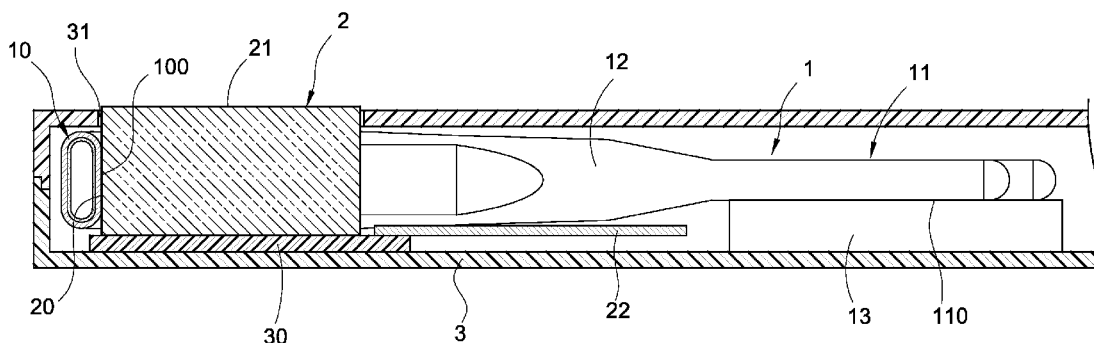


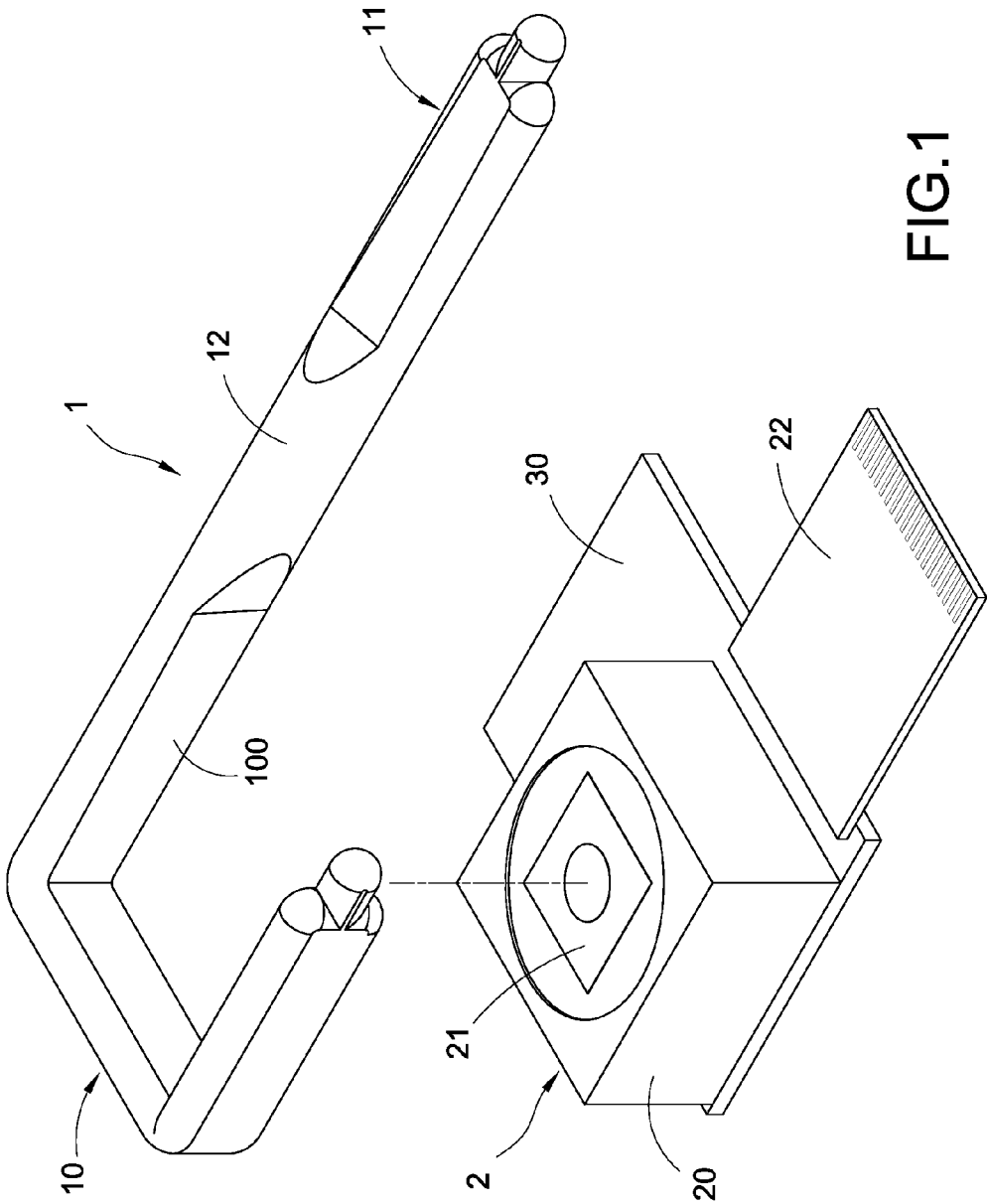


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WANG et al.(10) **Pub. No.: US 2017/0108285 A1**(43) **Pub. Date: Apr. 20, 2017**(54) **LATERAL SURROUNDING HEAT PIPE AND
HEAT DISSIPATING STRUCTURE THEREOF****Publication Classification**(51) **Int. Cl.**
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(TW); **Kuan-Ming LAI, NEW TAIPEI**
CITY (TW)(57) **ABSTRACT**

A lateral surrounding heat pipe is for contacting a heating element while the heating element has a working surface and a sidewall formed around the working surface. The heat pipe includes a heated section and a cooling section. The heated section has a heated surface, which is flat, for contacting and being attached to the sidewall of the heating element. The cooling section is integrally connected to the heated section and extends from the heating element towards any direction.

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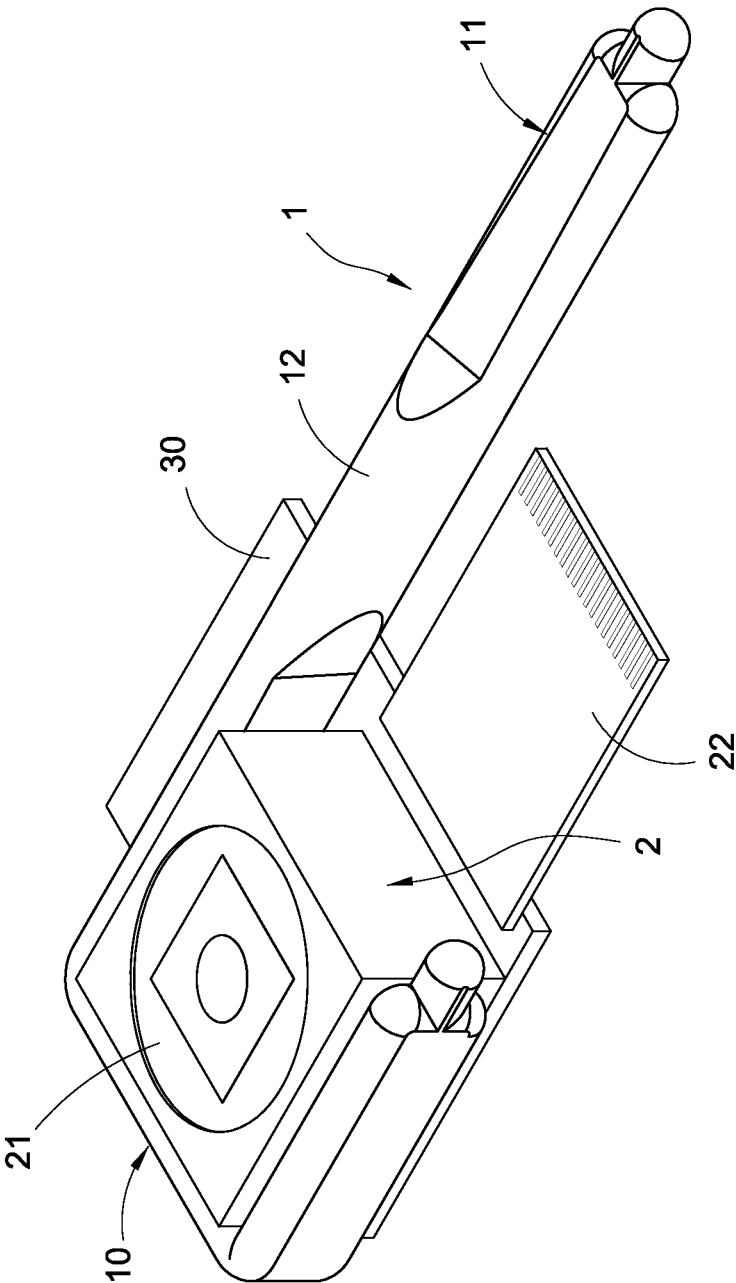


FIG.2

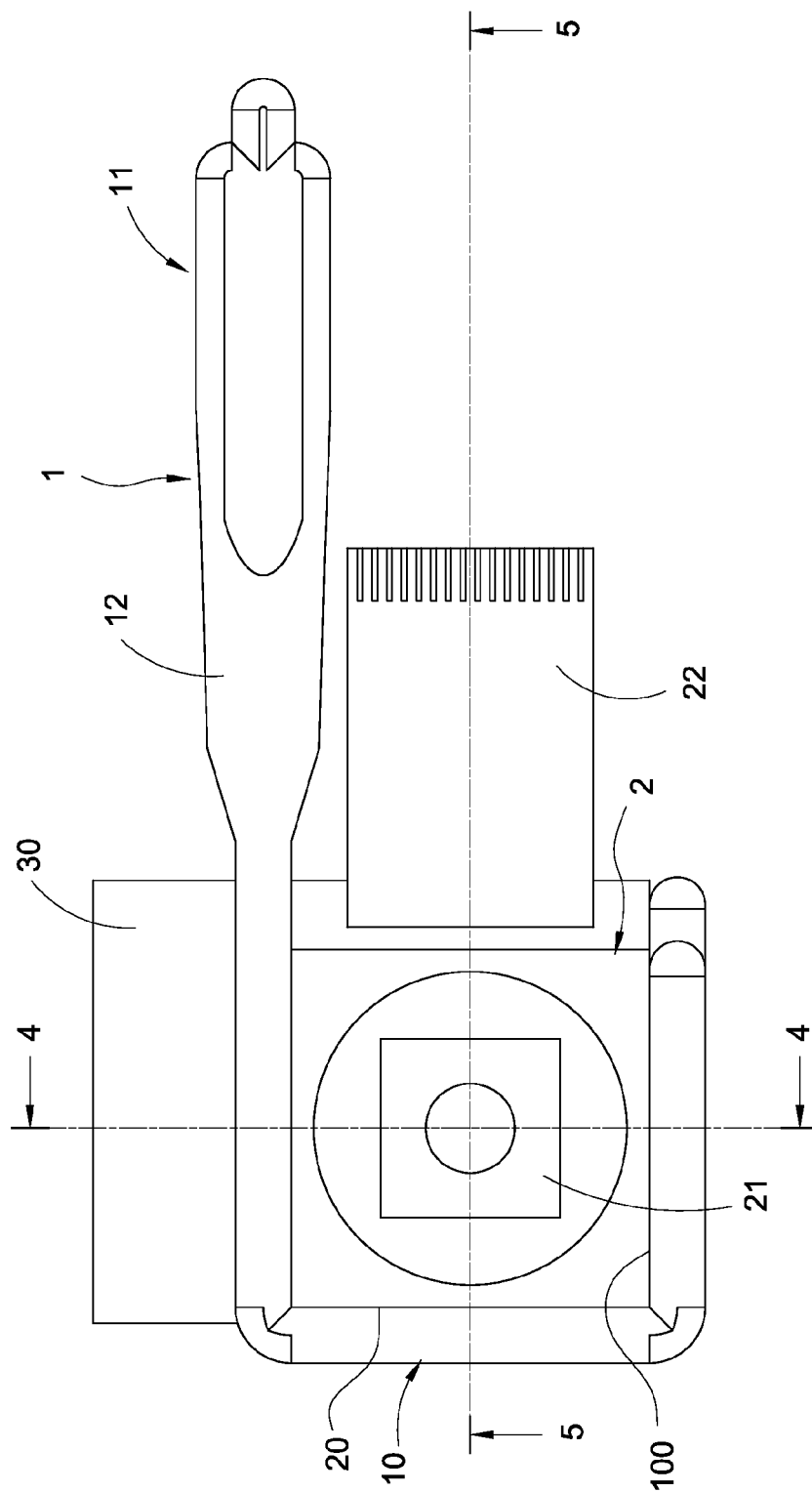


FIG. 3

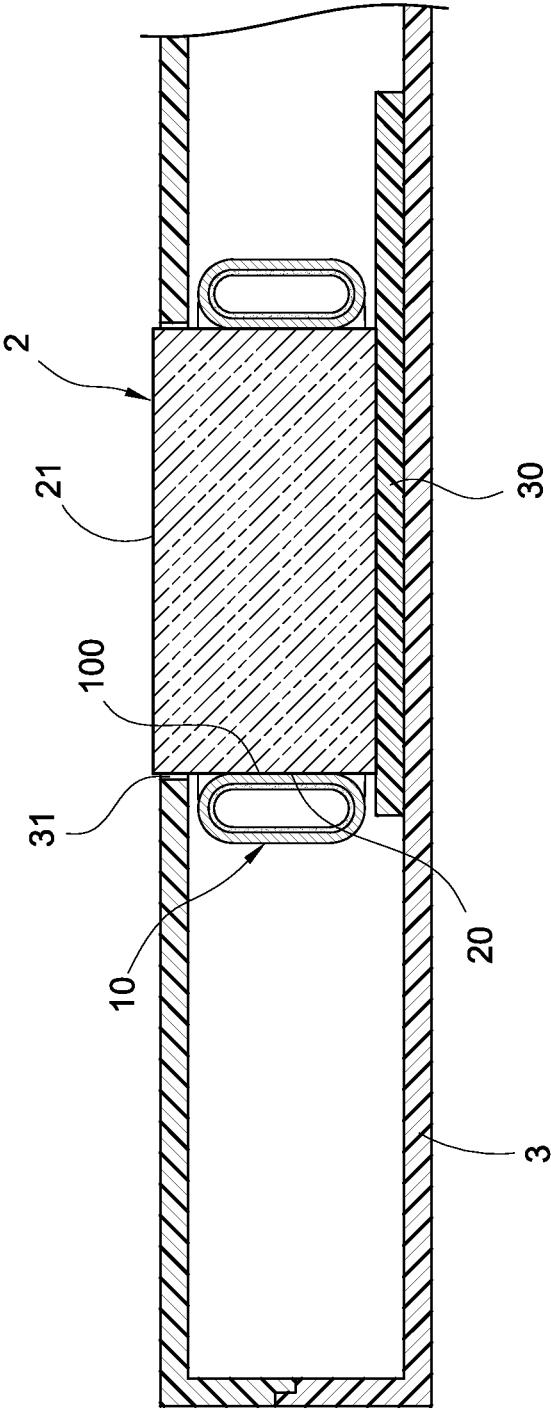


FIG.4

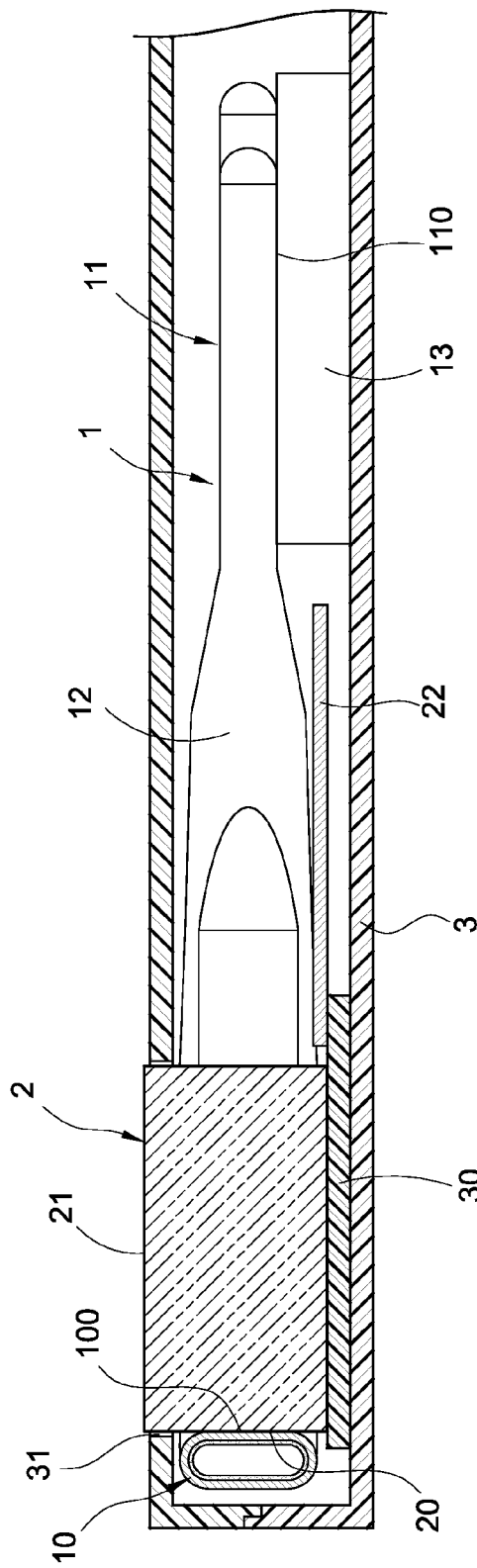


FIG.5

LATERAL SURROUNDING HEAT PIPE AND HEAT DISSIPATING STRUCTURE THEREOF

TECHNICAL FIELD

[0001] The disclosure relates to technology of heat dissipation, more particularly to a lateral surrounding heat pipe and a heat dissipating structure thereof.

BACKGROUND

[0002] Conventional heat dissipating structures (e.g. heat pipes) for the electronic heating elements inside an electronic device, such as a mobile phone or a tablet computer, are usually attached to the upper surface of the heating elements. The heat dissipating structures are capable of dissipating the heat from the heating elements.

[0003] As functions and applications of different kinds of electronic components advance and evolve, the heat generated by some of the electronic components, such as digital camera's lens, increases greatly. This therefore creates the need for heat dissipation. Unlike heating elements such as CPUs or GPUs, the upper surface or the working surface of normal lens is unable to be attached by normal heat dissipating structures such as conventional heat pipes. Hence, the traditional approach, namely by adding and attaching heat dissipating structures to the heating elements, cannot be applied here.

[0004] Consequently, the disclosure aims to provide an improved design capable of solving the abovementioned problems.

SUMMARY

[0005] The main purpose of the disclosure is to provide a lateral surrounding heat pipe and a heat dissipating structure thereof which can be applied to a heating element such as a digital camera's lens. The heating element has at least one working surface which is unable to be attached by the heat dissipating structure. As such, the heat dissipation is completed by attaching the structure to the sidewall of the heating element.

[0006] To fulfill the purpose, a lateral surrounding heat pipe is provided. The lateral surrounding heat pipe is configured for contacting a heating element while the heating element has a working surface and a sidewall formed around the working surface. The heat pipe comprises a heated section and a cooling section. The heated section has a heated surface, which is flat, for contacting and being attached to the sidewall of the heating element. The cooling section is integrally connected to the heated section and extends from the heating element towards any direction.

[0007] To fulfill the purpose, a lateral surrounding heat dissipating structure is provided. The lateral surrounding heat dissipating structure comprises a heat pipe and a heating element. The heat pipe comprises a heated section and a cooling section. The heated section has a heated surface which is flat while the cooling section is integrally connected to the heated section. The heating element has a working surface and a sidewall formed around the working surface. The heated surface of the heat pipe is in contact with and attached to the sidewall of the heating element while the cooling section of the heat pipe extends from the heating element towards any direction.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The disclosure will become more fully understood from the detailed description and the drawings given herein below for illustration only, and thus does not limit the disclosure, wherein:

[0009] FIG. 1 is an exploded view of the heat pipe and the heating element of the disclosure;

[0010] FIG. 2 is a schematic view of the assembly of the heat pipe and the heating element of the disclosure;

[0011] FIG. 3 is a top view of the heat pipe and the heating element of the disclosure;

[0012] FIG. 4 is a sectional view of FIG. 3 cut along the cutting plane line 4-4; and

[0013] FIG. 5 is a sectional view of FIG. 3 cut along the cutting plane line 5-5.

DETAILED DESCRIPTION

[0014] In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing.

[0015] FIG. 1, FIG. 2 and FIG. 3 are respectively an exploded view, a schematic view of the assembly and a top view of the heat pipe and the heating element of the disclosure. The disclosure provides a lateral surrounding heat pipe and a heat dissipating structure thereof. The lateral surrounding heat dissipating structure comprises a heat pipe 1 and a heating element 2.

[0016] The heat pipe 1 is for being in contact with the heating element 2 and may be round tubular matching the heating element 2 for flattening and/or bending. As such, the heat pipe 1 is in tight contact and attached to the peripheral sidewall 20 of the heating element 2. The heat pipe 1 mainly comprises a heated section 10 and a cooling section 11. In the embodiment of the disclosure, one end of the heat pipe 1 is the heated section 10 while the other end is the cooling section 11. The heated section 10 and the cooling section 11 are integrally connected by a connecting section 12 to form the heat pipe 1.

[0017] The heating element 2 may be any kind of electronic heating element and at least has a working surface 21. In the embodiments of the disclosure, the heating element 2 may be a digital camera's lens of which the working surface 21 refers to the surface for photographing. The sidewall 20 is formed around and surrounding the working surface 21. Furthermore, the heating element 2 is disposed in an electronic product 3 (as shown in FIG. 4) and is welded on a circuit board 30 of the electronic product 3. The electronic product 3 may be a portable device having a camera, such as a mobile phone or a tablet computer, but the disclosure is not limited thereto. The electronic product 3 is disposed with a through hole 31 so that the working surface 21 of the heating element 2 corresponding to the through hole 31 is exposed and out of the electronic product 3. The heating element 2 is configured for being electrically connected to the inside of the electronic product 3 via the wire 22.

[0018] In the disclosure, the heated section 10 of the heat pipe 1 forms the heated surface 100 which is flat. Thereby, the heated surface 100 is in contact and attached to the

sidewall **20** of the heating element **2**. The cooling section **11** of the heat pipe **1**, on the other hand, extends from the heating element **2** towards any direction so it is relatively away from the heated section **10** for better cooling results. In the embodiments of the disclosure, the sidewall **20** of the heating element **2** is a square formed by four continuous sides. The heated section **10** of the heat pipe **1** is bent in a reversed U-shape, which in turns makes the heated surface **100** be continuously formed in a reversed U-shape for matching and being attached to the continuously adjacent three sides of the sidewall **20**. The heat generated by the heating element **2**, therefore, transfers rapidly to the cooling section **11** through the heated section **10** of the heat pipe **1**, thereby improving the heat dissipation for the heating element **2**. Surely, the heated surface **100** may further surround all the sidewall **20**.

[0019] Hence, by the structural design mentioned above, the lateral surrounding heat pipe and the heat dissipating structure thereof are built.

[0020] Accordingly, as shown in FIG. 3, FIG. 4 and FIG. 5, the heat pipe **1** is attached to the sidewall **20** of the heating element **2**. As a result, the heat generated by the heating element **2** in operation may be transferred by the sidewall **20** contacting the heated section **10** of the heat pipe for better heat transfer results. This therefore avoids overheat of the heating element **2** in operation which could lead to damages. Moreover, after the cooling section **11** of the heat pipe **1** extends from the heating element **2** towards any direction, it further forms the cooling surface **110** to be attached to a heat conduction block **13** for cooling. The heat conduction block **13** may further be attached to the electronic device **3** to utilize the case of the electronic device **3** for heat dissipation. Additionally, the cooling surface **110** and the working surface **21** of the heating element **2** may be arranged in parallel.

What is claimed is:

1. A lateral surrounding heat pipe being configured for contacting a heating element, the heating element having a working surface and a sidewall formed around the working surface; the heat pipe comprising:

a heated section having a heated surface, which is flat, for contacting and being attached to the sidewall of the heating element; and

a cooling section integrally connected to the heated section and extending from the heating element towards any direction.

2. The lateral surrounding heat pipe according to claim 1, wherein the heated section is located on one end of the heat pipe while the cooling section is located on the other end of the heat pipe.

3. The lateral surrounding heat pipe according to claim 2, wherein the heated section and the cooling section are integrally connected by a connecting section.

4. The lateral surrounding heat pipe according to claim 1 wherein a cooling surface is formed on the cooling section and is arranged with the working surface of the heating element in parallel.

5. A lateral surrounding heat dissipating structure, comprising:

a heat pipe comprising a heated section and a cooling section, the heated section having a heated surface which is flat while the cooling section being integrally connected to the heated section; and

a heating element having a working surface and a sidewall formed around the working surface,

wherein the heated surface of the heat pipe is in contact with and attached to the sidewall of the heating element while the cooling section of the heat pipe extends from the heating element towards any direction.

6. The lateral surrounding heat dissipating structure according to claim 5, wherein the heated section is located on one end of the heat pipe while the cooling section is located on the other end of the heat pipe.

7. The lateral surrounding heat dissipating structure according to claim 6, wherein the heated section and the cooling section are integrally connected by a connecting section.

8. The lateral surrounding heat dissipating structure according to claim 5, wherein a cooling surface is formed on the cooling section and is attached to a heat conduction block.

9. The lateral surrounding heat dissipating structure according to claim 8, wherein the cooling surface is arranged with the working surface of the heating element in parallel.

10. The lateral surrounding heat dissipating structure according to claim 5, wherein the heating element is a digital camera's lens.

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