US 20090151897A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2009/0151897 A1**

(43) **Pub. Date: Jun. 18, 2009**

LI et al.

(54) **HEAT DISSIPATION DEVICE**

(75) Inventors: **WU LI**, Shenzhen (CN); **YI-QIANG WU**, Shenzhen (CN)

Correspondence Address:
PCE INDUSTRY, INC.
ATT. Steven Reiss
458 E. LAMBERT ROAD
FULLERTON, CA 92835 (US)

(73) Assignees: **FU ZHUN PRECISION INDUSTRY (SHEN ZHEN) CO., LTD.**, Shenzhen City (CN); **FOXCONN TECHNOLOGY CO., LTD.**, Tu-Cheng (TW)

(21) Appl. No.: **11/959,323**

(22) Filed: **Dec. 18, 2007**

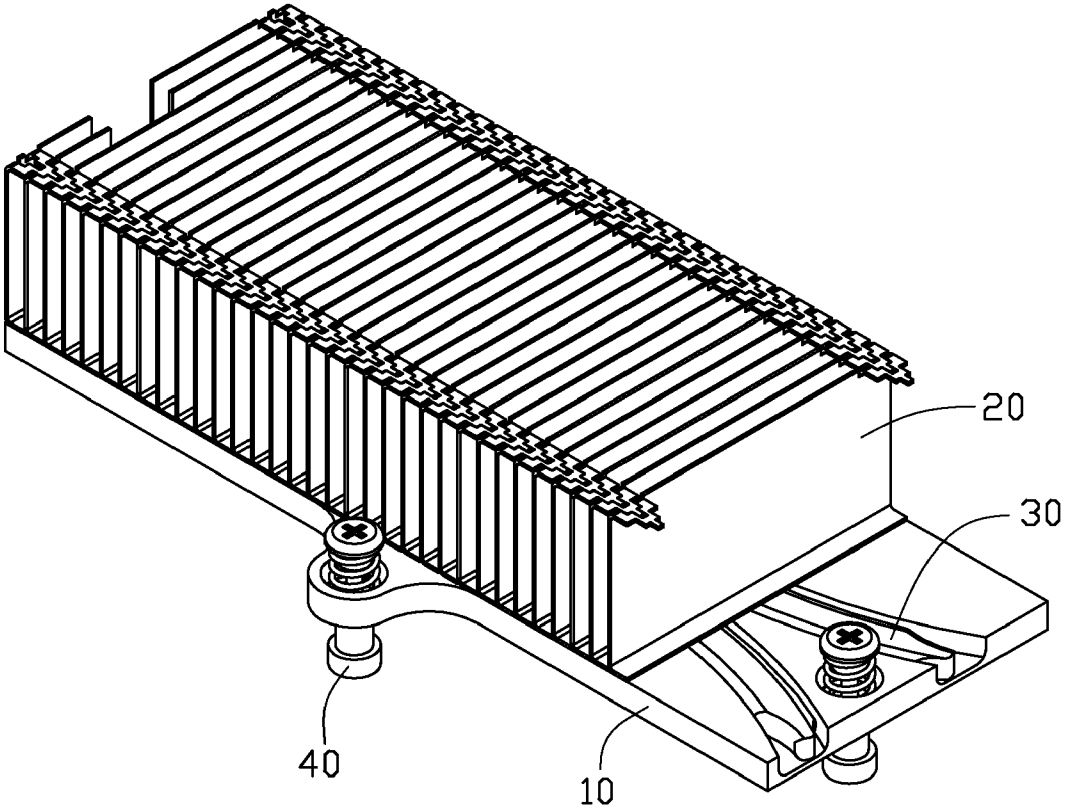
Publication Classification

(51) **Int. Cl.**
F28F 7/00 (2006.01)

(52) **U.S. Cl.** **165/80.3**

(57) **ABSTRACT**

A heat dissipation device includes a base, a fin group mounted on a top surface of the base, and a plurality of fasteners secured on the base. Each fastener includes a bolt extending through the base, and an elastic sleeve engaging with the bolt under the base. The sleeve defines a hole and the hole has a configuration such that the sleeve securely clasp the bolt. The bolt extends through the base and engages in the hole of the sleeve.



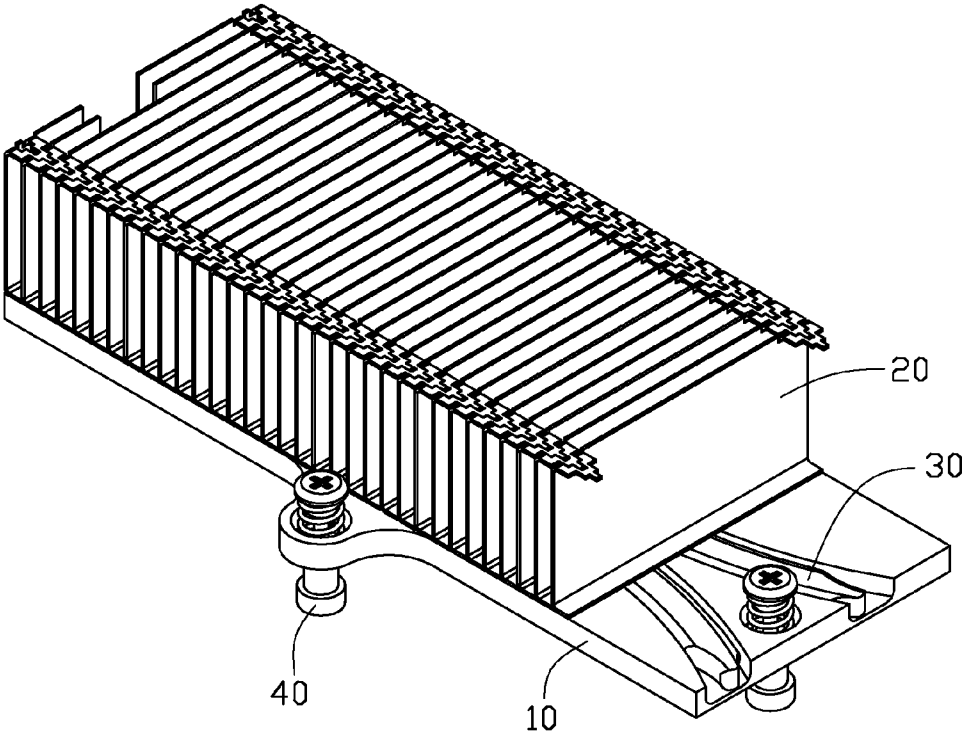


FIG. 1

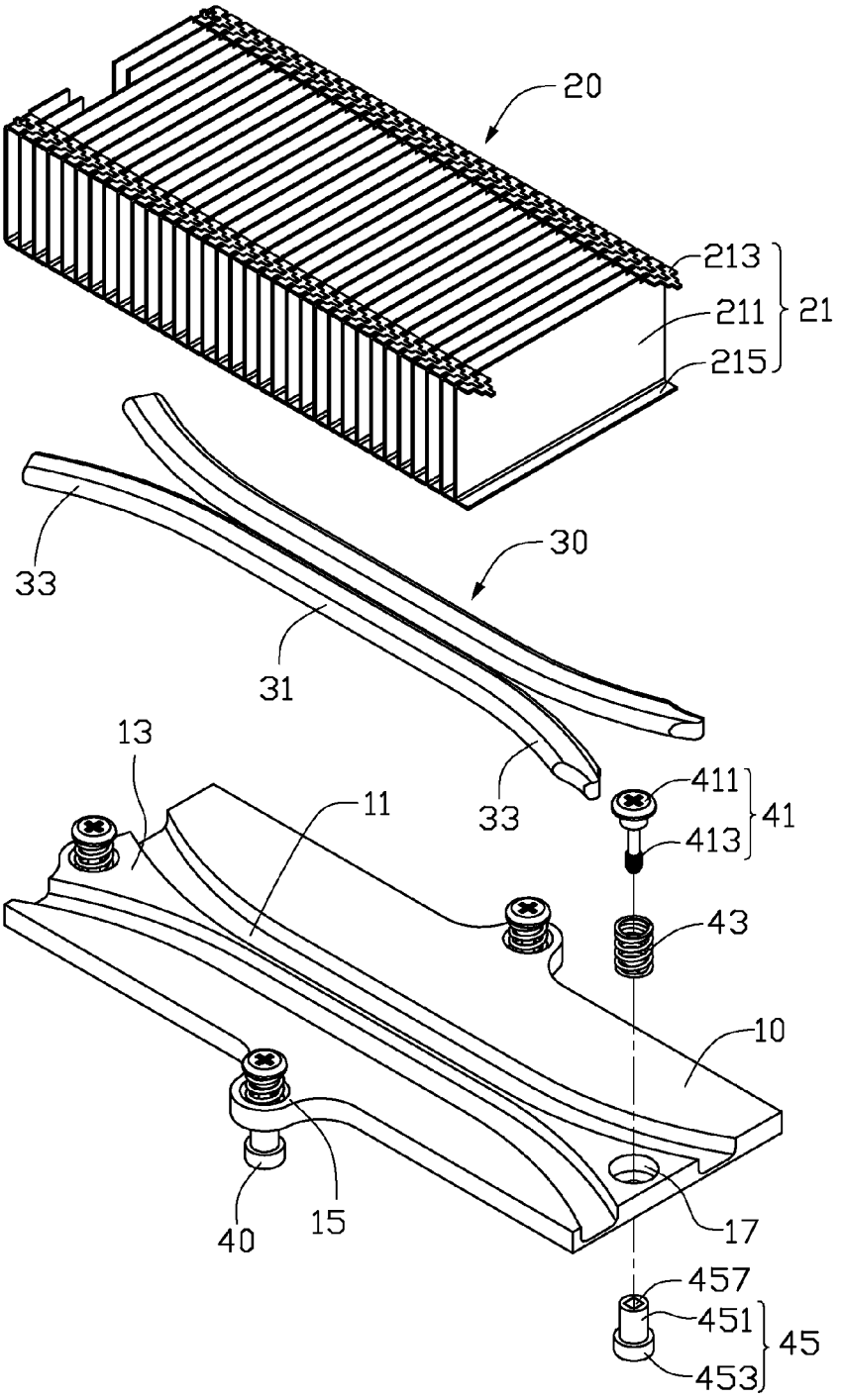

20
213
211
215
21
33
30
31
13
11
33
411
413
41
43
10
40
15
17
457
451
453
45

FIG. 2

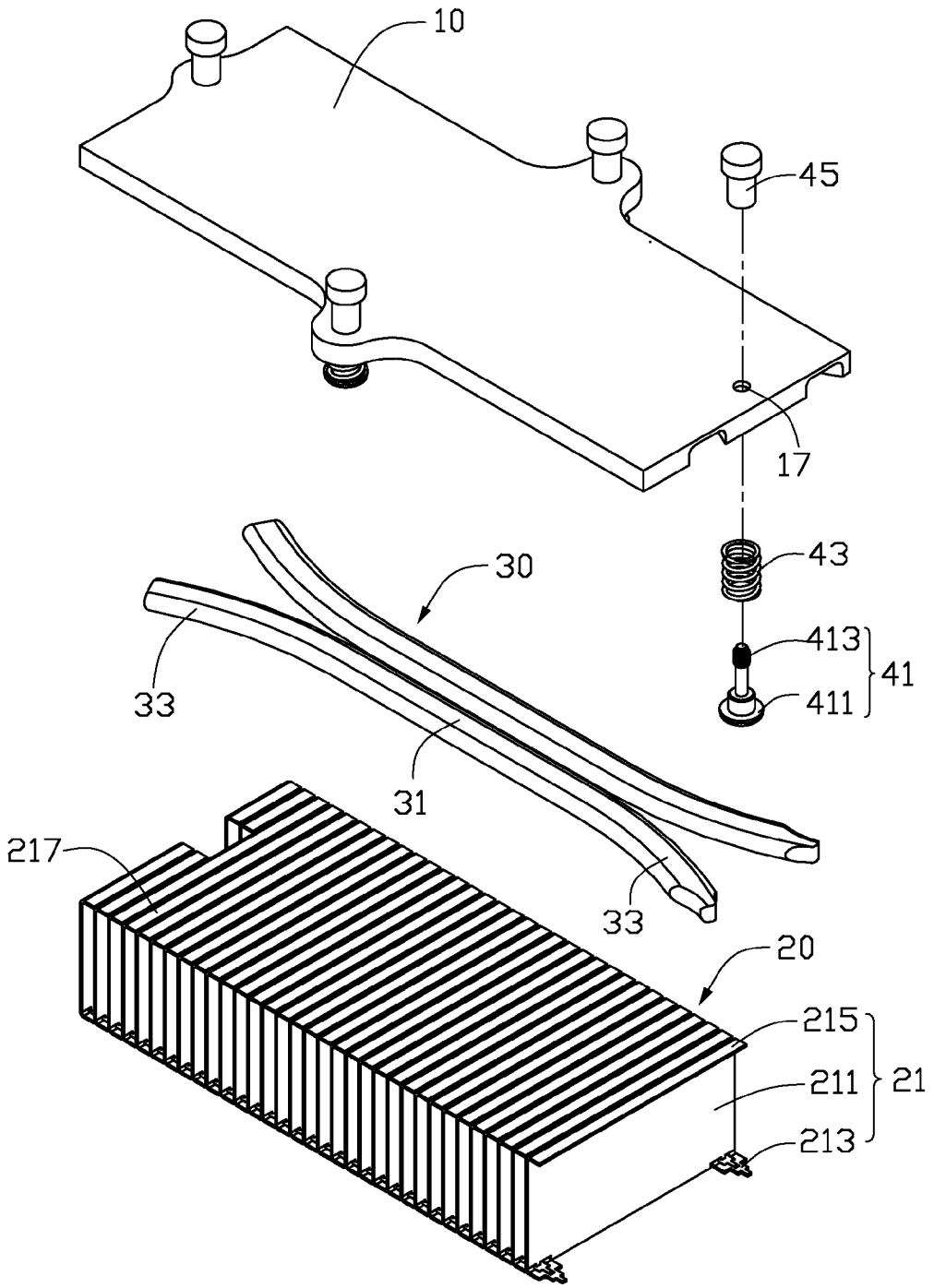


FIG. 3

HEAT DISSIPATION DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a heat dissipation device, more particularly to a heat dissipation device with bolts mounted thereon.

[0003] 2. Description of Related Art

[0004] A conventional heat dissipation device, for dissipating heat generated by an electronic component on a printed circuit board, includes a base connecting with the electronic component, a plurality of fins formed on a top surface of the base and a plurality of bolts extending through the base for engaging with corresponding nuts to mounting the heat dissipation device to the printed circuit board. Each bolt includes a head and a thread end. A spring fits is encircling the bolt and is sandwiched between the head of the bolt and the base. Before the heat dissipation device mounted to the printed circuit board, the thread end of the bolt is screwed engaging in a corresponding screw thread hole defined in the base, and the springs loosely fit around the bolts. When transporting, the bolts drop from the base along the screw thread of the base because of vibration or other factors, which results in missing of the bolts from the heat dissipation device. This has adversely affected assembly quality of the heat dissipation device when the heat dissipation device is mounted to the printed circuit board.

[0005] What is needed, therefore, is a heat dissipation device which has bolts securely keeping with the heat dissipation device when transporting.

SUMMARY OF THE INVENTION

[0006] A heat dissipation device includes a base, a fin group mounted on a top surface of the base, and a plurality of fasteners secured on the base. Each fastener includes a bolt extending through the base, and an elastic sleeve engaging with the bolt under the base. The sleeve defines a hole and the hole has a configuration such that the sleeve securely clasp the bolt. The bolt extends through the base and engages in the hole of the sleeve.

[0007] Other advantages and novel features will become more apparent from the following detailed description of preferred embodiments when taken in conjunction with the accompanying drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Many aspects of the present embodiments can be better understood with reference to the following drawings. The components in the drawings are not necessarily drawn to scale, the emphasis instead being placed upon clearly illustrating the principles of the present embodiments. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0009] FIG. **1** is an assembled view of a heat dissipation device in accordance with a preferred embodiment of the present invention;

[0010] FIG. **2** is an exploded view of FIG. **1**; and

[0011] FIG. **3** is an inverted view of FIG. **3**.

DETAILED DESCRIPTION OF THE INVENTION

[0012] Referring to FIG. **1**, a heat dissipation device in accordance with a preferred embodiment of the present invention comprises a base **10** adapted for contacting with an electronic component (not shown) mounted on a printed circuit board (not shown), a fin group **20** mounted on a top of the base **10**, a pair of heat pipes **30** sandwiched between the fin group **20** and the base **10**, and a plurality of fasteners **40** secured on the base **10**.

[0013] Referring to FIGS. **2-3** also, the fin group **20** consists of a plurality of single fins **21**. The fins **21** are spaced from each other such that channels (not labeled) are evenly defined between the fins **21**. Each fin **21** comprises a rectangular body **211**, a pair of clasps **213** formed on opposite ends of a top edge of the body **211**, and an elongated flange **215** formed on a bottom edge of the body **211** along the same direction of the clasps **213**. The clasps **213** of the adjacent fins **21** are clasped each other, thus, the fin group **20** is formed. The flanges **215** are assembled together to form a flat bottom surface **217** to connect with the base **10**. A cutout (not labeled) is defined at a rear end of the fin group **20** to prevent the fin group **20** and the fastener **40** from interfering with each other when the fasteners **40** are mounted on the base **10**.

[0014] Each heat pipe **30** is flattened and comprises a top surface (not shown) and a bottom surface (not shown) opposite to the top surface. Each heat pipe **30** has a straight evaporating portion **31** and two bent condensing portions **33** extending from opposite ends of the evaporating portion **31**. When the heat pipes **30** are soldered in the base **10**, the evaporating portions **31** are parallel and near to each other, and corresponding condensing portions **33** are spaced from each other. Thus, a distance between the corresponding condensing portions **33** is larger than that between the evaporating portions **33**. The heat pipes **30** defines an X-shaped configuration in the base **10**. [0015] The base **10** has a rectangular configuration and is made of metal such as aluminum or copper which has a high degree of heat conductivity. A length of the base **10** is larger than that of the fin group **20**. The base **10** has a bottom surface (not labeled) and a top surface (not labeled) opposite to the bottom surface. The bottom surface of the base **10** intimately contacts with the electronic component. The bottom surface **217** of the fin group **20** thermally contacts with the top surface of the base **10**. Two grooves **11** are defined at a top portion of the base **10** along a longitudinal direction of the base **10**. The heat pipes **30** are received in the grooves **11**. The top surface of the heat pipes **30** and the top surface of the base **10** are coplanar. Each groove **11** has a straight portion (not labeled) located at a centre of the base **10** and two bent portions (not labeled) extending from opposite ends of the straight portion and located at a front and rear portion of the base **10** respectively. The straight portions of the grooves **11** are adjoining to each other, and the bent portions at the front or rear portion of the base **10** are spaced from each other. Thus, the front and the rear portions of the base **10** form a substantially triangular protrusion portion **13** respectively. Two bulges **15** extend from the base **10** along a transverse direction of the base **10**. The bulges **15** and the centre of the protrusion portions **13** define four counterbores **17**, respectively. Each counterbore **17** defines a first through hole (not labeled) at a top portion of the base **10** and a smaller second through hole (not labeled) at a bottom portion of the base **10**. Each fastener **40** is mounted in each counterbore **17**.

[0015] Each fastener **40** comprises a bolt **41** received in the counterbore **17**, a spring **43** encircling the bolt **41** and an elastic sleeve **45** engaged with the bolt **41**. The bolt **41** has a circular head **411** and a shaft **413** extending downwardly from the head **411**. The shaft **413** terminates with a screw end adapted for engaging in a nut (not shown) or a back plate (not

shown) to mount the heat dissipation device on the printed circuit board. The spring **43** has an outer diameter smaller than a diameter of the head **411** and larger than a diameter of the shaft **413**. Each sleeve **45** is made of elastic material such as rubber and comprises a cylindrical base **453** and a cylindrical mounting portion **451** with a through hole **457** extending through a centre of the base **453**. The mounting portion **451** has a diameter larger than that of the second through hole of the counterbore **17**. The through hole **457** has a diameter smaller than that of the shaft **413** of the bolt **41**. In this embodiment, the mounting portion **451** has a circular cross section, and the through hole **457** is rectangular in the cross section. The shaft **413** of each bolt **41** extends the counterbore **17** and engages in the sleeve **45**, thus, the bolt **41** is stably mounted on the base **10**.

[0016] In assembly, the heat pipes **30** are soldered in the grooves **11** of the base **10**, and the fin group **20** are soldered on the top surface of the base **10**, and the fasteners **40** are secured on the base **10**. A rear edge of the fin group **20** is aligned with a rear edge of the base **10**. The fastener **40** located at the rear end of the base **10** is positioned in the cutout of the fin group **20**. A front end of the fin group **20** is spaced from a front end of the base **10** and not covers the fastener **40** located at the front end of the base **10**.

[0017] It is believed that the present embodiments and their advantages will be understood from the foregoing description, and it will be apparent that various changes may be made thereto without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the examples hereinbefore described merely being preferred or exemplary embodiments of the invention.

What is claimed is:

1. A heat dissipation device adapted for dissipating heat generated by an electronic component mounted on a printed circuit board comprising:

a base;

a fin group mounted on a top surface of the base; and

a plurality of fasteners secured on the base, each fastener comprising a bolt extending through the base and an elastic sleeve engaging with the bolt under the base;

wherein the sleeve defines a hole and the hole has a configuration such that the sleeve securely clasp the bolt, and the bolt extends through the base and engages in the hole of the sleeve.

2. The heat dissipation device as claimed in claim **1** further comprising a spring encircling the bolt of each of the fasteners, wherein the bolt has a head and a shaft extending from the head, and the spring is sandwich between the head of the bolt and the base.

3. The heat dissipation device as claimed in claim **2**, wherein the spring has an out diameter smaller than a diameter of the head and larger than a diameter of the shaft of the bolt of each of the fastener, and the diameter of the shaft is larger than that of the hole of the sleeve, the shaft extending through the base and engaging in the hole of the sleeve.

4. The heat dissipation device as claimed in claim **2**, wherein the base defines a plurality of counterbores receiving the fasteners therein, each counterbore having a first through hole located at a top portion of the base and a smaller second through hole located at a bottom portion of the base, a part of spring being received in the first through hole and the shaft of the bolt extending through the counterbore.

5. The heat dissipation device as claimed in claim **4**, wherein the sleeve has a diameter larger than that of the second through hole of the counterbore and is located under a bottom surface of the base.

6. The heat dissipation device as claimed in claim **1**, wherein the sleeve is made of elastic material.

7. The heat dissipation device as claimed in claim **1** further comprising a pair of heat pipes sandwiched between the fin group and the base.

8. The heat dissipation device as claimed in claim **7**, wherein each of heat pipe has a straight evaporating portion located at a centre of the base and two bent condensing portions extending from opposite ends of the evaporating portion, and a distance between the corresponding condensing portions is larger than that of between the evaporating portions.

9. The heat dissipation device as claimed in claim **7**, wherein each of the heat pipes is flattened and comprises a top surface, and the top surfaces of the heat pipes and the top surface of the base are coplanar.

10. The heat dissipation device of claim **8**, wherein the pair of heat pipes define an X-shaped configuration in the base.

11. The heat dissipation device as claimed in claim **1**, wherein the fin group comprises a plurality of fins and the fins are clasped each other by a clasp formed on a top edge of each of the fins.

12. The heat dissipation device as claimed in claim **11**, wherein each of the fins of the fin group further comprises an elongated flange formed on a bottom edge thereof, and the flange are assembled together to contact the top surface of the base.

13. The heat dissipation device of claim **1**, wherein the hole of the sleeve is rectangular in a cross section direction of the sleeve.

14. The heat dissipation device of claim **1**, wherein the sleeve comprises a base portion and mounting portion extending from the base, the hole extending through a centre of the mounting portion.

* * * * *