



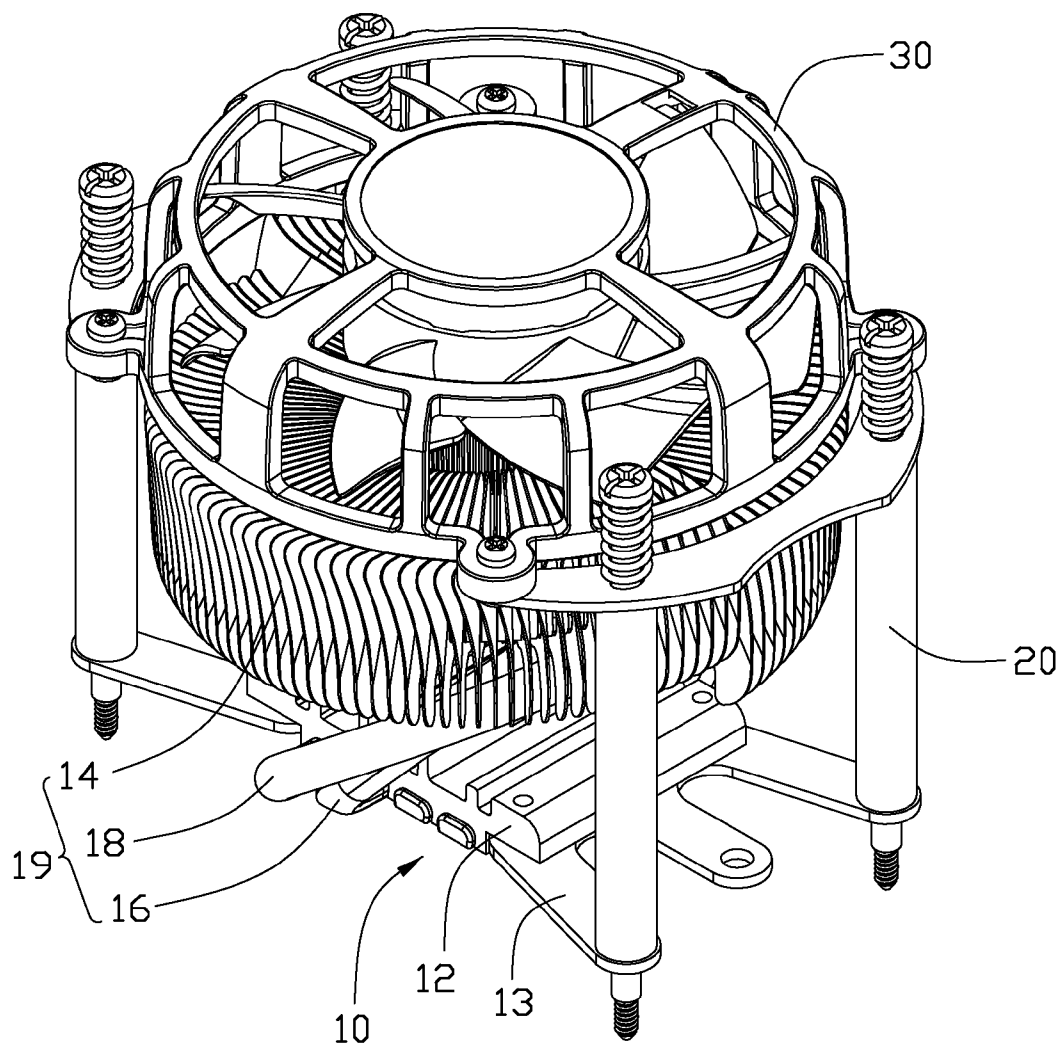
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XU(10) **Pub. No.: US 2009/0236077 A1**(43) **Pub. Date: Sep. 24, 2009**(54) **HEAT DISSIPATION DEVICE****Publication Classification**(75) Inventor: **HONG-BO XU**, Shenzhen (CN)(51) **Int. Cl.**
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PCE INDUSTRY, INC.**ATT. Steven Reiss****458 E. LAMBERT ROAD****FULLERTON, CA 92835 (US)**(52) **U.S. Cl.** **165/80.3**(57) **ABSTRACT**

A heat dissipation device for dissipating heat generated by an electronic component includes a base, a pair of fin groups and heat pipes connecting the base with the fin groups. The base is used for thermally contacting with the electronic component. The fin groups includes a plurality of fins located over the base. Each of the heat pipes includes an evaporating portion received in the base, a condensing portion extending spirally and upwardly from an end of the evaporating portion through a corresponding fin group. The fins of each fin group is so arranged that each fin group has an arch-shaped profile. The condensing portions in each fin group are parallel to each other. A fan is mounted over the fin groups.

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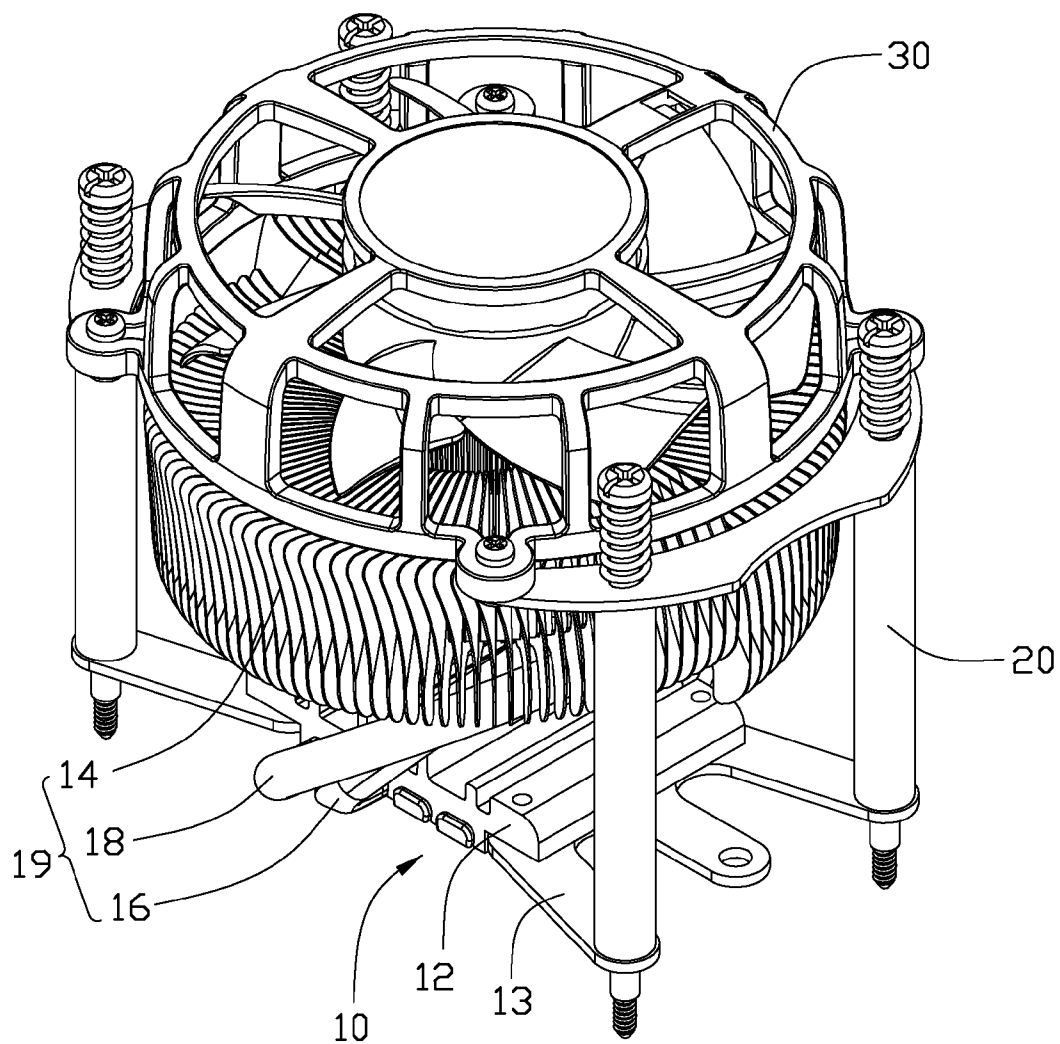


FIG. 1

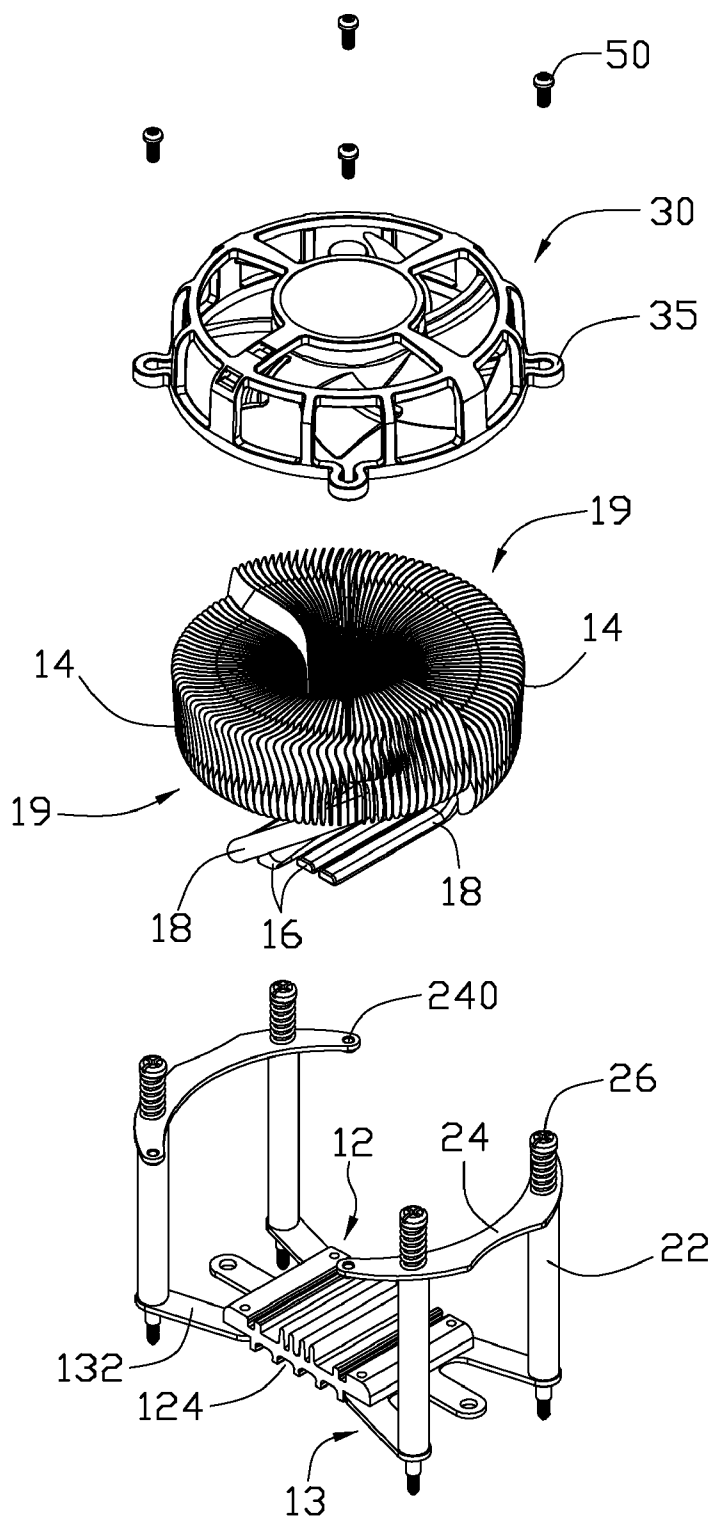


FIG. 2

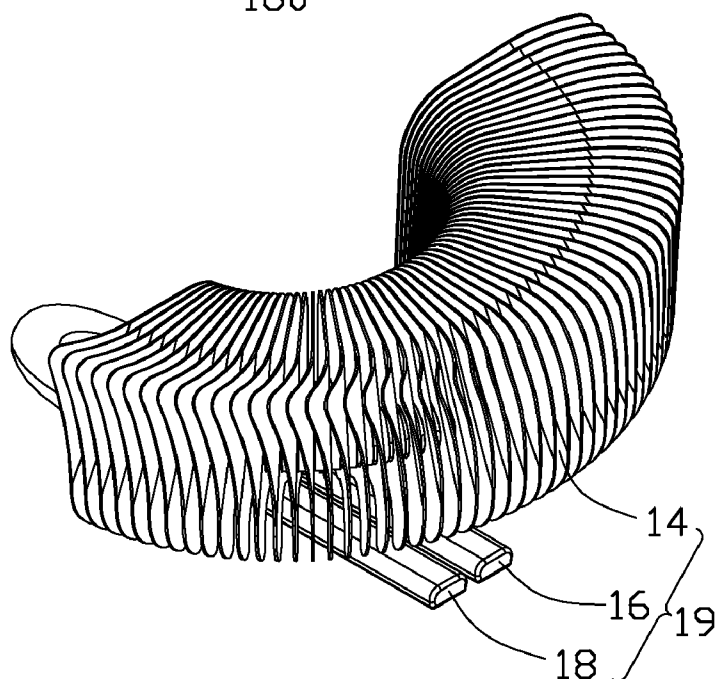
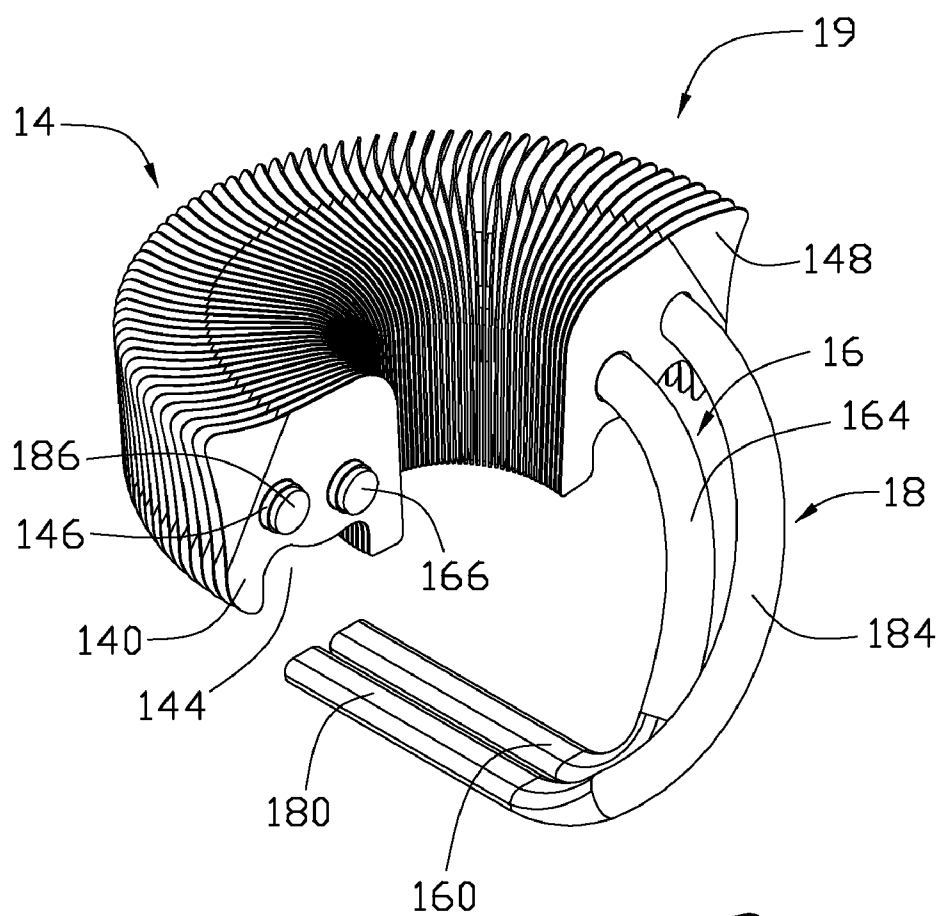


FIG. 3

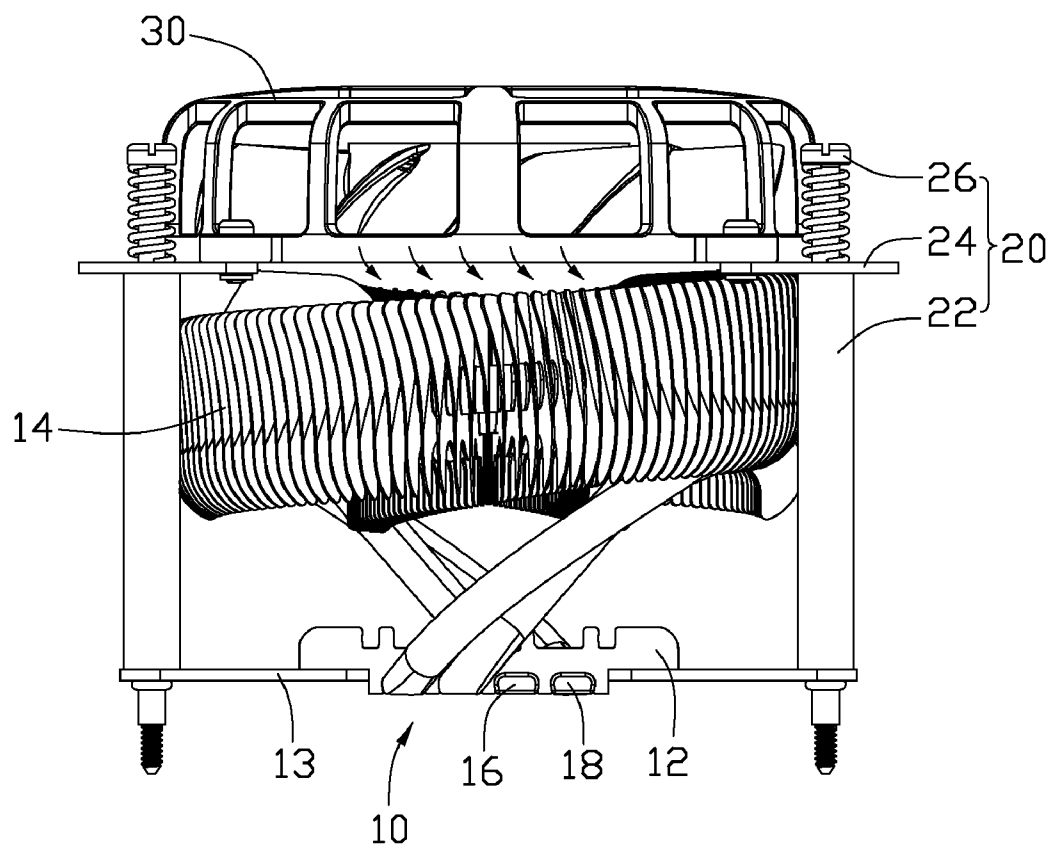


FIG. 4

HEAT DISSIPATION DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to a heat dissipation device, and more particularly to a heat dissipation device for dissipating heat generated by an electronic component.

[0003] 2. Description of related art

[0004] A computer central processing unit (CPU) is the core controller of electrical signals in the contemporary personal computers. Continued development of the CPUs has enabled them to perform more and more functions. Heat generated by the CPUs has thus increased enormously. Such heat can adversely affect the operational stability of the computers. Measures must be taken to efficiently remove the heat from the CPU. Typically, a dissipation device having great heat conductivity is mounted on the CPU to remove the heat therefrom.

[0005] The conventional heat dissipation device commonly comprises a base thermally contacting with the CPU, a plurality of fins extending upwardly from a top of the base, and a fan mounted on a top portion of the heat sink. The fins are perpendicular to the base and parallel to each other with a predetermined distance; thus, a plurality of linear airflow passages is defined between the fins. When the heat dissipation device works, airflow generated by the fan blows spirally and downwardly into the airflow passages of the heat sink. The fins are so oriented that they have varied confronting angles with the airflow. Accordingly, a part of the fins cannot have a thorough contact with airflow, whereby heat in the part of the fins cannot be effectively taken away by the airflow flowing through the heat sink. Thus, heat dissipation efficiency of the heat dissipation device is not high and still needs to improve.

[0006] Thus, it is desired to devise a heat dissipating device which having a good heat dissipation efficiency.

SUMMARY OF THE INVENTION

[0007] A heat dissipation device for dissipating heat generated by an electronic component includes a base, a fin group and a heat pipe connecting the base with the fin group. The base thermally contacts with the electronic component. The fin group includes a plurality of fins located at a top of the base. The heat pipe includes an evaporating portion received in the base, a condensing portion extending spirally and upwardly from an end of the evaporating portion. The condensing portion of the heat pipe extends through the fin group. The fins of the fin group are arranged to have an arch-shaped profile. A fan is mounted over the fin group.

[0008] 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

[0009] 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.

[0010] FIG. 1 is an assembly view of a heat dissipation device in accordance with a preferred embodiment of the present invention;

[0011] FIG. 2 is an exploded view of the heat dissipation device of FIG. 1;

[0012] FIG. 3 is an exploded view of heat sinks of the heat dissipation device of FIG. 2; and

[0013] FIG. 4 is a front elevational view of FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Referring to FIGS. 1-2, they illustrate a heat dissipation device for dissipating heat generated by an electronic component (not shown) mounted on a printed circuit board (not shown). The heat dissipation device comprises a heat sink assembly 10 thermally contacting with the electronic component, a fan holder 20 securing the heat sink assembly 10 on the printed circuit board, and a fan 30 mounted on a top of the heat sink assembly 10 and supported by the fan holder 20.

[0015] The heat sink assembly 10 comprises a base 12 contacting with the electronic component and a pair of heat sinks 19 located at a top of the base 12. Each heat sink 19 comprises a fin group 14, and a first heat pipe 16 and a second heat pipe 18 connecting the fin group 14 with the base 12.

[0016] The base 12 is located at a bottom of the fin groups 14 and spaced from the fin groups 14. The base 12 is substantially rectangular and made of metal with high degree of heat conductivity such as copper or aluminum. Four spaced grooves 124 are parallel to each other and defined in a bottom portion of the base 12 for receiving the first and second heat pipes 16, 18. A plurality of ribs (not labeled) extends from a top of the base 12. Two locking portions (not labeled) are formed at opposite sides of the base 12 for engaging with a pair of locking members 13. Each locking member 13 comprises a mounting plate (not shown) located below the locking portions of the base 12 and a pair of legs 132 extending outwardly from opposite ends of the mounting plate. Screws (not shown) extend through the mounting plates and engage with the locking portions of the base 12 to mount the locking members 13 on the base 12.

[0017] Referring to FIGS. 3-4 also, each first heat pipe 16 comprises a flattened and horizontal evaporating portion 160 received in a corresponding groove 124 of the base 12, an arc-shaped condensing portion 166 received in the fin group 14, and a connecting portion 164 interconnecting the evaporating portion 160 and the condensing portion 166. The connecting portion 164 and the condensing portion 166 extend spirally and upwardly from an end of the evaporating portion 160 along an anti-clockwise direction. Each second heat pipe 18 comprises a flattened evaporating portion 180 received in a corresponding groove 124 of the base 12, an arc-shaped condensing portion 186 received in the fin group 14, and a connecting portion 184 connecting the evaporating portion 180 with the condensing portion 186. More specifically, the arc-shaped condensing portion 186 has a semicircular configuration. As shown in FIG. 4, the connecting portions 164, 184 of the heat pipes 16, 18 in connection with one of the fin groups 14 extend from a front side of the base 12, while the connecting portions 164, 184 of the heat pipes 16, 18 in connection with the other of the fin groups 14 extend from a rear side of the base 12. The two evaporating portions 160, 180 of the first and second heat pipes 16, 18 are adjoined. The connecting portion 184 and the condensing portion 186 extend spirally and upwardly from an end of the evaporating

portion **180** along an anti-clockwise direction. The condensing portion **186** is located at an outer side of the fin group **14** and the condensing portion **166** is located at an inner side of the fin group **14**. The condensing portion **186** and the condensing portion **166** in the same fin group **14** are parallel to each other.

[0018] Each fin group **14** comprises a plurality of vertical fins **140**. The fins **140** are spaced from each other with a predetermined distance; thus a plurality of airflow passages (not labeled) is defined between every neighboring two of the fins **140**. Each fin **140** is substantially rectangular and perforated with two through holes (not labeled) at a centre portion thereof. An outward corner of each fin **140** is bent to form a bent plate **148** for guiding airflow generated by the fan into the airflow passages of the fin group **14**. A cutout **144** is defined in a lower portion of each fin **140** to receive the connecting portions **164**, **184** of the first and second heat pipes **16**, **18** of the other heat sink **19**. Annular flanges **146** are formed during punching the through holes of the fins **14**. The flanges **146** in each fin group **14** are soldered together to form a spiral-shaped channel (not labeled) along an anti-clockwise direction; thus, when the fins **140** of each fin group **14** are assembled together, two spiral channels (not labeled) are defined in the each fin group **14**. The condensing portions **166**, **186** of the first and second heat pipes **16**, **18** are soldered in the channels, so that the first and second heat pipes **16**, **18** and the fin group **14** are assembled together. The fins **140** of the fin group **14** are perpendicular to the condensing portions **160**, **180** of the first and second heat pipes **16**, **18**.

[0019] The pair of heat sinks **19** are located at opposite sides of the base **12**. The evaporating portions **160**, **180** of the first and second heat pipes **16**, **18** are received in the grooves **124** of the base **12** and coplanar with a bottom surface of the base **12** to contact with the electronic component. The connecting portions **164**, **184** of the first and second heat pipes **16**, **18** of one of the heat sinks **19** are opposite those of the other of the heat sinks **19**. The connecting portions **164**, **184** of the first and second heat pipes **16**, **18** of the two heat sinks **19** are received in the cutouts **144** of the fin groups **14**. The fin groups **14** each are formed with a substantially arch-shaped configuration. The fin groups **14** together form an annular configuration.

[0020] The fan holder **20** comprise four sleeves **22** each with a bottom portion abutting a corresponding leg **132** of the locking members **13**, a pair of arc-shaped supporting plates **24** mounted on tops of the sleeves **22** and four elongated screws **26**. The screws **26** extend through the supporting plates **24**, the sleeves **22** and the legs **132** to threadedly engage with a fastening plate (not shown) under the printed circuit board thereby to mount the heat sink assembly **10** and the fan holder **20** on the printed circuit board. Opposite ends of each supporting plates **24** define mounting holes **240** respectively, whereby screws **50** can extend through the fan **30** to threadedly engage in the mounting holes **240** to thereby mount the fan **30** on the supporting plates **24**.

[0021] The fan **30** has a circular configuration and comprises a cage (not labeled) and an impeller assembly (not labeled) received in the cage. Four mounting portions **35** extend outwardly from the cage of the fan **30**, located corresponding to the opposite ends of the supporting plates **24**. The screws **50** extend through the mounting portions **35** and engage into the mounting holes **240** of the supporting plates **24** to mount the fan **30** on the supporting plates **24**.

[0022] In use, heat generated by the electronic component is absorbed by the base **12**, then transferred to the fin group **14** via the first and second heat pipes **16**, **18**, and finally dispersed into ambient cool air. Airflow generated by the fan **30** spirally blows into airflow passages of the fin groups **14** along the anti-clockwise direction to dissipate heat generated by the electronic component. Due to the airflow passages of the fin groups **14** extending upwardly along the anti-clockwise direction and the airflow spirally blowing into the airflow passages along the anti-clockwise direction, the airflow generated by the fan **30** can easily blow into the airflow passages to have a thorough contact with all of the fins **140**. Thus, heat dissipation efficiency of the heat dissipation device is improved. Furthermore, the bent plates **148** of the fin groups **14** extend outwardly from the fins **140**; thus, the airflow generated by the fan **30** can more easily blow into the airflow passages by a guidance of the bent plates **148** to take away heat in the fins **140**.

[0023] 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 comprising a plurality of fins located above and spaced from a top of the base; and

a heat pipe connecting the base with the fin group and comprising an evaporating portion received in the base, a condensing portion extending spirally and upwardly from an end of the evaporating portion through the fin group.

2. The heat dissipation device as claimed in claim 1, wherein the condensing portion extends spirally along an anti-clockwise direction, and each of the fins of the fin group comprises a bent plate extending upwardly and outwardly from an outward corner thereof to guide airflow into a passage between two neighboring fins.

3. The heat dissipation device as claimed in claim 1, wherein the condensing portion of the heat pipe has a semi-circular-shaped configuration, and each of the fins of the fin group is perpendicular to the condensing portion.

4. The heat dissipation device as claimed in claim 3 further comprising another heat pipe located opposite to the heat pipe, the another heat pipe comprising an evaporating portion received in the base, and a condensing portion extending spirally and upwardly from an end of the evaporating portion thereof, the condensing portion of the another heat pipe extending through another fin group.

5. The heat dissipation device as claimed in claim 4, wherein the fin group and the another fin group together form an annular configuration.

6. The heat dissipation device as claimed in claim 4, wherein the heat pipe and the another heat pipe comprise two connecting portions located at two opposite sides of the base, respectively, and interconnecting with the evaporating portions and the condensing portions of the heat pipe and the another heat pipe.

7. The heat dissipation device as claimed in claim 6, wherein the fin group and the another fin group each defines a cutout at a lower portion thereof, the cutouts receiving the connecting portions of the heat pipes respectively.

8. The heat dissipation device as claimed in claim 1 further comprising a fan holder comprising locking members secured to the base, a plurality of elongated sleeves mounted on the locking members and a pair of arc-shaped supporting plates mounted on tops of the elongated sleeves, a fan being mounted on the arc-shaped supporting plates of the fan holder.

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

- a base adapted for thermally contacting with the electronic component;

- a heat sink assembly located at a top of the base, the heat sink comprises a pair of heat pipes and a plurality of fins extending spirally and upwardly and formed an annular configuration, each of the heat pipes comprising an evaporating portion received in the base, and a condensing portion extending spirally upwardly from an end of the evaporating portion thereof, the condensing portions extending through and supporting the fins thereon; and

- a fan mounted on a top of the heat sink assembly.

10. The heat dissipation device as claimed in claim 9, wherein the fins are spaced from each other and extend spirally along an anti-clockwise direction.

11. The heat dissipation device as claimed in claim 9, wherein each of the fins has a bent plate extending outwardly and upwardly from an outward corner thereof to guide airflow generated by the fan into a passage between two neighboring fins.

12. The heat dissipation device as claimed in claim 9, wherein the heat pipes comprise connecting portions located at opposite sides of the base and received in a cutout defined at a lower portion of each of the fins.

13. A heat dissipation device comprising:

- a base;

- a pair of fins groups each having an arch-shaped profile and mounted over the base;

- a fan mounted over the fin groups;

- a first heat pipe having an evaporating portion mounted to the base and a condensing portion extending upwardly and spirally from the evaporating portion and through one of the fin groups and;

- a second heat pipe having an evaporating portion mounted to the base and a condensing portion extending upwardly and spirally from the evaporating portion of the second heat pipe and through the other of the fin groups;

14. The heat dissipation device as claimed in claim 13 further comprising a fan holder including a locking member secured to the base, a sleeve mounted on the locking member, a supporting plate mounted on the sleeve and a screw extending through the supporting plate, the sleeve and the fastening member, the fan being mounted on the supporting plate.

15. The heat dissipation device as claimed in claim 13 further comprising a third heat pipe having an evaporating portion mounted to the base and a condensing portion extending upwardly and spirally from the evaporating portion thereof and through the one of the fin groups, the condensing portions of the first and third heat pipes being parallel to each other.

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