

HEAT DISSIPATION CIRCUIT BOARD STRUCTURE

TECHNICAL FIELD

The present utility model relates to a printed circuit board, and relates in particular to a heat dissipation circuit board structure capable of solving the heat dissipation problem of electronic components plugged on a general printed circuit board (PCB).

BACKGROUND

On a conventional printed circuit board (PCB), in addition to a predetermined electronic circuit planned, there are many electronic components plugged on the circuit board, and these electronic components release a certain operating temperature during operation. If heat dissipation is not properly provided, the operating efficiency of these electronic components will be affected, or even the operation of the system to which they belong will be destroyed.

In order to solve the problem of heat dissipation, it is a general method to add heat sinks to these electronic components, absorb the temperature released from the components by using the material property (for example, aluminum material) of the heat sinks that conducts heat efficiently, disperse and transmit the absorbed temperature to various parts of a heat sink having a large area, so that the heat source is not concentrated and the effect of moderate cooling is achieved.

As described above, it can be recognized that the area of the heat sink directly affects the efficiency of heat dissipation, and the area of the heat sink is directly proportional to the effect of heat dissipation. However, on the basis that the circuit board includes more than a single electronic component, most conventional heat sinks expand the heat dissipation area in an upright manner in a limited space, and then are close to objects to be heat-dissipated.

However, such a large-sized vertical heat sink or heat dissipation module often encounters some difficulties in practical application.

For example, a high-power LED can produce a luminous effect several times larger than that of a conventional LED and is very energy-saving. Therefore, it is currently applied to a large-sized display panel or a similar article such as a display lighting as its main light emitting source. Due to the large volume of these items, the high temperature released during operation of such a high-power LED can be absorbed by their wider space, or the problem of heat dissipation can be

solved by the aforementioned heat dissipation device. However, for some miniaturized technology products, such as notebook computer panels, and color screens of personal digital assistants (PDAs) or mobile phones, the heat dissipation space they can provide is limited, and these LEDs are built in groups. Therefore, these products cannot be matched with the aforementioned large vertical heat sinks or other heat dissipation modules. Since the heat dissipation problem caused by this high-power LED is difficult to solve, it is the main reason why these miniaturized products have not been widely used, which is a great loss for manufacturers and consumers.

SUMMARY

The main object of the present utility model is to solve the problems that cannot be overcome by the prior art, and in particular to provide a novel heat dissipation circuit board structure. By means of the special design of the circuit board, in addition to simplifying the layout of the heat dissipation device in the system, a better heat dissipation effect can be directly provided for an object (component) to be heat-dissipated, so that the operating efficiency of the object (component) is improved.

A heat dissipation circuit board structure provided by the present utility model is composed of a printed circuit board raw material and a heat dissipation plate with good heat conduction efficiency which are cut into plates with desired specifications so as to be bonded by stacking one above the other, wherein a predetermined electronic circuit is planned on the printed circuit board raw material, a punched hole penetrating the printed circuit board is provided at a predetermined position of the circuit, an object to be heat-dissipated is placed in the punched hole, pins of the object to be heat-dissipated are connected to the circuit on the printed circuit board, and a bottom portion of the object to be heat-dissipated is directly in contact with the heat dissipation plate.

In the heat dissipation circuit board structure provided by the present utility model, the heat dissipation plate is provided with a roughened layer, which is pre-roughened and then bonded to the printed circuit board, on a facing surface corresponding to the printed circuit board.

In the heat dissipation circuit board structure provided by the present utility model, the roughened layer of the heat dissipation plate is a surface sandblasted layer.

In the heat dissipation circuit board structure provided by the present utility model, the heat dissipation plate is an aluminum plate.

In the heat dissipation circuit board structure provided by the present utility model, the object to be heat-dissipated is a high-power light-emitting diode.

The manufacturing process of the circuit board according to the present utility model is as follows: It is composed of a conventional printed circuit board (PCB) raw material and a heat dissipation plate (such as an aluminum plate) with good heat conduction efficiency, which are cut into desired specifications by a certain process so as to be bonded by stacking one above the other. A surface of the heat dissipation plate to be bonded to the PCB raw material is pre-roughened by sandblasting, thereby increasing the surface area to be bonded to each other, so that the two plates of different materials are firmly bonded to each other. Moreover, an electronic circuit is planned on the PCB raw material, and a through hole is provided at a predetermined position of the circuit, so that an electronic component is inserted into the hole and directly contacts the heat dissipation plate. The operating temperature of the electronic object (component) is absorbed by the heat dissipation plate, and the heat source is dispersed by using its good heat conduction efficiency.

With the above-described design of the circuit board, it can be found that the heat dissipation plate does not occupy too much space on the equipment side, but provides a heat dissipation area equivalent to that of the original circuit board, so that an excellent heat dissipation effect can be obtained for an electronic component connected to the circuit board raw material, thereby improving the operating efficiency of the electronic component.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a flowchart of a method for manufacturing a heat dissipation circuit board according to the present utility model.

FIG. 2 is an exploded structural view of the heat dissipation circuit board according to the present utility model.

FIG. 3 is an external structural view of the heat dissipation circuit board according to the present utility model.

FIG. 4 is an exploded view illustrating a state in which a high-power LED, as an example of an object to be heat-dissipated, is bonded to the heat dissipation circuit board according to the present utility model.

FIG. 5 is a diagram of a completed assembly of the embodiment shown in FIG. 4.

Description of reference numerals

10...printed circuit board raw material

101...solder paste

11...punched hole

20...heat dissipation plate

21...bonding surface of heat dissipation plate

211...place where a heat dissipation plate comes into contact with an object to be heat-dissipated

30...high-power LED

31...base

32...light-emitting chip

311, 312...pin

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring to FIGS. 1, 2 and 3, FIG. 1 is a main flowchart of manufacturing such a heat dissipation circuit board by using the technology of the present utility model, and the manufacturing method can be briefly summarized from the reference numerals, the steps of which mainly include:

I. selecting a printed circuit board (PCB) raw material 10 and a heat dissipation plate (for example, aluminum material) 20;

II. cutting the printed circuit board raw material 10 and the heat dissipation plate 20 into predetermined dimensions and specifications;

III. punching the printed circuit board raw material 10 and the heat dissipation plate 20 to form mutually corresponding holes 12 and 22;

IV. fabricating a circuit on a surface of the printed circuit board raw material 10;

V. printing peelable glue at a place intended to come into contact with an object to be heat-dissipated;

VI. roughening a surface of the heat dissipation plate 20 by sandblasting with a grit size of #80;

VII. removing the peelable glue of step V;

VIII. applying glue to a bonding surface between the printed circuit board 10 and the heat dissipation plate 20;

IX. punching the printed circuit board 10 at a predetermined position where the object to be heat-dissipated is to be placed to form a hole;

X. riveting, hot pressing, punching and molding, and V-cutting the printed circuit board 10 and the heat dissipation plate 20; and

XI. applying solder paste 101 at the connection between the printed circuit board 10 and pins of the object to be heat-dissipated, and bonding the object to be heat-dissipated to the circuit of the printed circuit board 10 by means of a tin oven, as shown in FIG. 5.

Finally, quality control (QC) is performed and the product is packaged for shipment.

FIGS. 2 and 3 are an exploded view and an external view of the heat dissipation circuit board according to the present utility model, respectively. The heat dissipation circuit board includes at least one printed circuit board raw material 10 and one heat dissipation plate (for example, aluminum material) 20, which are bonded in an overlapping manner (refer to the above steps). In particular, a bonding surface 21 of the heat dissipation plate 20 is pre-roughened to form a roughened layer (for example, a surface sandblasted layer), thereby increasing the contact area, so that the heat dissipation plate 20 can be surely bonded to the printed circuit board 10.

Before the surface of the heat dissipation plate 20 is roughened, it is necessary to print peelable glue on a place 211 intended to come into contact with an object to be heat-dissipated, and the peelable glue is removed before the two plates 10 and 20 are bonded together, so that the surface of the raw material of the heat dissipation plate 20 can be maintained at the place 211, so as not to affect the heat dissipation effect.

As in step IX above, before the two plates 10 and 20 are bonded to each other, the printed circuit board 10 is punched at a predetermined position where the object to be heat-dissipated is to be placed to form a hole 11, so that the object to be heat-dissipated can directly contact the heat dissipation plate 20 through the hole 11, and the place 211 where the heat dissipation plate 20 and

the object to be heat-dissipated are in direct contact with each other is the aforementioned place where the peelable glue is printed on the surface of the heat dissipation plate 20.

In order to enable examiners to more specifically understand the contents of the present utility model, a case where the heat dissipation plate according to the present utility model is practically used for an object to be heat-dissipated will be described in detail.

As shown in FIG. 4, taking a high-power LED 30 as an example of the object to be heat-dissipated, such an LED 30 has a bowl-shaped base 31 having a light-emitting chip 32 therein, a light collection cover 33 is formed on the surface of the base 31, and positive and negative electrode pins 311 and 312 extend outward from the base 31. Such a high-power LED 30 has a characteristic that the luminous intensity is more than 8 times as high as that of an LED on the market at present, so that the operating temperature thereof is much higher than that of the general LED. Therefore, in order to solve the problem of heat dissipation during use of this object, and to prevent a heat dissipation device from occupying too much space, the heat dissipation circuit board according to the present utility model is the best choice.

FIGS. 4 and 5 each show a state where the object to be heat-dissipated (the high-power LED 30) is bonded to the heat dissipation circuit board according to the present utility model, wherein one of units of the circuit board is taken as an example. The circuit board has been bonded into a whole with the printed circuit board raw material 10 and the heat dissipation plate 20 by the foregoing steps. The printed circuit board raw material 10 has been provided with a punched hole 11 for placing the high-power LED 30. The bottom edge of the punched hole 11 contacts the heat dissipation plate 20, so that the base 31 and the light-emitting chip 32 of the high-power LED 30 can directly contact the predetermined place 21 of the heat dissipation plate 20, and the pins 311 and 312 of the high-power LED 30 are separately soldered on the solder paste 101 applied on the surface of the printed circuit board 10 on the periphery of the punched hole 11. Through such a connection relationship, the high-power LED 30 and the prefabricated circuit of the printed circuit board 10 are connected and utilized, and the heat dissipation compensation provided by the heat dissipation plate 20 can be obtained, so that the heat dissipation problem of the object to be heat-dissipated such as the high-power LED 30 is solved.

From the above disclosure, it can be found that the heat dissipation circuit board according to the present utility model can surely improve the heat dissipation problem occurring during the

operation of many electronic objects, and such a heat dissipation circuit board does not cause a hindrance in the space design in the system, so that the utilization efficiency of the industry is significantly improved. However, the foregoing is only a preferred embodiment of the present utility model and is not intended to limit the scope of the present utility model, that is, all equivalent variations and modifications based on the present utility model shall fall within the technical scope of the present utility model.

CLAIMS

1. A heat dissipation circuit board structure, characterized by being composed of a printed circuit board raw material and a heat dissipation plate with good heat conduction efficiency which are cut into plates with desired specifications so as to be bonded by stacking one above the other, wherein a predetermined electronic circuit is planned on the printed circuit board raw material, a punched hole penetrating the printed circuit board is provided at a predetermined position of the circuit, an object to be heat-dissipated is placed in the punched hole, pins of the object to be heat-dissipated are connected to the circuit on the printed circuit board, and a bottom portion of the object to be heat-dissipated is directly in contact with the heat dissipation plate.
2. The heat dissipation circuit board structure according to claim 1, wherein the heat dissipation plate is provided with a roughened layer, which is pre-roughened and then bonded to the printed circuit board, on a facing surface corresponding to the printed circuit board.
3. The heat dissipation circuit board structure according to claim 2, wherein the roughened layer of the heat dissipation plate is a surface sandblasted layer.
4. The heat dissipation circuit board structure according to claim 1, wherein the heat dissipation plate is an aluminum plate.
5. The heat dissipation circuit board structure according to claim 1, wherein the object to be heat-dissipated is a high-power light-emitting diode.

ABSTRACT

Disclosed in the present utility model is a heat dissipation circuit board structure having a heat dissipation effect, which is mainly composed of a printed circuit board (PCB) raw material and a heat dissipation plate (for example, an aluminum plate) having good heat conduction efficiency, which are cut into desired specifications by a certain process so as to be bonded by stacking one above the other. A surface of the heat dissipation plate to be bonded to the PCB raw material is pre-roughened by sandblasting to form a roughened layer, thereby increasing the surface area to be bonded to each other, so that the two plates of different materials are firmly bonded to each other. In addition, an electronic circuit is planned on the PCB raw material, and a through hole is provided at a predetermined position of the circuit, so that an object to be heat-dissipated is inserted into the hole and direct contacts the heat dissipation plate, so as to achieve the effect of heat dissipation of the component.

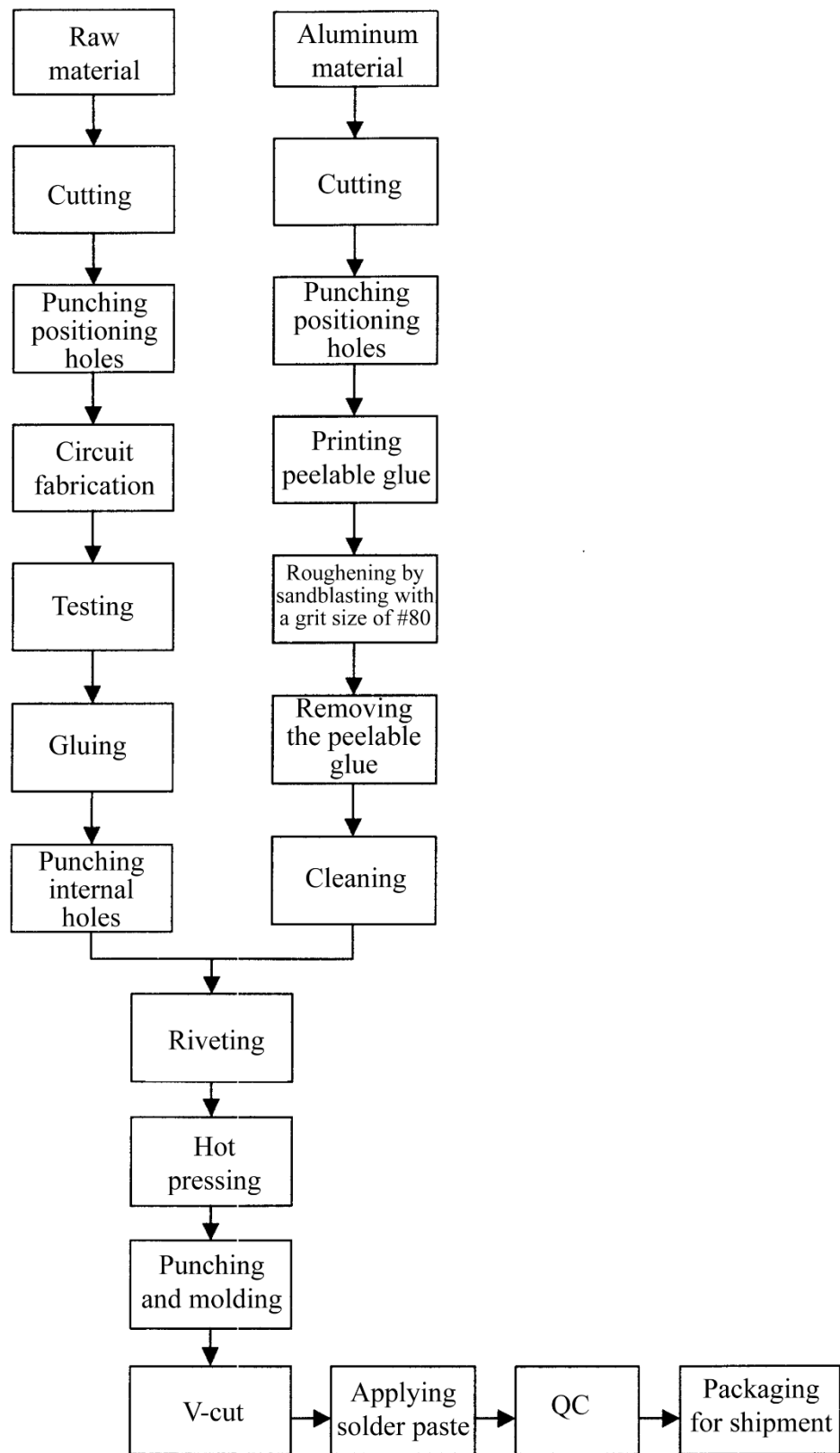


FIG. 1

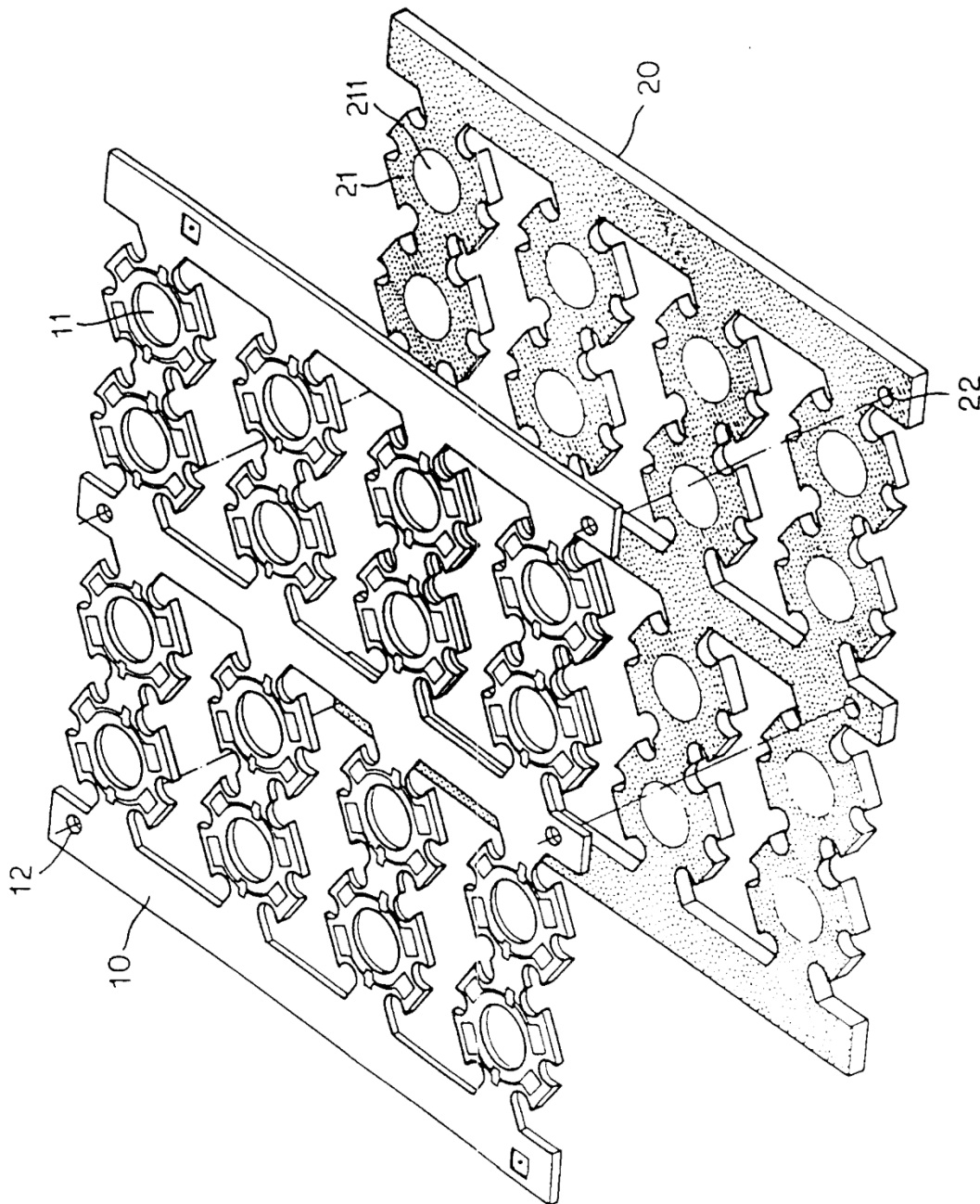


FIG. 2

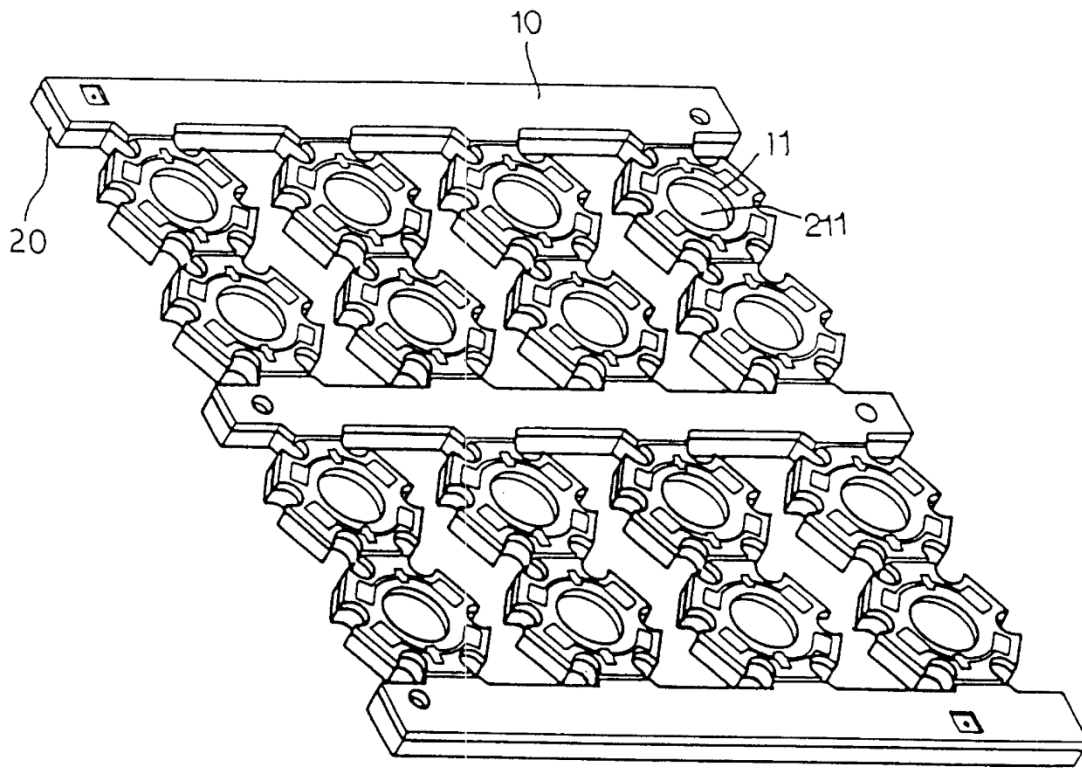


FIG. 3

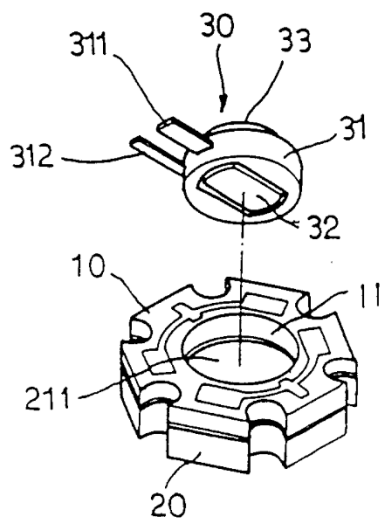


FIG. 4

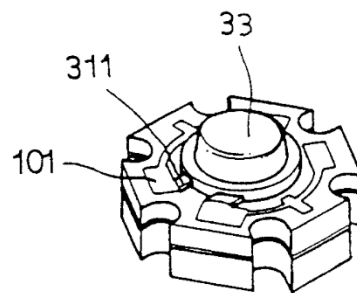


FIG. 5



TRANSLATOR'S CERTIFICATE OF TRANSLATION

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. I further declare that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

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