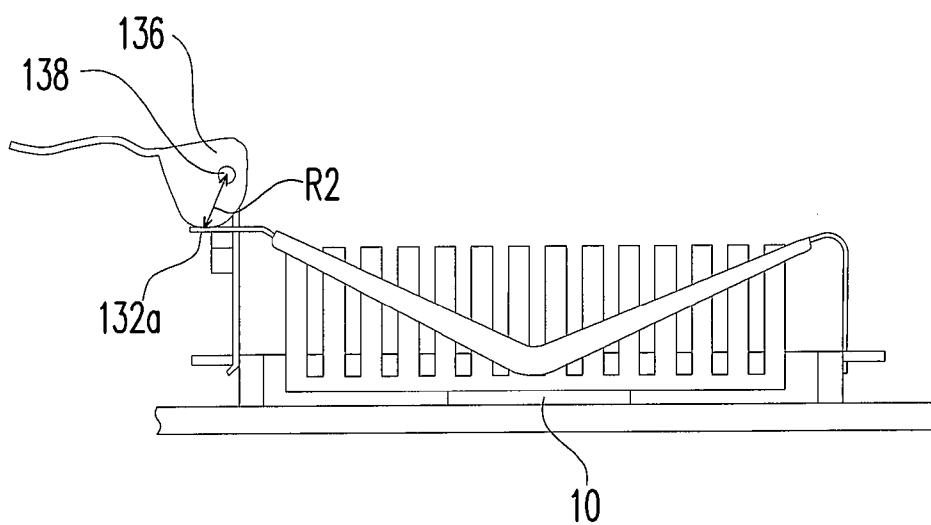


FIG. 1D (PRIOR ART)

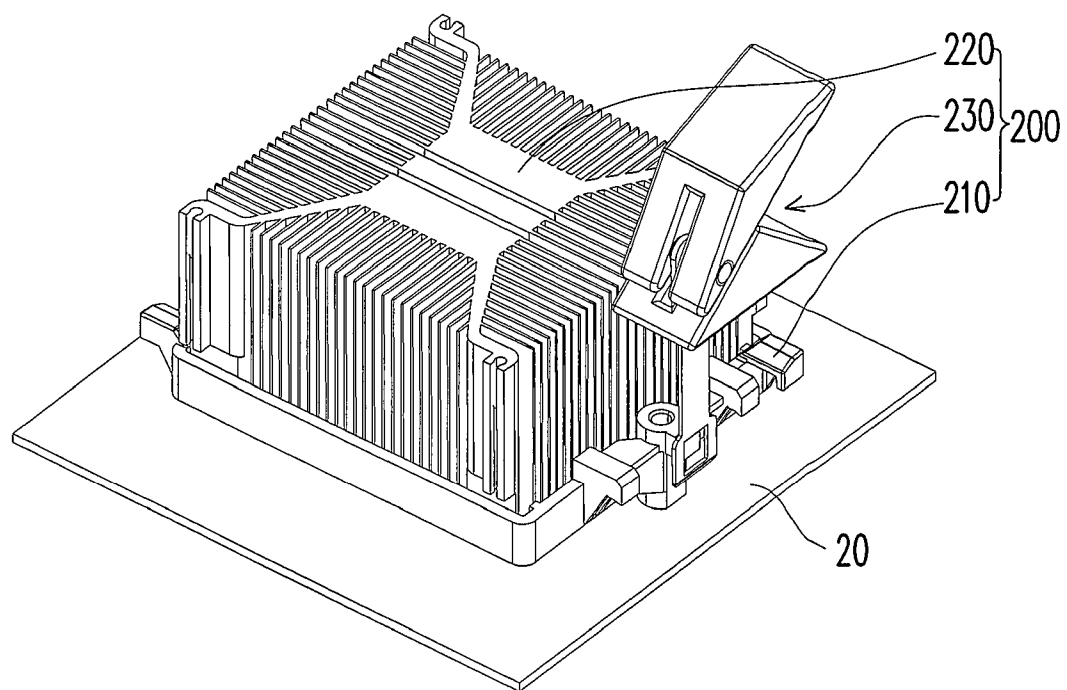


FIG. 2A

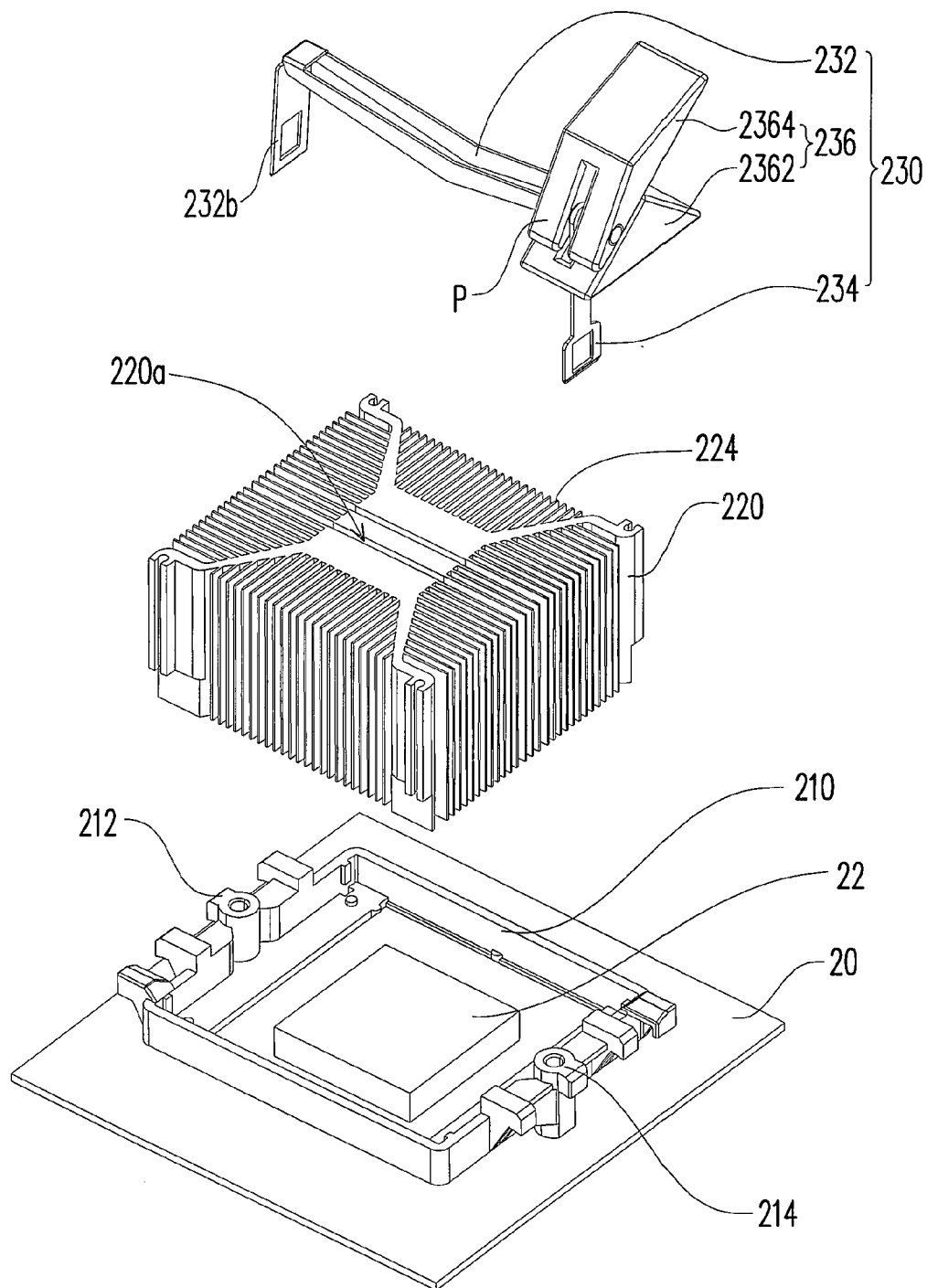


FIG. 2B

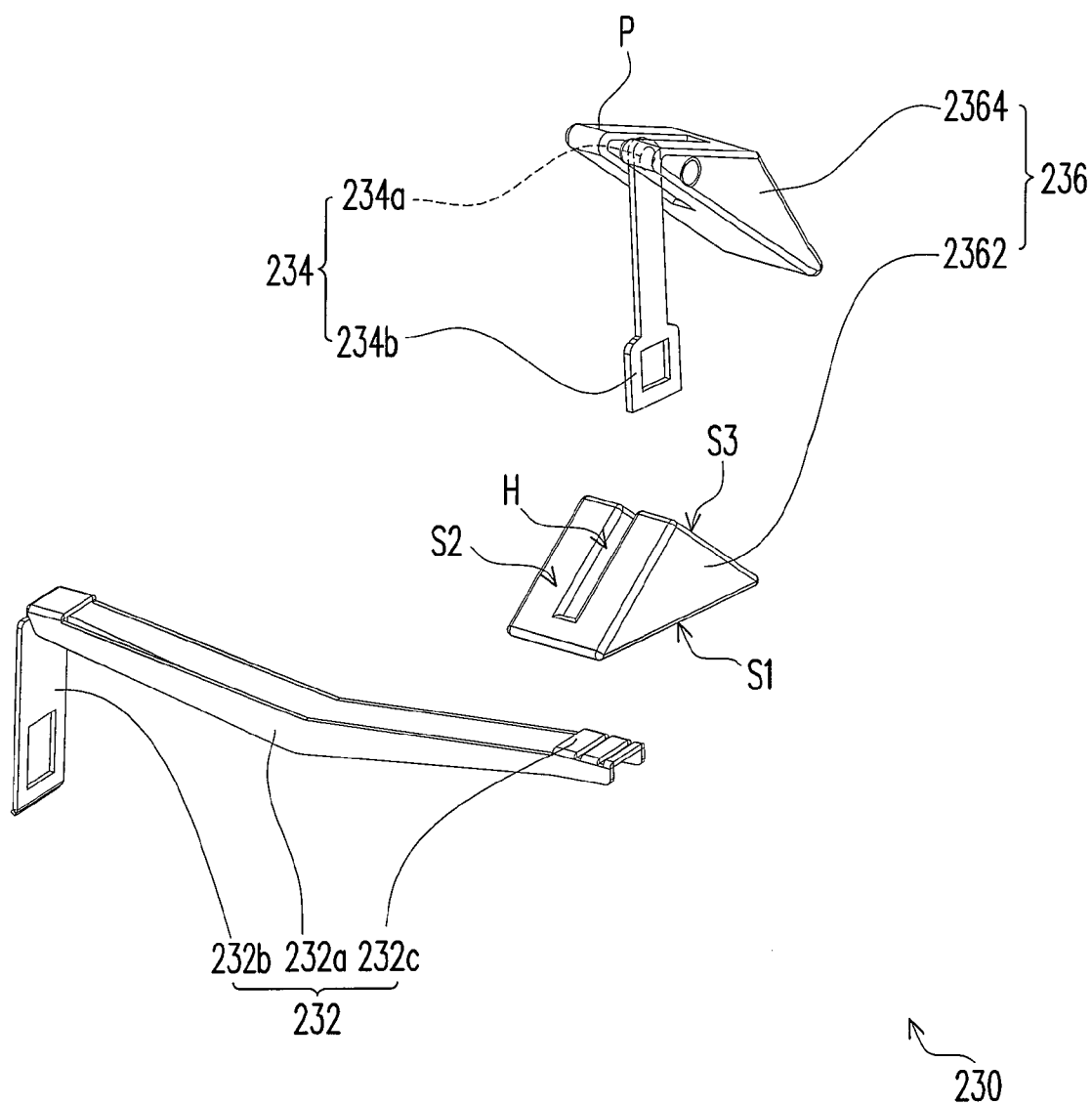


FIG. 3

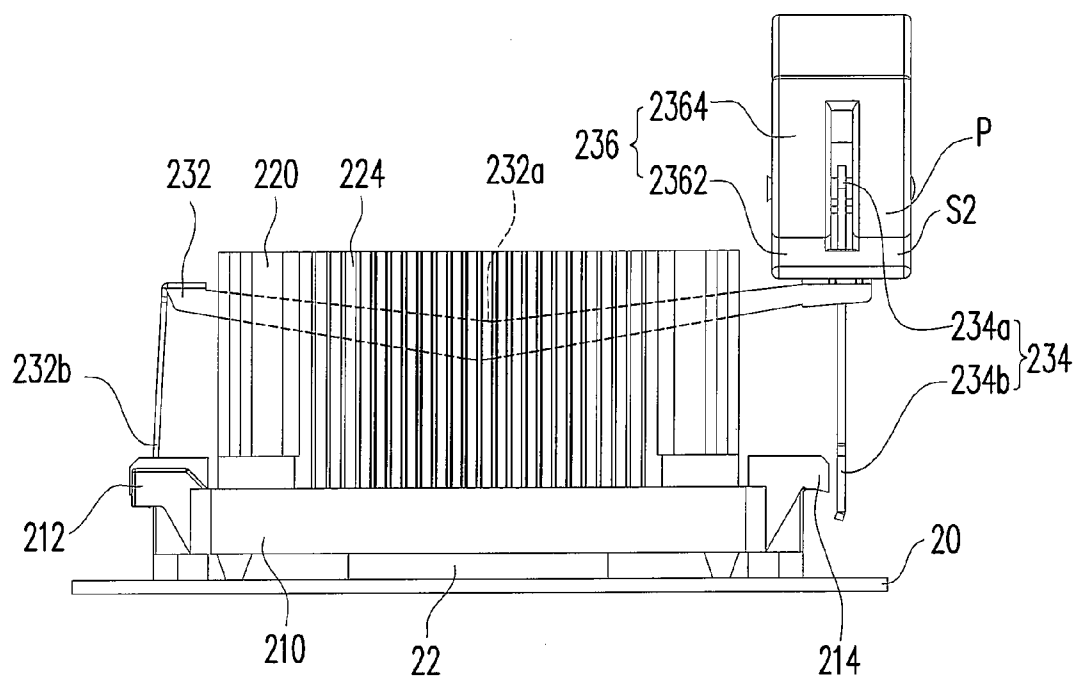


FIG. 4A

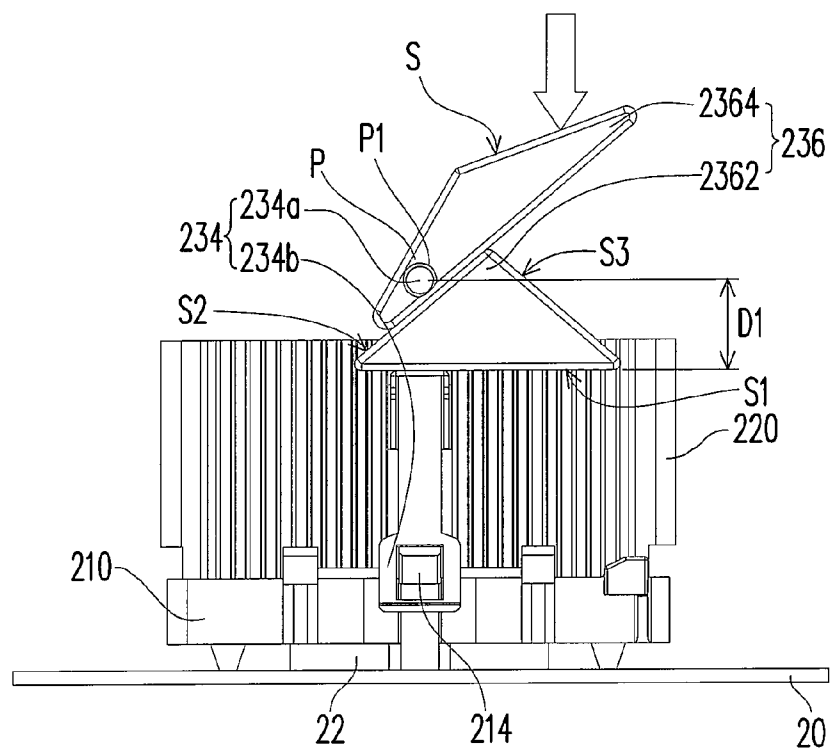


FIG. 4B

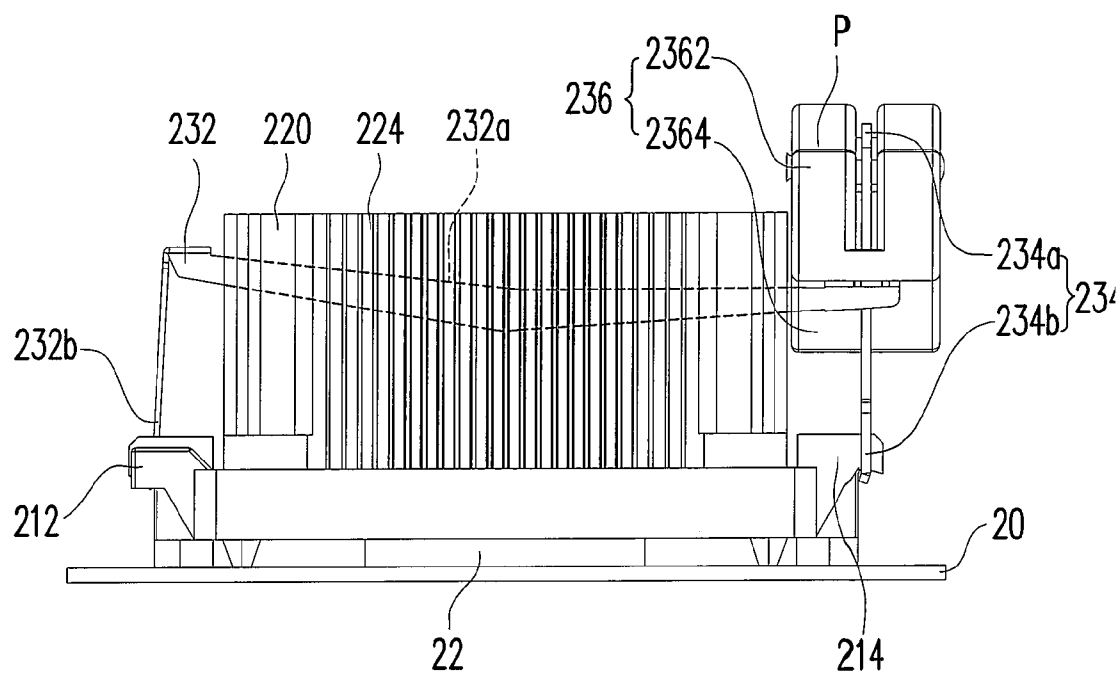


FIG. 5A

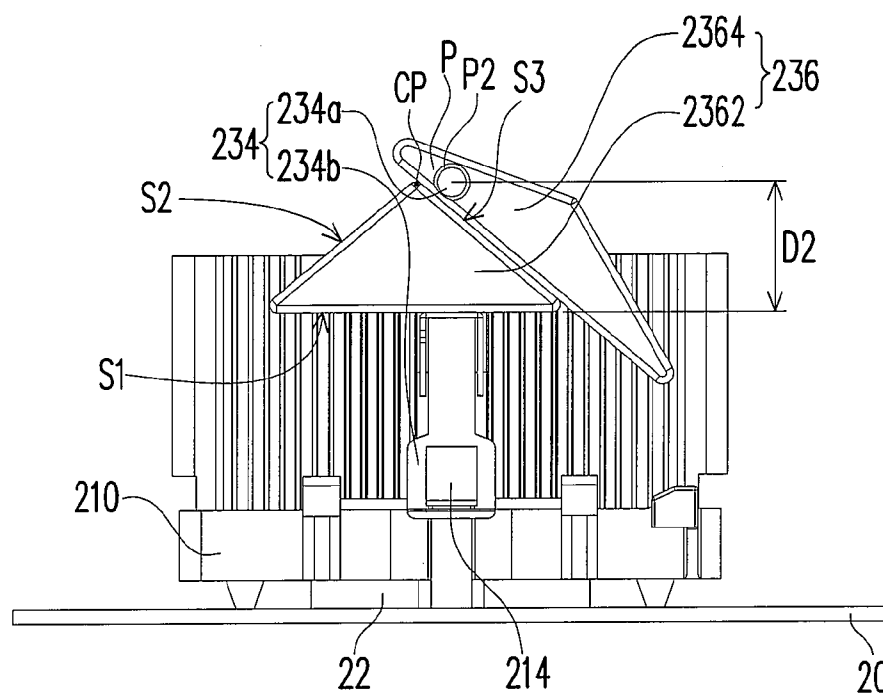


FIG. 5B

CLIP MODULE AND HEAT DISSIPATION DEVICE HAVING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefit of Taiwan application serial no. 96127746, filed on Jul. 30, 2007. The entirety of the above-mentioned patent application is hereby incorporated by reference herein and made a part of specification.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention relates to a clip module and, more particularly, to a clip module and a heat dissipation device having the same.

[0004] 2. Description of the Related Art

[0005] In recent years, along with the enormous progress of the science and technology, the operating speed of transistors (such as a chip set) included in various electronic components becomes higher and higher, so that the working temperature of the electronic components also becomes higher and higher. Taking a central processing unit (CPU) of a computer device as an example, since the operating speed of the CPU is continuously increased, the heat generating power of the CPU also continuously rises. To prevent the CPU from being overheated and the computer device from losing effectiveness temporarily or permanently, the computer device needs to have sufficient heat dissipation ability to enable the CPU to work normally. To dissipate the heat energy generated by the CPU which works with a high speed and to make the CPU maintain the normal state when the CPU works with the high speed, in the conventional technology, a heat dissipation device is directly assembled on the CPU (or other heat generating chip) to make the heat energy generated by the CPU rapidly dissipated to the ambient environment via the heat dissipation device.

[0006] FIG. 1A is a three-dimensional schematic diagram showing a conventional heat dissipation device provided on a heat source, and FIG. 1B is an exploded diagram showing the heat dissipation device and the heat source in FIG. 1A. Please refer to FIG. 1A and FIG. 1B, simultaneously, and a conventional heat dissipation device 100 is provided in a computer host to dissipate the heat for a heat source 10 such as a CPU. The heat dissipation device 100 includes a retention module 110 which is provided around the heat source 10, a heat sink 120 and a clip module 130. The heat sink 120 is suitable to be provided on the heat source 10 to dissipate the heat for the heat source 10, and the clip module 130 is suitable to be provided across the heat sink 120 and apply a downward pressure to the heat sink 120 to make the heat sink 120 tightly attached to the heat source 10. In this way, the heat energy in the heat source 10 can be effectively conducted to the heat sink 120, and further be dissipated to the ambient environment via the heat sink 120.

[0007] In the conventional technology, the clip module 130 includes a body 132 provided across the heat sink 120, a fastener 134 and a pressing structure 136. The body 132 is suitable to press against the heat sink 120 to make the heat sink 120 tightly attached to the heat source 10. One end of the body 132 is fastened to a tenon 112 of the retention module 110, and the fastener 134 is assembled to the other end of the body 132, and the fastener 134 is suitable to be fastened to

another tenon 114 of the retention module 110. In addition, the pressing structure 136 is pivotally connected to the fastener 134 via a bolt 138. The pressing structure 136 can rotate along the pivotal axis L1 (X axis) of the bolt 138 to apply a downward pressure to the body 132.

[0008] The pressing structure 136 of the above conventional clip module 130 is an eccentric structure, that is, the rotary axis center of the pressing structure 136 is not located at the center of the pressing structure 136, and therefore, when a user rotates the pressing structure 136, the rotation radius of the pressing structure 136 gradually increases. About the further illustration for the pressing structure 136, please refer to FIG. 1C and FIG. 1D, simultaneously. FIG. 1C is a schematic diagram showing the clip module which is shown in FIG. 1A and is not fastened to a retention module, and FIG. 1D is a schematic diagram showing the clip module which is shown in FIG. 1C and is fastened to a retention module. In FIG. 1D, the rotation radius R2 of the pressing structure 136 is greater than the rotation radius R1 of the pressing structure 136 in FIG. 1C. Therefore, the pressing structure 136 can press the connecting part 132a of the body 132 to make the connecting part 132a move for a distance during the rotation process, so that the connecting part 132a can move downward along the Z axis and the body 132 can apply a downward pressure to the heat sink 120. In this way, the heat sink 120 can be tightly attached to the heat source 10.

[0009] The pressing structure 136 is made of plastic which has a high cost, and has a more complicated structure and more components, and therefore, the conventional clip module 130 has a higher production cost. In addition, since the pressing structure 136 rotates along the pivotal axis L1 (X axis) of the bolt 138 to apply a downward pressure to the body 132, when the heat sink 120 is assembled on the heat source 10, sufficient space around the heat sink 120 needs to be supplied for the rotation of the pressing structure 136 further to make the heat sink 120 successfully assembled on the heat source 10. However, at the interior of the computer host, the space around the heat sink 120 is limited (various electronic components such as a memory module, various cards, etc. may be provided around the heat sink 120), and therefore, during the process of assembling the heat sink 120 to the heat source 10, when the pressing structure 136 pivotally connected to the fastener 134 rotates, the pressing structure 136 easily interferes with the electronic components around the heat sink 120 because of the limited space, so that the heat sink 120 is difficult to be assembled on the heat source 10.

BRIEF SUMMARY OF THE INVENTION

[0010] The objective of the invention is to provide a clip module which has a simple structure, convenient operation and a low production cost.

[0011] Another objective of the invention is to provide a heat dissipation device having a clip module to solve the problem that the clip module is easy to interfere with electronic components around a heat sink during the process of assembling the heat sink to a heat source.

[0012] To achieve the above or other objectives, the invention provides a clip module which is suitable to cooperate with a retention module to fix a heat sink to a heat source. The retention module has a first fastening part and a second fastening part. The clip module includes a body, a fastener and a pressing structure. The body has a pressing part, a third fastening part and a connecting part, wherein the third fastening part and the connecting part are located at two ends of the

pressing part. The pressing part is used to make the heat sink press against the heat source, and the third fastening part is used to be fastened to the first fastening part. The fastener has a guiding part and a fourth fastening part, wherein the fourth fastening part is used to be fastened to the second fastening part. The pressing structure has a first triangle block and a second triangle block. The first triangle block has a first lateral surface, a second lateral surface, a third lateral surface and a guiding hole. The first lateral surface leans against the connecting part; the second triangle block leans against the second lateral surface or the third lateral surface in a sliding mode; the guiding part passes through the connecting part and the guiding hole and is pivotally provided at a pivotal connecting end of the second triangle block. When the second triangle block slides to the third lateral surface from the second lateral surface, the guiding part slides from a first position on the second lateral surface and near the first lateral surface to a second position on the third lateral surface and away from the first lateral surface further to make the pressing structure apply force to the body.

[0013] In one embodiment of the invention, the guiding part and the fourth fastening part are provided at two ends of the connecting part, respectively.

[0014] In one embodiment of the invention, the guiding hole extends from the first lateral surface to the second lateral surface and part of the third lateral surface.

[0015] In one embodiment of the invention, the guiding part is pivotally provided on a pivot of the second triangle block.

[0016] To achieve the above or other objectives, the invention further provides a heat dissipation device which is suitable to dissipate the heat for a heat source on a circuit board. The heat dissipation device mostly includes a retention module, a heat sink and a clip module. The retention module is provided on the circuit board and around the heat source, wherein the retention module has a first fastening part and a second fastening part. The heat sink is provided on the heat source. The clip module is provided across the heat sink and is fastened to the retention module. The clip module includes a body, a fastener and a pressing structure. The body has a pressing part, a third fastening part and a connecting part, wherein the third fastening part and the connecting part are located on two ends of the pressing part. The pressing part is used to make the heat sink press against the heat source, and the third fastening part is used to be fastened to the first fastening part. The fastener has a guiding part and a fourth fastening part, wherein the fourth fastening part is used to be fastened to the second fastening part. The pressing structure has a first triangle block and a second triangle block. The first triangle block has a first lateral surface, a second lateral surface, a third lateral surface and a guiding hole. The first lateral surface leans against the connecting part; the second triangle block leans against the second lateral surface or the third lateral surface in a sliding mode; the guiding part passes through the connecting part and the guiding hole, and is pivotally provided at a pivotal connecting end of the second triangle block. When the second triangle block slides to the third lateral surface from the second lateral surface, the pivotal connecting end slides from a first position on the second lateral surface and near the first lateral surface to a second position on the third lateral surface and away from the first lateral surface further to make the pressing structure apply force to the body.

[0017] In one embodiment of the invention, the guiding part and the fourth fastening part are provided at two ends of the connecting part, respectively.

[0018] In one embodiment of the invention, the guiding hole extends from the first lateral surface to the second lateral surface and part of the third lateral surface.

[0019] In one embodiment of the invention, the guiding part is pivotally provided on a pivot of the second triangle block.

[0020] The pressing structure of the invention utilizes the cooperation of two triangle blocks and a fastener pivotally connected to one of the two triangle blocks to make a heat sink firmly provided on a heat source. Therefore, compared with the conventional clip module, the clip module of the invention has a simple structure, fewer components, convenient operation and a low production cost.

[0021] These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0022] FIG. 1A is a three-dimensional schematic diagram showing a conventional heat dissipation device provided on a heat source.

[0023] FIG. 1B is an exploded diagram showing the heat dissipation device and the heat source in FIG. 1A.

[0024] FIG. 1C is a schematic diagram showing the clip module which is shown in FIG. 1A and is not fastened to a retention module.

[0025] FIG. 1D is a schematic diagram showing the clip module which is shown in FIG. 1C and is fastened to a retention module.

[0026] FIG. 2A is a three-dimensional schematic diagram showing a heat dissipation device provided on a heat source according to the preferred embodiment of the invention.

[0027] FIG. 2B is an exploded diagram showing the heat dissipation device and the heat source in FIG. 2A.

[0028] FIG. 3 is an exploded diagram showing the clip module in FIG. 2B.

[0029] FIG. 4A is a front view showing the heat dissipation device provided on a heat source in FIG. 2A.

[0030] FIG. 4B is a lateral view showing the heat dissipation device in FIG. 4A.

[0031] FIG. 5A is a front view showing the fastening mechanism fastened to a retention module in FIG. 4.

[0032] FIG. 5B is a lateral view showing the heat dissipation device in FIG. 5A.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0033] FIG. 2A is a three-dimensional schematic diagram showing a heat dissipation device provided on a heat source according to the preferred embodiment of the invention, and FIG. 2B is an exploded diagram showing the heat dissipation device and the heat source in FIG. 2A. Please refer to FIG. 2A and FIG. 2B simultaneously, and a heat dissipation structure 200 of the embodiment is suitable to dissipate the heat for a heat source 22 on a circuit board 20 and includes a retention module 210, a heat sink 220 provided on the heat source 22 and a clip module 230.

[0034] In the embodiment, the retention module 210 is provided on the circuit board 20 and around the heat source

22, and the retention module 210 has a first fastening part 212 and a second fastening part 214. In addition, the heat sink 220 is, for example, an extrusion heat sink or other appropriate type of heat sink, and the clip module 230 is provided across the heat sink 220 and is fastened to the first fastening part 212 and the second fastening part 214 of the retention module 210. The clip module 230 of the embodiment is illustrated in detail hereinbelow.

[0035] FIG. 3 is an exploded diagram showing the clip module in FIG. 2B. Please refer to FIG. 2B and FIG. 3, simultaneously. The clip module 230 of the embodiment includes a body 232, a fastener 234 and a pressing structure 236. The body 232 has a pressing part 232a, a third fastening part 232b located at one end of the pressing part 232a and a connecting part 232c located at the other end of the pressing part 232a. In the embodiment, the heat sink 220 has, for example, a notch 220a, and the pressing part 232a of the body 232 is suitable to be provided through the notch 220a of a fin assembly 224 and press against the heat sink 220, and the third fastening part 232b is suitable to be fastened to the first fastening part 212.

[0036] The fastener 234 has a guiding part 234a and a fourth fastening part 234b, and the guiding part 234a of the fastener 234 is provided at the connecting part 232c, and the fourth fastening part 234b is suitable to be fastened to the second fastening part 214. In the embodiment, the first fastening part 212 and the second fastening part 214 have a hook, respectively, and the third fastening part 232b and the fourth fastening part 234b have a fastening hole, respectively, so that the third fastening part 232b can be fastened to the first fastening part 212, and the fourth fastening part 234b can be fastened to the second fastening part 214. Certainly, in other embodiments, the first fastening part 212 and the second fastening part 214 can have fastening holes, and the third fastening part 232b and the fourth fastening part 234b can have hooks, and they are not limited in the invention.

[0037] The pressing structure 236 is mostly composed of a first triangle block 2362 and a second triangle block 2364. The first triangle block 2362 has a first lateral surface S1, a second lateral surface S2 and a third lateral surface S3. In addition, the interior of the first triangle block 2362 has a guiding hole H which extends from the first lateral surface S1 to the second lateral surface S2 and part of the third lateral surface S3. The first lateral surface S1 leans against the connecting part 232c, and the second triangle block 2364 leans against the second lateral surface S2 or the third lateral surface S3 of the first triangle block 2362 in a sliding mode. In addition, the guiding part 234a of the fastener 234 can pass through the connecting part 232c and the guiding hole H and is pivotally provided at a pivotal connecting end P of the second triangle block 2364. In this way, when the second triangle block 2364 moves, the fastener 234 pivotally provided on the second triangle block 2364 can move along with the movement of the second triangle block 2364.

[0038] The above paragraphs mostly illustrate connection relationships between each component of the clip module 230, the retention module 210 and the heat sink 220. How to fasten the clip module 230 to the retention module 210 further to fix the heat sink 220 to the heat source 22 is illustrated in detail hereinbelow.

[0039] FIG. 4A is a front view showing the heat dissipation provided on a heat source in FIG. 2A, and FIG. 4B is a lateral view showing the heat dissipation device in FIG. 4A. FIG. 5A is a front view showing the fastening mechanism fastened to

a retention module in FIG. 4, and FIG. 5B is a lateral view showing the heat dissipation device in FIG. 5A. Please refer to FIG. 4A and FIG. 4B first. When a user wants to fix the heat sink 220 at the heat source 22, he can make the third fastening part 232b of the body 232 fastened to the first fastening part 212 of the retention module 210 and then make the fourth fastening part 234b of the fastener 234 fastened to the second fastening part 214 of the retention module 210. In this way, the pressing part 232a of the body 232 can press against the heat sink 220. When the user does not apply force to the pressing structure 236, the second triangle block 2364 leans against the second lateral surface S2 of the first triangle block 2362, and at this moment, the guiding part 234a pivotally provided on the pivotal connecting end P is located at a first position P1 on the second surface S2 and near the first lateral surface S1, and the least distance between the guiding part 234a and the first lateral surface S1 is a first distance D1.

[0040] Next, as shown in FIG. 4B, when the user press a pressing surface S of the second triangle block 2364 downward, please refer to FIG. 5A and FIG. 5B, and the second triangle block 2364 can slide to the third surface S3 of the first triangle block 2362 from the second surface S2 of the first triangle block 2362. At this moment, the guiding part 234a pivotally provided on the pivotal connecting end P can slide to a second position P2 on the third surface S3 from the first position P1. When the guiding part 234a slides to the second position P2 from the first position P1, the least distance between the guiding part 234a and the first lateral surface S1 is a second distance D2 which is greater than the first distance D1. Since the fourth fastening part 234b of the fastener 234 is fastened to the second fastening part 214 of the retention module 210, when the guiding part 234a pivotally provided at the second triangle block 2362 slides to the second position P2 from the first position P1, the pressing structure 236 can press the connecting part 232c of the body 232 to move downward for a distance (the distance between the guiding part 234a of the fastener 234 and the connecting part 232c of the body 232 is gradually increased) further to enable the body 232 to apply a downward pressure to the heat sink 220. Therefore, the pressing structure 236 can effectively apply the downward pressure to the body 232, and the fastener 234 can also be firmly fastened to the retention module 210. In addition, the guiding part 234a is limited by a critical point CP at the intersection place of the second lateral surface S2 and the third lateral surface S3 and cannot slide back to the first position P1 from the second position P2.

[0041] In the embodiment, since the third fastening part 232b and the fourth fastening part 234b of the fastening mechanism are fastened to the first fastening part 212 and the second fastening part 214 of the retention module 210, respectively, and the body 232 of the clip module 230 can also apply a downward pressure to the heat sink 220, the heat sink 220 can be firmly provided on the heat source 22.

[0042] To sum up, the pressing structure of the invention mostly utilizes the cooperation of two triangle blocks and a fastener pivotally connected to one of the two triangle blocks to make a heat sink firmly provided on a heat source. Therefore, compared with the conventional clip module, the clip module of the invention has a simple structure, fewer components, convenient operation and a low production cost.

[0043] In addition, the pressing structure of the invention only needs to move for a shorter distance to make the body apply a pressure to the heat sink, so that the height of the fastener is lower and the whole height of the clip module is

lower than the height of the conventional clip module. In this way, the pressing structure pivotally provided on the fastener is not easy to interfere with electronic components around the heat sink because of the limitation of the space when the pressing structure is pressed. That is, the clip module of the invention can successfully fix the heat sink to the heat source. [0044] Although the present invention has been described in considerable detail with reference to certain preferred embodiments thereof, the disclosure is not for limiting the scope of the invention. Persons having ordinary skill in the art may make various modifications and changes without departing from the scope and spirit of the invention. Therefore, the scope of the appended claims should not be limited to the description of the preferred embodiments described above.

What is claimed is:

1. A clip module which is suitable to cooperate with a retention module to fix a heat sink on a heat source, wherein the retention module has a first fastening part and a second fastening part, the clip module comprising:

a body having a pressing part, a third fastening part and a connecting part, wherein the third fastening part and the connecting part are located at two ends of the pressing part, the pressing part is used to make the heat sink press against the heat source, and the third fastening part is used to be fastened at the first fastening part;

a fastener having a guiding part and a fourth fastening part, wherein the fourth fastening part is used to be fastened at the second fastening part; and

a pressing structure having a first triangle block and a second triangle block, wherein the first triangle block has a first lateral surface leaning against the connecting part, a second lateral surface, a third lateral surface and a guiding hole, and the second triangle block leans against the second lateral surface or the third lateral surface in a sliding mode, and the guiding part passes through the connecting part and the guiding hole and is pivotally provided at the second triangle block, and when the second triangle block slides to the third lateral surface from the second lateral surface, the guiding part slides from a first position on the second lateral surface and near the first lateral surface to a second position on the third lateral surface and away from the first lateral surface further to make the pressing structure apply force to the body.

2. The clip module according to claim 1, wherein the guiding part is provided at the connecting part.

3. The clip module according to claim 1, wherein the guiding hole extends from the first lateral surface to the second lateral surface and part of the third lateral surface.

4. The clip module according to claim 1, wherein the guiding part is pivotally provided on a pivot of the second triangle block.

5. A heat dissipation device which is suitable to dissipate the heat for a heat source on a circuit board, the heat dissipation device comprising:

a retention module provided on the circuit board and around the heat source, wherein the retention module has a first fastening part and a second fastening part;

a heat sink provided on the heat source; and

a clip module which is provided across the heat sink and is fastened at the retention module, the clip module comprising:

a body having a pressing part, a third fastening part and a connecting part, wherein the third fastening part and the connecting part are located on the pressing part, the pressing part is used to make the heat sink press against the heat source, and the third fastening part is used to be fastened at the first fastening part;

a fastener having a guiding part and a fourth fastening part, wherein the fourth fastening part is used to be fastened at the second fastening part; and

a pressing structure having a first triangle block and a second triangle block, wherein the first triangle block has a first lateral surface leaning against the connecting part, a second lateral surface, a third lateral surface and a guiding hole, and the second triangle block leans against the second lateral surface or the third lateral surface in a sliding mode, and the guiding part passes through the connecting part and the guiding hole and is pivotally provided at a pivotal connecting end of the second triangle block, and when the second triangle block slides to the third lateral surface from the second lateral surface, the pivotal connecting end slides from a first position on the second lateral surface and near the first lateral surface to a second position on the third lateral surface and away from the first lateral surface further to make the pressing structure apply force to the body.

6. The heat dissipation device according to claim 5, wherein the guiding part and the fourth fastening part are provided at the connecting part, respectively.

7. The heat dissipation device according to claim 5, wherein the guiding hole extends from the first lateral surface to the second lateral surface and part of the third lateral surface.

8. The heat dissipation device according to claim 5, wherein the guiding part is pivotally provided on a pivot of the second triangle block.

* * * * *