



US 20110220338A1

(19) **United States**

(12) **Patent Application Publication**
CHANG et al.

(10) **Pub. No.: US 2011/0220338 A1**

(43) **Pub. Date: Sep. 15, 2011**

(54) **LED HEAT SINK AND METHOD OF MANUFACTURING SAME**

(52) **U.S. Cl. 165/185; 29/890.03**

(76) **Inventors:** **Kun-Jung CHANG**, Kaohsiung County (TW); **Ching-Yuan Juan**, Kaohsiung County (TW); **Kuo-Chun Lin**, Kaohsiung County (TW); **Ching-Huang Juan**, Kaohsiung County (TW)

(57) **ABSTRACT**

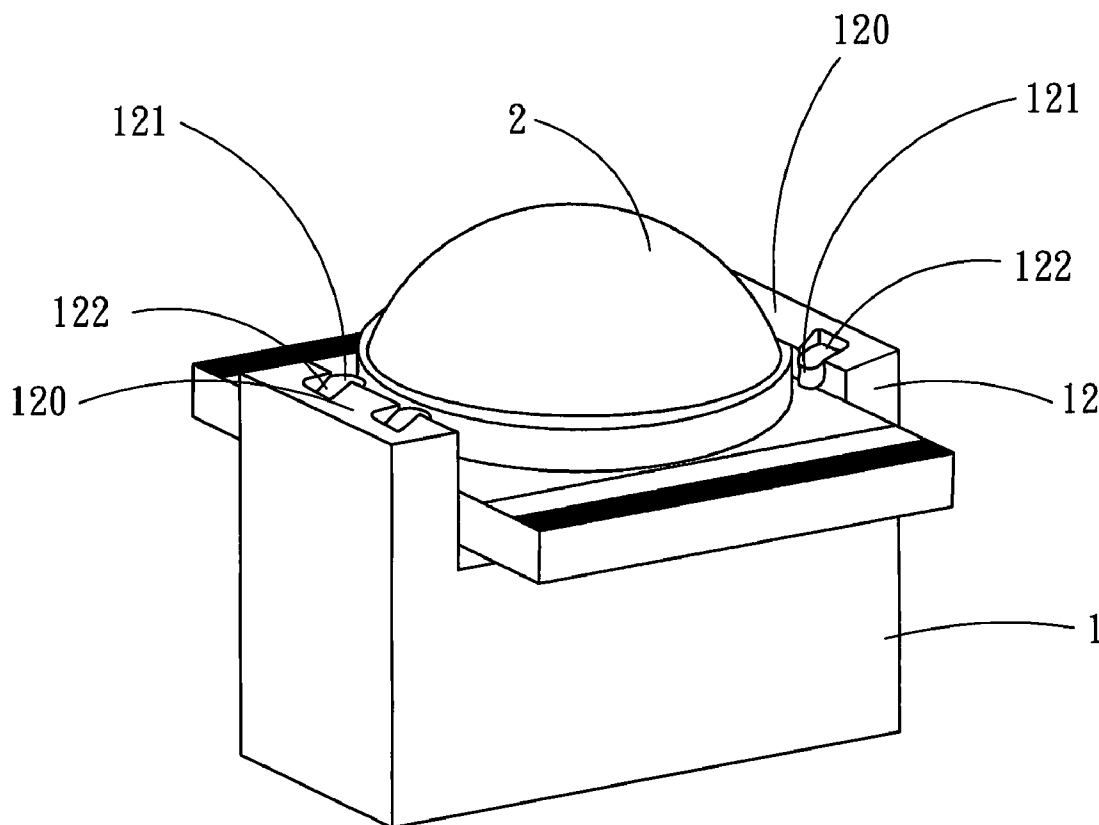
A LED heat sink and a method of manufacturing same are disclosed. The LED heat sink includes a holding zone bordered by one or more anchor portion of a higher elevation. The anchor zone has an upper side formed a compact stamping zone. The compact stamping zone is stamped forcefully through a mold in a diagonal direction towards the holding zone such that the material of the anchor zone is squeezed above the holding zone to form a latch hook to latch and press a LED lamp onto the holding zone so that the LED lamp is tightly in contact with the heat sink. Thus a forced transfer effect can be achieved to rapidly reduce the temperature of the LED lamp.

(21) **Appl. No.: 12/721,940**

(22) **Filed: Mar. 11, 2010**

Publication Classification

(51) **Int. Cl.**
F28F 7/00 (2006.01)
B21D 53/02 (2006.01)



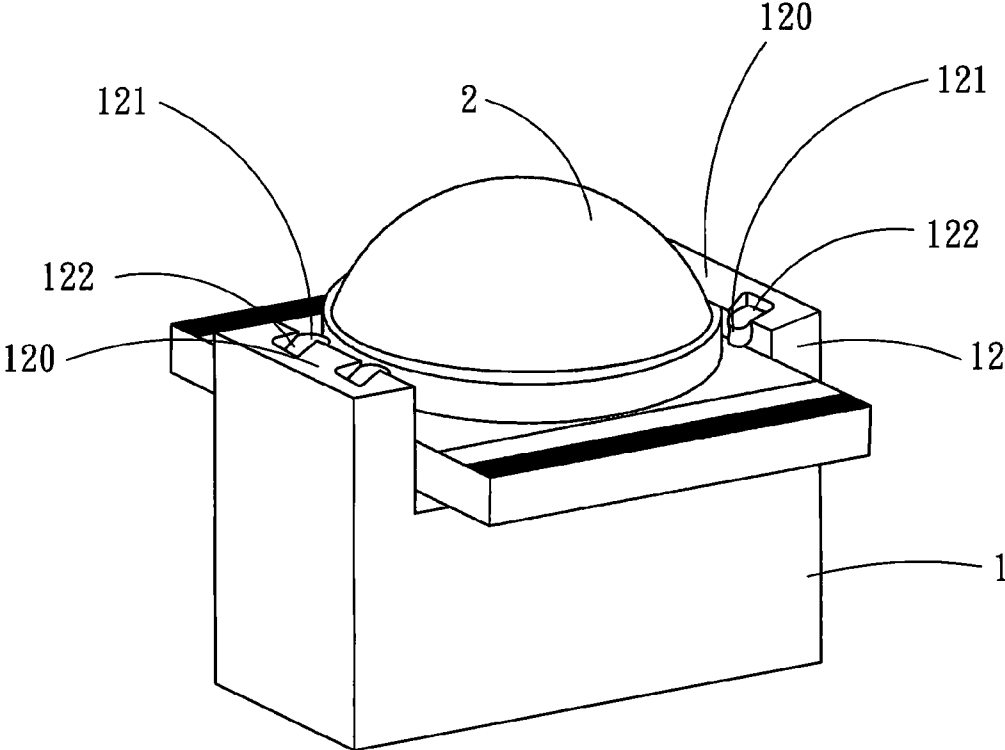


Fig.1

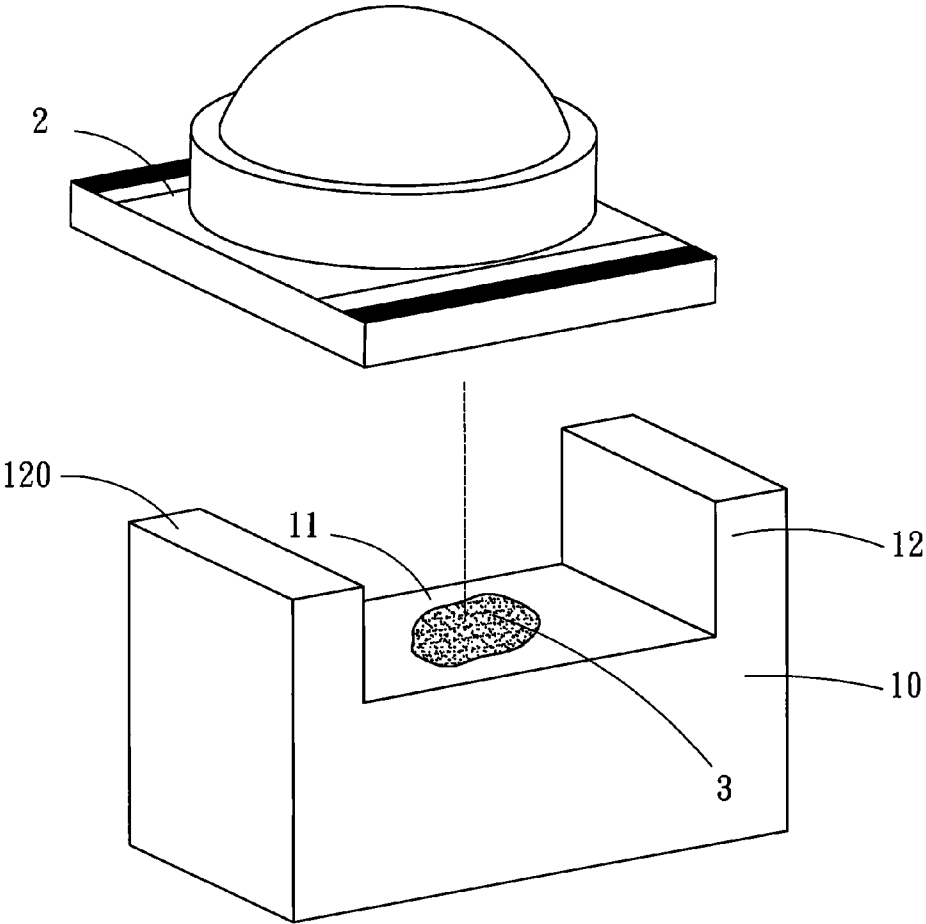


Fig. 2

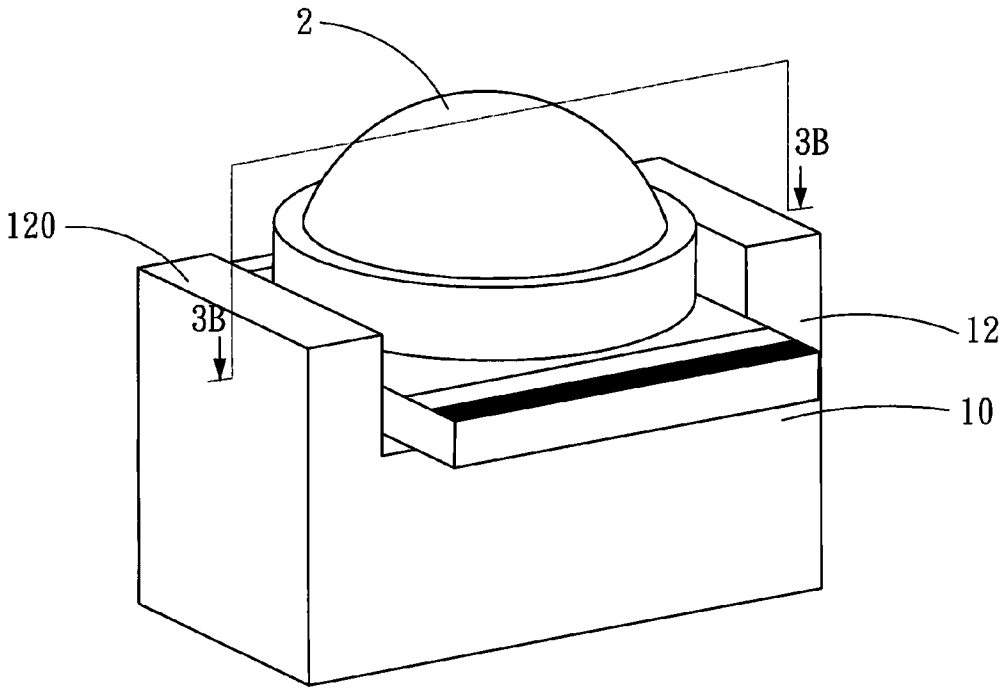


Fig. 3A

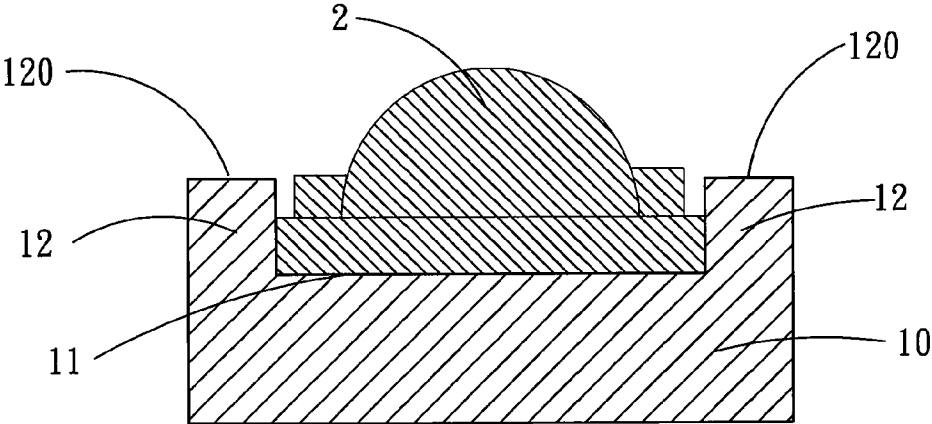


Fig. 3B

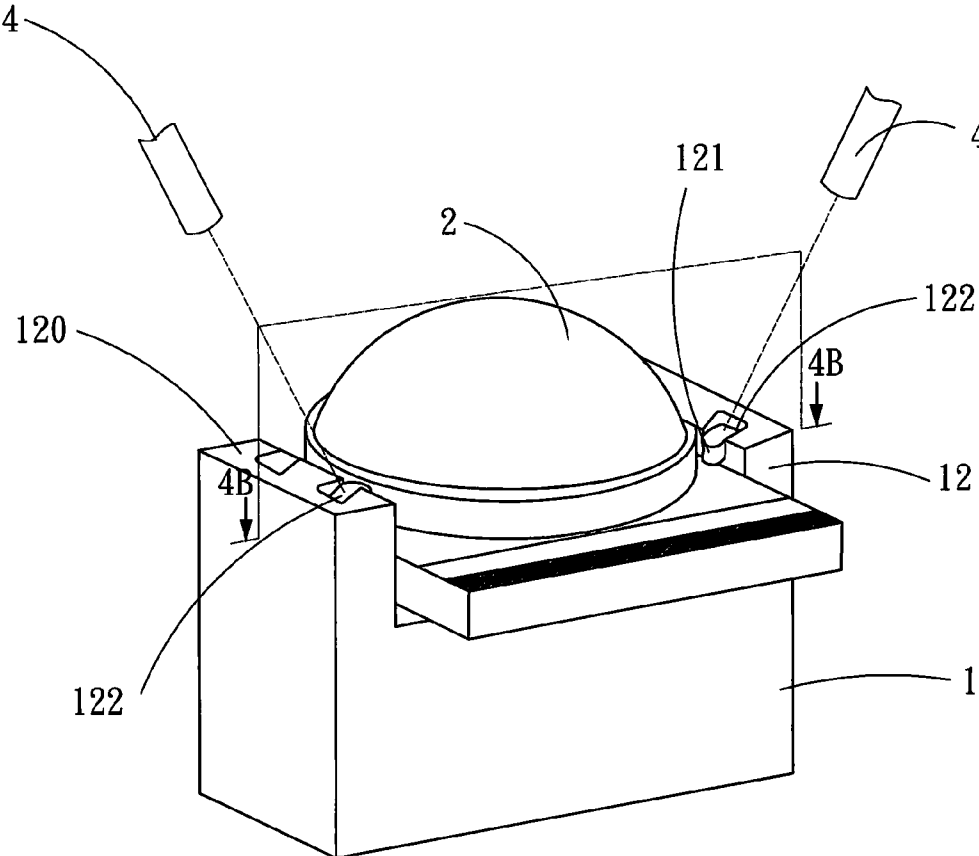


Fig. 4A

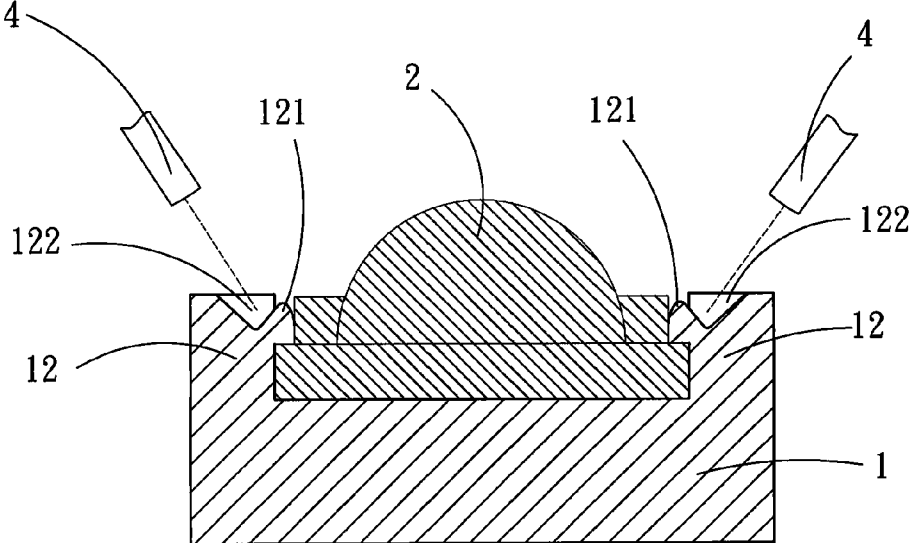


Fig. 4B

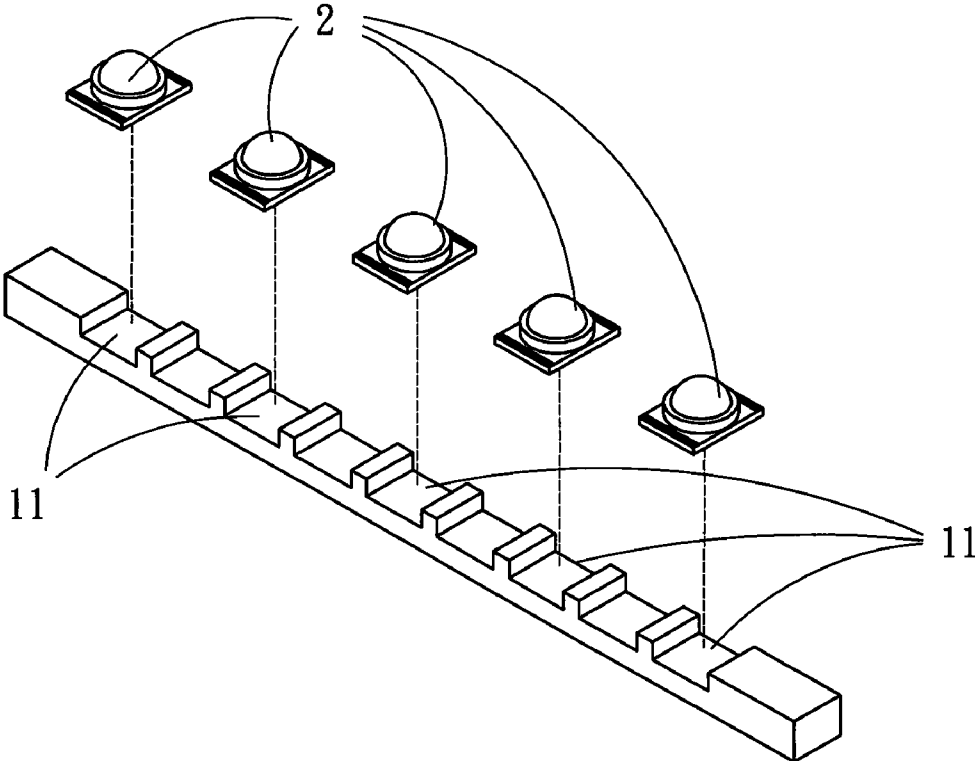


Fig. 5

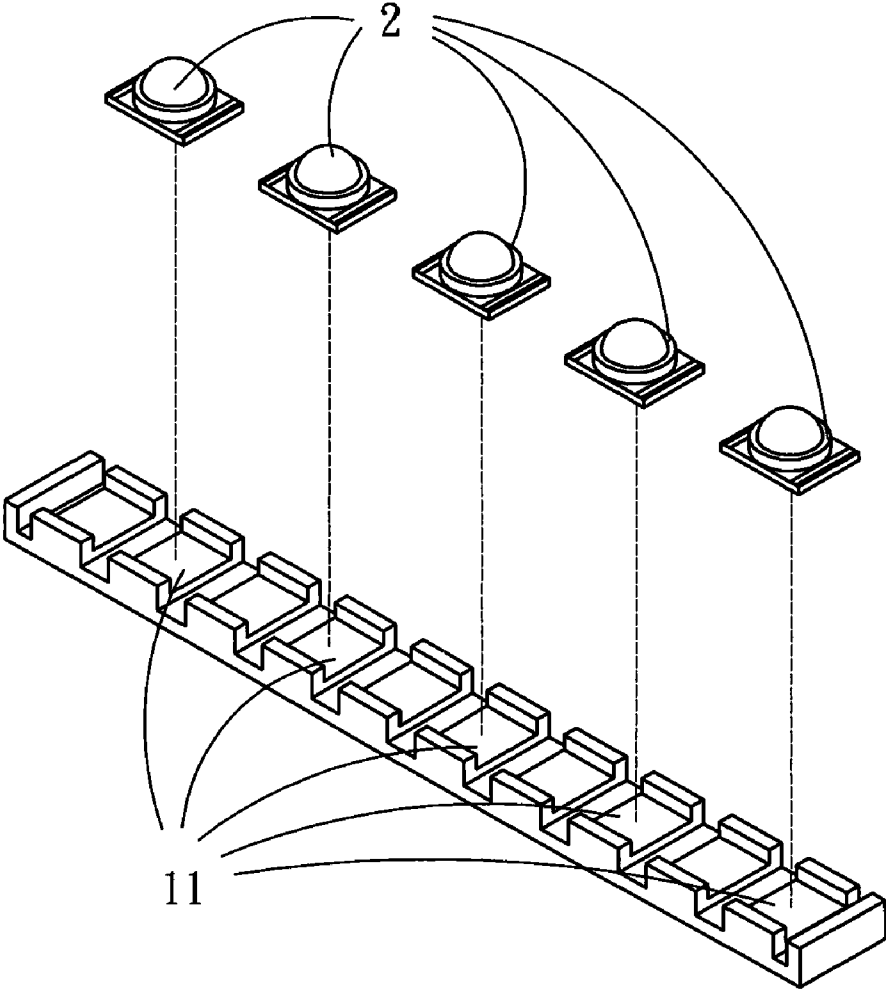


Fig.6

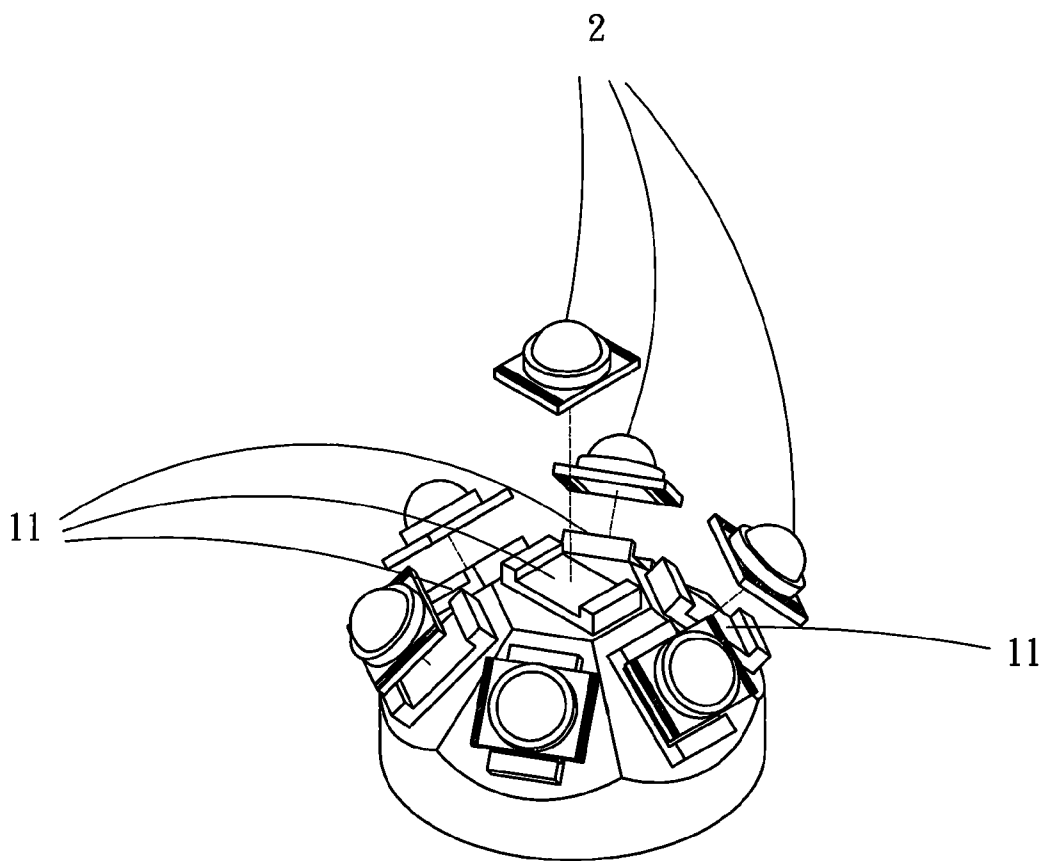


Fig. 7

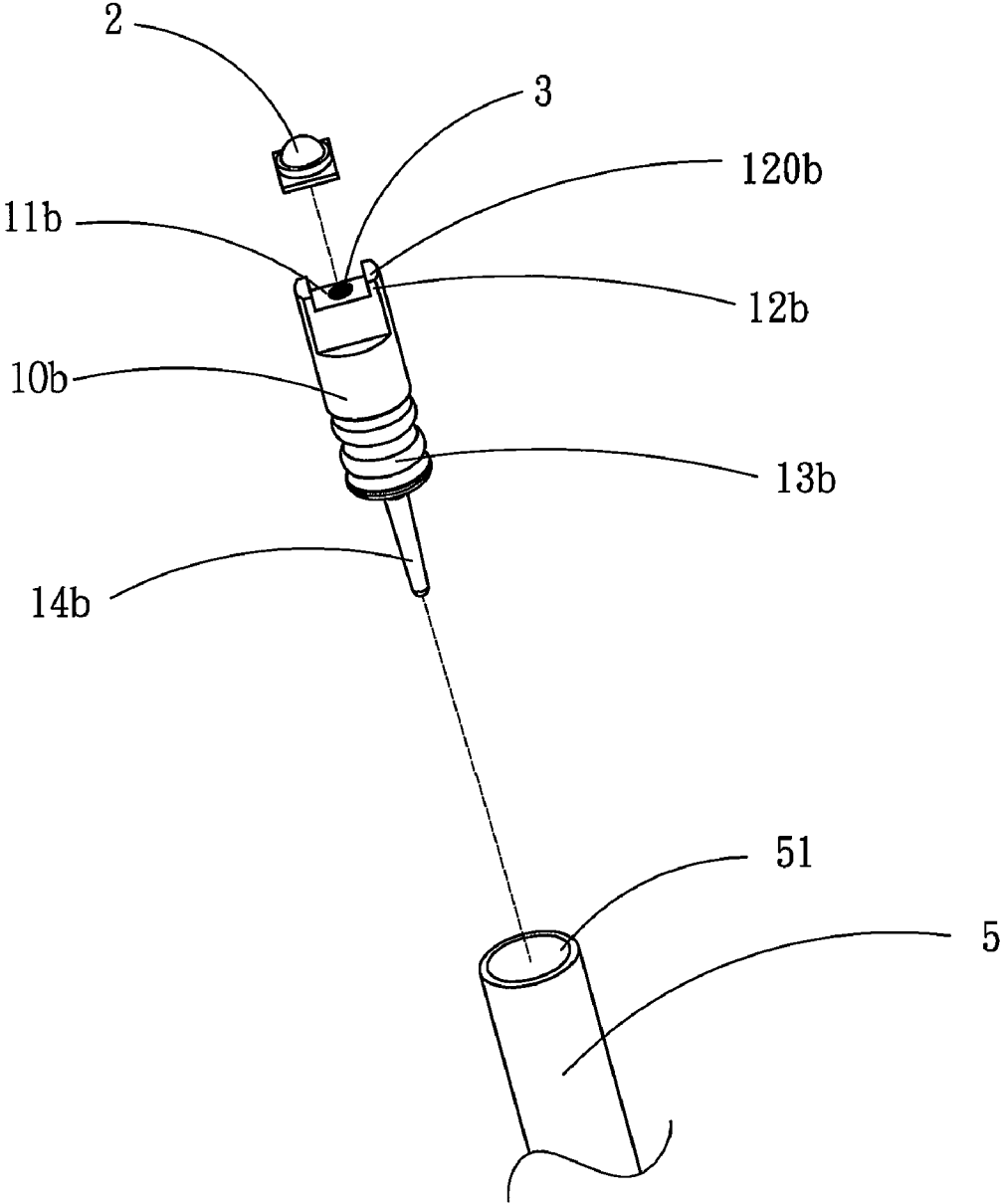


Fig. 8

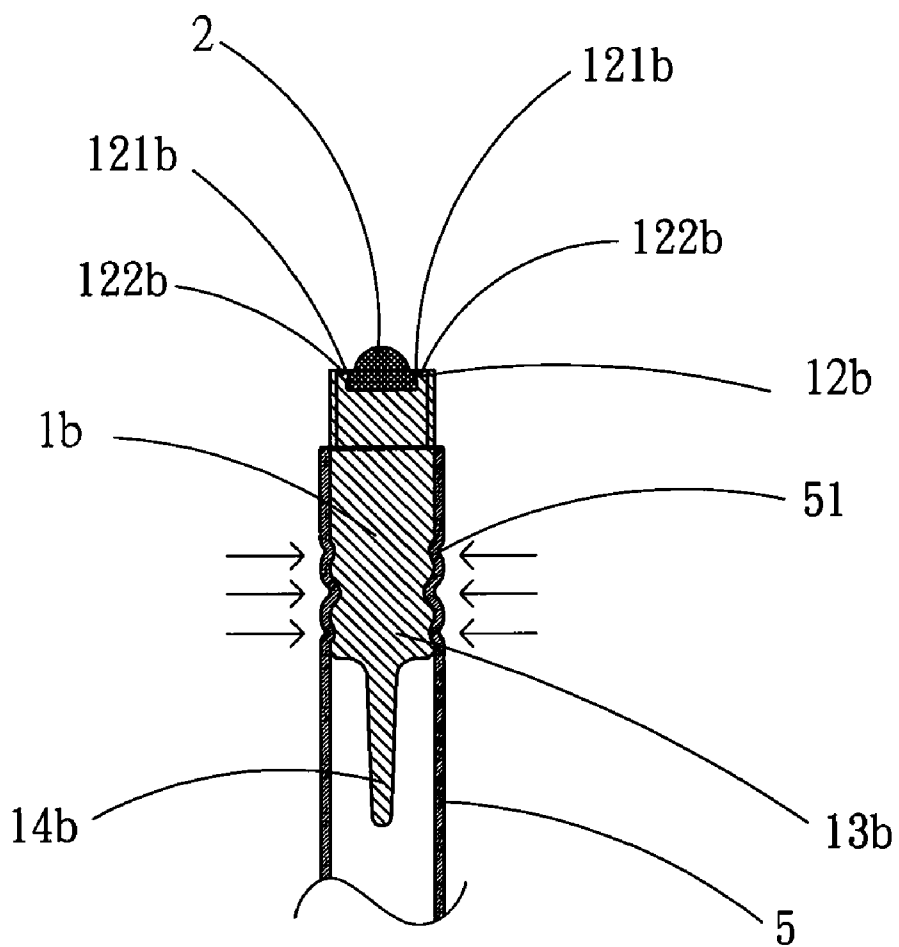


Fig.9

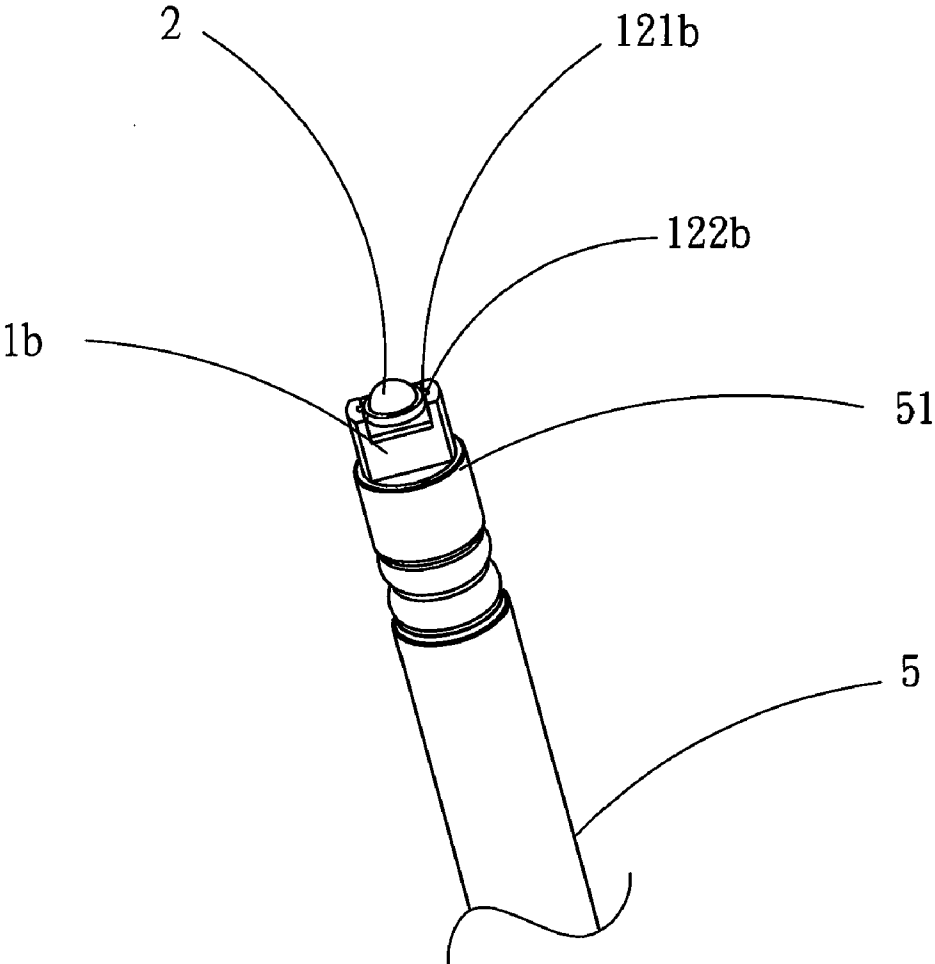


Fig. 10

LED HEAT SINK AND METHOD OF MANUFACTURING SAME

FIELD OF THE INVENTION

[0001] The present invention relates to a LED heat sink and a method of manufacturing same and particularly to a LED heat sink that provides anchoring and forced heat transfer function and a method of manufacturing same.

BACKGROUND OF THE INVENTION

[0002] A conventional LED lamp includes a heat sink attached to the bottom of a LED chip. When the LED lamp is in use for illumination it generates heat which can be transferred through the heat sink to lower the temperature of the LED lamp.

[0003] The conventional LED lamp and the heat sink are coupled by contact. In practice poor contact or contact failure could happen. Moreover, the LED with a greater luminosity also generates a greater amount of heat, especially on lighting fixtures containing composite LED lamps such as traffic lights on crossroads that share a common projection or notation surface. Poor heat transfer could result in malfunction of the LED lamp. Not only maintenance cost is higher, the number of LED lamps to illuminate the projection and notation surface also reduces and results in dark zones or dark spots, light projection or notation effect is impacted.

[0004] The conventional LED lamp has to be mounted onto a printed circuit board. The printed circuit board has holes formed thereon the hold the heat sink. In the event that the printed circuit board or heat sink has dimensional errors, installation and use are hindered. If the heat sink is too small poor contact or contact failure takes place. The size of the heat sink may be increased to avoid the poor contact or contact failure, but such an approach has to exert an extra force during mounting the heat sink onto the printed circuit board. The printed circuit board could be warped or broken.

SUMMARY OF THE INVENTION

[0005] The primary object of the present invention is to overcome the problems of the conventional LED lamp of poor contact or contact failure that results in ineffective heat transfer of the heat generated by the LED lamp. The present invention provides a heat sink with a latch hook to form a compact coupling between the LED lamp and the heat sink.

[0006] To achieve the foregoing object the heat sink according to the present invention takes into account of operational characteristics of LED lamp such as small size, greater heat generation and higher heat concentration by providing a heat sink prototype which has a holding zone with a cooling medium such as heat dispersing paste dispensed thereon; next mounting a LED lamp onto the holding zone; the holding zone being bordered by an anchor portion of a greater height and a compact stamping zone extended upwards from the anchor zone; then the compact stamping zone is stamped forcefully through a mold in a diagonal direction towards the holding zone such that the anchor zone is squeezed and deformed and a portion of the compact stamping zone is squeezed to form a latch hook above the holding zone to form compact coupling between the LED lamp and the heat sink. Thus a secured coupling can be formed without the need of providing a printed circuit board to mount the LED lamp.

[0007] The construction thus formed by the present invention provides many benefits as follows:

[0008] 1. The LED heat sink of the present invention can firmly hold the LED lamp and provide forced heat dissipation.

[0009] 2. The LED heat sink of the present invention forms a firm coupling between the LED lamp and the heat sink and provides improved heat transfer effect.

[0010] 3. The LED heat sink of the present invention allows the LED lamp to be directly mounted thereon without an extra printed circuit board.

[0011] 4. The present invention can be made through a simpler fabrication process with a higher production yield and at a greater production efficiency.

[0012] The foregoing, as well as additional objects, features and advantages of the present invention will be more readily apparent from the following detailed description, which proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. 1 is a perspective view of the LED heat sink according to the present invention.

[0014] FIG. 2 is a schematic view of the LED heat sink and a LED lamp in a coupling condition.

[0015] FIG. 3A is a schematic view of the LED heat sink with a LED lamp mounted thereon.

[0016] FIG. 3B is a cross section taken on line 3B-3B in FIG. 3A.

[0017] FIG. 4A is a schematic view of a fabrication process according to the present invention.

[0018] FIG. 4B is a cross section taken on line 4B-4B in FIG. 4A.

[0019] FIG. 5 is a perspective view of an embodiment of the present invention in a vertical and linear arrangement.

[0020] FIG. 6 is a perspective view of another embodiment of the present invention in a horizontal and linear arrangement.

[0021] FIG. 7 is a perspective view of yet another embodiment of the present invention in a stacked arrangement.

[0022] FIG. 8 is a perspective view of the present invention coupling with a heat transfer duct.

[0023] FIG. 9 is a sectional view of the present invention coupled with a heat transfer duct.

[0024] FIG. 10 is perspective view of still another embodiment of the present invention

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Please referring to FIGS. 1 and 2, the present invention aims to provide a LED heat sink 1 formed by mounting a LED lamp 2 onto a heat sink prototype 10 (as shown in FIG. 2) through a fabrication process. The heat sink 1 includes a holding zone 11 and one or more anchor portions 12 formed in blocks or struts bordering the holding zone 11 and higher than the holding zone 11. Each anchor portion 12 has a latch hook 121 at one side adjacent to the holding zone 11. The latch hook 121 is directed towards the holding zone 11 in a downward manner to form latching and downward pressing.

[0026] Referring to FIGS. 2 through 4B, the present invention aims to provide the LED heat sink 1 with the holding zone 11 to hold the LED lamp 2. The holding zone 11 is bordered by the anchor portions 12 to prevent the LED lamp 2 from sliding. Each anchor portion 12 has a latch hook 121 at one side adjacent to the holding zone 11 to latch and press the

LED lamp 2 downwards so that the LED lamp 2 and the heat sink 1 are coupled tightly in one body, thereby heat generated by the LED lamp 2 during lighting can be transferred through the heat sink 1 to reduce the temperature of the LED lamp 2 to increase the life span thereof.

[0027] The present invention also provides a manufacturing method to fabricate the LED heat sink 1 that comprises procedures as follows:

[0028] 1. Step 1: Provide a heat sink prototype 10 which has a holding zone 11 on an upper side bordered by one or more jutting anchor portions 12 each has an upper end formed a compact stamping zone 120;

[0029] 2. Step 2: Provide at least one LED lamp 2, and dispense a heat transfer medium 3 such as heat dispersing paste on the holding zone 11, and mount the LED lamp 2 onto the holding zone 11 at a desired location;

[0030] 3. Step 3: Provide a mold 4 corresponding to the compact stamping zone 120 of the anchor portion 12;

[0031] 4. Step 4: Stamp forcefully the compact stamping zone 120 on the upper side with the mold 4 in a diagonal direction towards the holding zone 11 to form a cavity 122 on the compact stamping zone 120 and squeeze the material of the anchor portion 12 beneath the compact stamping zone 120 towards the periphery of the LED lamp 2 to form a latch hook 121 pressing downwards, thereby the LED lamp 2 and the heat sink 1 are tightly coupled together in one body in a close contact manner to achieve forced heat transfer effect.

[0032] The present invention also provides a number of embodiments in arrangement between a plurality of LED lamps 2 and the holding zone 11. FIG. 5 illustrates an embodiment in which the LED lamps 2 are mounted onto the holding zone 11 in a vertical and linear manner. FIG. 6 illustrates another embodiment in which the LED lamps 2 are mounted onto the holding zone 11 in a horizontal and linear manner. FIG. 7 shows yet another embodiment in which the LED lamps 2 are mounted onto the holding zone 11 in a stacked manner.

[0033] Refer to FIGS. 8, 9 and 10 for still another embodiment of the present invention to couple with a heat transfer duct 5. In this embodiment the heat sink 1b is an elongate body equipped with an opening sealing function. The heat sink 1b is taken from a heat sink prototype 10b with one or more holding zone 11b formed at the top end. The holding zone 11b is bordered by one or more anchor portions 12b each has an upper side formed a compact stamping zone 120b. The heat sink prototype 10b has a bundle portion 13b in a middle section formed in varying shapes or sizes. In this embodiment the bundle portion 13b is a plurality of indented rings. The heat sink prototype 10b also has a heat transfer strut 14b at the bottom end.

[0034] In this embodiment the holding zone 11b is daubed with a heat transfer medium 3 such as heat dispersing paste; next, mount the LED lamp 2 onto the holding zone 11b at a desired location; then stamp the upper side of the compact stamping zone 120b with a mold (not shown in the drawings) in a diagonal direction towards the holding zone 11b to form a cavity 122b on the upper side of the compact stamping zone 120b and squeeze the material of the anchor portion 12b below towards the periphery of the LED lamp 2 so that a latch hook 121b is formed on the heat sink prototype 10b to latch the LED lamp 2 to become the heat sink 1b; then couple the heat transfer duct 5 with the heat sink 1b through the bottom of the heat sink 1b with the LED lamp 2 fastened thereon,

through the heat transfer strut 14b until reaching the bundle portion 13b in the middle of the heat sink 1b; through a corresponding duct sealing mold (not shown in the drawings) the opening 51 of the heat transfer duct 5 and the bundle portion 13b can be sealed tightly to finish the heat sink 1b coupled with the heat transfer duct 5.

What is claimed is:

- 1. A LED heat sink, comprising:
 - one or more holding zone on an upper side of the heat sink; and
 - one or more anchor portion which borders the holding zone at a higher elevation and includes a latch hook at one side adjacent to the holding zone.
- 2. The LED heat sink of claim 1, wherein the latch hook faces the holding zone and forms downward latching and pressing.
- 3. The LED heat sink of claim 1, wherein the anchor portion is a jutting block.
- 4. The LED heat sink of claim 1, wherein the anchor portion is a jutting strut.
- 5. A LED heat sink formed in an elongate body insertable into a heat transfer duct, comprising:
 - one or more holding zone located on an upper side of the heat sink;
 - a bundle portion located in a middle section of the heat sink; and
 - a heat transfer strut located at a bottom end of the heat sink.
- 6. The LED heat sink of claim 5, wherein the holding zone borders one or more anchor portion which is higher than the holding zone.
- 7. The LED heat sink of claim 6, wherein the anchor portion includes a latch hook at one side adjacent to the holding portion.
- 8. The LED heat sink of claim 5, wherein the bundle portion has a plurality of indent rings.
- 9. The LED heat sink of claim 5, wherein the bundle portion and the heat transfer strut are inserted into the heat transfer duct.
- 10. The LED heat sink of claim 9, wherein the heat transfer duct includes an opening which couples the bundle portion from an outer side and is sealed through a mold to form tight coupling and sealing between the heat transfer duct and the bundle portion.

11. A method for manufacturing a LED heat sink comprising the steps of:

- providing a heat sink prototype which has a holding zone on an upper side bordered by one or more jutting anchor portion which has an upper end formed a compact stamping zone;
- providing at least one LED lamp and dispensing a heat transfer medium on the holding zone, and mounting the LED lamp onto the holding zone at a desired location;
- providing a mold corresponding to the compact stamping zone of the anchor portion; and
- stamping the compact stamping zone on an upper side thereof with the mold in a diagonal direction towards the holding zone to squeeze the material of the anchor portion beneath the compact stamping zone to the periphery of the LED lamp to form a latch hook to produce a tight coupling between the LED lamp and the heat sink to generate forced heat transfer effect.

* * * * *