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(71) Applicant: **OSRAM GMBH** [DE/DE]; Marcel-Breuer-Strafie 6, 80807 Munchen (DE).

(72) Inventors: **LI, Rencheng;** 5F, Hantang Building, OCT (Overseas Chinese Town), Shenzhen, Guangdong 518053 (CN). **ENGL, Moritz;** 5F, Hantang Building, OCT (Overseas Chinese Town), Shenzhen, Guangdong 518053 (CN). **LAN, Tingbiao;** 5F, Hantang Building, OCT (Overseas Chinese Town), Shenzhen, Guangdong 518053 (CN). **LI, Zhian;** 5F, Hantang Building, OCT (Overseas Chinese Town), Shenzhen, Guangdong 518053 (CN).

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(54) Title: HEAT DISSIPATING STRUCTURE AND ILLUMINATING DEVICE HAVING SAID HEAD DISSIPATING STRUCTURE

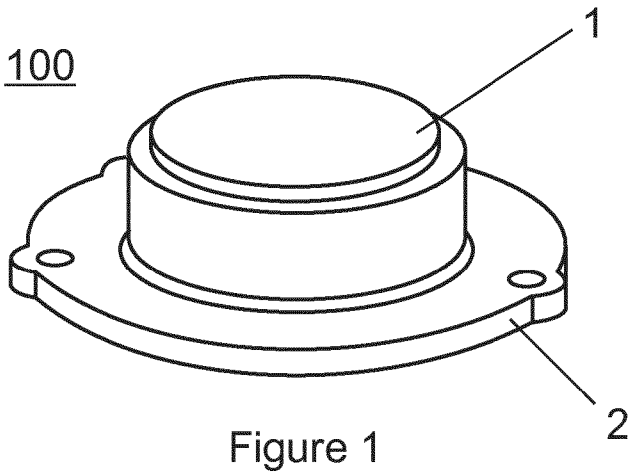

Figure 1

(57) Abstract: The present invention relates to a heat dissipating structure (100) for an illuminating device, comprising: a first heat dissipating body (1) and a second heat dissipating body (2), wherein the first heat dissipating body (1) is made of a metal by a first manufacturing process, and the second heat dissipating body (2) is made of a metal by a second manufacturing process, wherein the capacity of heat transmission of the first heat dissipating body (1) is higher than that of the second heat dissipating body (2), and the first heat dissipating body (1) and the second heat dissipating body (2) are assembled together in heat conduction with each other. In addition, the present invention further relates to an illuminating device (200) having a heat dissipating structure (100) of the above type.

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Description

Heat Dissipating Structure and Illuminating Device Having Said Head Dissipating Structure

Technical Field

The present invention relates to a heat dissipating structure for an illuminating device. In addition, the present invention further relates to an illuminating device having a heat dissipating structure of the above type.

Background Art

With continuous development of the technology, LEDs are widely applied in illuminating devices, and have the advantages of long service life, high luminous efficiency, and environmental protection. However, the luminous efficiency and service life of an LED illuminating device depend upon the heat dissipation performance of the illuminating device to a great degree. Good heat dissipation performance contributes to the improvement of luminous efficiency and the prolongation of service life. Hereby, a specially designed heat sink is usually provided in LED illuminating devices. Traditional heat sinks usually comprise a heat dissipating structure manufactured through die-casting process or a heat dissipating structure manufactured through stamping process. A heat dissipating structure manufactured through die-casting process has a relatively large volume capacity, and therefore possesses relatively good heat dissipation performance, while the cost thereof is relatively high. Whereas a heat dissipating structure manufactured through stamping process requires relatively low cost, while having a relatively small volume capacity, and therefore possesses relatively bad heat dissipation performance.

Summary of the Invention

In order to solve the problems existing in the prior art, the present invention provides a heat dissipating structure for an illuminating device. Said heat dissipating structure can provide good heat dissipating performance, while requiring relative low cost. In addition, the present invention further provides an illuminating device having a heat dissipating structure of the above type.

The first object of the present invention is achieved through a heat dissipating structure for an illuminating device in such a manner that said heat dissipating structure comprises: a first heat dissipating body and a second heat dissipating body, wherein the first heat dissipating body is made of a metal by a first manufacturing process, and the second heat dissipating body is made of a metal by a second manufacturing process, wherein the capacity of heat transmission of the first heat dissipating body is higher than that of the second heat dissipating body, and the first heat dissipating body and the second heat dissipating body are assembled together in heat conduction with each other. In an embodiment of the present invention, the first heat dissipating body and the second heat dissipating body are manufactured using different processes. In this case, the obtained heat dissipating body possesses on one hand relatively high capacity of heat transmission, while requiring relatively high cost. On the other hand, the obtained heat dissipating body has relatively low capacity of heat transmission, while requiring relatively low cost. Thus, the heat dissipating structure obtained by combining the two reaches appropriate compromises regarding capacity of heat transmission and cost, so as to obtain a heat dissipating structure with strong heat dissipation property and low cost.

It is provided according to the present invention, the first heat dissipating body is configured as a metallic extrusion part, and the second heat dissipating body is configured as a metallic stamping part. The volume capacity of the metallic extrusion part is relatively large, and therefore, the heat dissipation performance thereof is relatively good. And the manufacturing cost of the metallic stamping part is relatively low.

It is preferable that the second heat dissipating body partially surrounds the first heat dissipating body in a manner of interference fit. The first heat dissipating body and the second heat dissipating body can be firmly fixed together in a manner of interference fit, without aid of auxiliary mechanical structures or use of an adhering or welding method. Moreover, the first heat dissipating body and the second heat dissipating body are in close contact with each other, and no gap is present between the two, such that the heat resistance on a heat conductive path from the first heat dissipating body to the second heat dissipating body is reduced .

It is further preferable that the first heat dissipating body is configured as a solid mass, wherein heat from a heat source of the illuminating device is conducted through the first heat dissipating body to the second heat dissipating body. The metallic extrusion part obtained through a die-casting mode usually has a relatively large volume capacity, that is, it is easy to constitute a solid mass. Such a mass possesses relatively strong capacity of heat transmission, and heat from the heat source can be rapidly dissipated through said first heat dissipating body that is configured as a mass.

According to the present invention, it is further provided that the second heat dissipating body is made of a sheet metal. The second heat dissipating body can be manufactured of a sheet metal through stamping process with low cost. Moreover, different shapes can be formed by stamping through the use of a sheet metal, so as to obtain a large contact area with air as possible to further improve the heat dissipation performance of the heat dissipating structure.

It is preferable that the first heat dissipating body includes a bearing part in thermal contact with the heat source of the illuminating device, and an abutting part in thermal contact with the second heat dissipating body. Heat of a light source of the illuminating device is directly transferred through the bearing part to the first heat dissipating body, and then directly transferred through the abutting part to the second heat dissipating body. In this case, heat can be rapidly transferred to the first heat dissipating body, which possesses relatively high capacity of heat transmission, such that the object of rapid temperature reduction is achieved.

It is further preferable that the first heat dissipating body is configured to be columnar, wherein the columnar first heat dissipating body includes two end surfaces and a circumferential surface formed between the end surfaces, wherein one of the end surfaces is configured as the bearing part, and the circumferential surface is configured as the abutting part. Of course, the first heat dissipating body can also be configured to have other shapes, e.g. a prismoid etc.

According to the present invention, it is provided that the second heat dissipating body includes a mounting part for mount on the illuminating device, and a clamping part for

thermal contact with the abutting part. The abutting part is at least partially enclosed by the clamping part, so as to assure a good heat transfer.

It is advantageous that the second heat dissipating body includes a bottom plate configured as the mounting part and a through hole formed in the center of the bottom plate, an annular wall extending away from the bottom plate is formed at an edge of the through hole, and the annular wall is configured as the clamping part and defines an accommodating passage for accommodating the first heat dissipating body.

It is further advantageous that the geometric outline of the accommodating passage is so configured that the first heat dissipating body can be held in the accommodating passage in a manner of interference fit. In said embodiment, the geometric outline of the accommodating passage shall be slightly smaller than that of the first heat dissipating body, so that the abutting part of the first heat dissipating body can abut on the inner wall of the accommodating passage with a certain force when the first heat dissipating body is placed in the accommodating passage, so as to form the so-called interference fit. It is preferable that the first heat dissipating body is in a form of cyliner, and the accommodat – ing passage has a circular cross-section, wherein the circumferential surface of the cylinder abuts on the inner wall of the accommodating passage.

It is advantageous that at least one assembly hole for a fastening bolt is formed on the bottom plate. A bolted connection enables the heat dissipating structure to be reliably fixed on a corresponding position of the illuminating device.

According to the present invention, it is further provided that the first heat dissipating body and the second heat dissipating body are made of aluminum. Of course, the first heat dissipating body and the second heat dissipating body can also be made of a metallic material of other types, e.g. copper etc.

The other object of the present invention is achieved through an illuminating device, said illuminating device comprises a housing, a light source, and a driver accommodated in the housing, wherein the illuminating device further comprises a heat dissipating structure of the above type, wherein the light source is arranged on the first heat dissipating body of the heat dissipating structure in thermal contact with the same, and the heat dissipating structure is fixed on the housing by means of the second heat dissipating body.

It is preferable that the light source includes a circuit board and at least one LED chip arranged on the circuit board, wherein the circuit board is in thermal contact with the first heat dissipating body.

It is to be understood that the features of the various exemplary embodiments described herein may be combined with each other, unless specifically noted otherwise.

Brief Description of the Drawings

The accompanying drawings constitute a part of the present Description and are used to provide further understanding of the present invention. Such accompanying drawings illustrate the embodiments of the present invention and are used to describe the principles of the present invention together with the Description. In the accompanying drawings, the same components are represented by the same reference numbers. As

shown in the drawings :

Figure 1 is a schematic diagram of a heat dissipating structure according to the present invention;

Figure 2 is a sectional view of the heat dissipating structure shown in Figure 1;

Figure 3 is an exploded schematic diagram of the heat dissipating structure according to the present invention; and

Figure 4 is a sectional view of an illuminating device according to the present invention.

Detailed Description of the Embodiments

In the following detailed description, reference is made to the accompanying drawings, which form a part hereof, and in which is shown by way of illustration specific embodiments in which the invention may be practiced. In this regard, directional terminology, such as "upper", "lower", "circumferential", is used in reference to the orientation of the figures being described. Because components of embodiments of the present invention can be positioned in a number of different orientations, the directional terminology is used for purposes of illustration and is in no way limiting. It is to be understood that other embodiments may be utilized and structural or logical changes may be made without departing from the scope of the present invention. The following detailed description, therefore, is not to be taken in a limiting sense, and the scope of the present invention is defined by the appended claims.

Figure 1 shows a schematic diagram of a heat dissipating structure 100 according to the present invention. It can be

seen from the figure that the heat dissipating structure 100 according to the present invention comprises a first heat dissipating body 1 and a second heat dissipating body 2, wherein the first heat dissipating body 1 and the second heat dissipating body 2 are assembled together in heat conduction with each other. In the present example, the second heat dissipating body 2 partially surrounds the first heat dissipating body 1 in a manner of interference fit, and it can be seen from the figure that only the upper surface and the lower surface (not shown in the figure, specifically see Figure 2) of the first heat dissipating body 1 are exposed, while the most area of the circumferential surface of the first heat dissipating body 1 is surrounded by the second heat dissipating body 2. Thus, a heat dissipating structure composed of two parts is obtained.

Figure 2 shows a sectional view of the heat dissipating structure 100 according to the present invention. It can be seen from the figure that the first heat dissipating body 1 is configured as a solid mass, wherein heat from a heat source of the illuminating device is conducted through the first heat dissipating body 1 to the second heat dissipating body 2. In the meanwhile, the second heat dissipating body 2 is made of a sheet metal. In the present example, the first heat dissipating body 1 and the second heat dissipating body 2 can be made of aluminum, while in other examples, the two can also be made of another metal with a high heat conductivity, e.g. copper. Moreover, in order to obtain such a structure, it is provided in an embodiment of the present invention that the first heat dissipating body 1 is configured as a metallic extrusion part manufactured through die-casting process, and the second heat dissipating body 2 is configured as a metallic stamping part manufactured through stamping process, and thus, the capacity of heat

transmission of the first heat dissipating body 1 is higher than that of the second heat dissipating body 2.

Figure 3 shows an exploded schematic diagram of the heat dissipating structure 100 according to the present invention. A second heat dissipating body 2 manufactured of a sheet metal and configured as a metallic stamping part is shown in the upper part of Figure 3, while a first heat dissipating body 1 configured as a solid mass and formed into a metallic extrusion part is shown in the lower part of Figure 3.

It can be seen from Figure 3 that the first heat dissipating body 1 is configured to be columnar, wherein the columnar first heat dissipating body 1 includes two end surfaces and a circumferential surface formed between the end surfaces, wherein one of the end surfaces is configured as a bearing part 11 which is in thermal contact with the heat source of the illuminating device, and the circumferential surface is configured as an abutting part 12 which is in thermal contact with the second heat dissipating body 2.

It can further be seen from Figure 3 that the second heat dissipating body 2 includes a mounting part 21 for mount on the illuminating device, and a clamping part 22 for thermal contact with the abutting part 12. In the present example, the second heat dissipating body 2 includes a bottom plate configured as the mounting part 21 and a through hole 23 formed in the center of the bottom plate, an annular wall 24 extending away from the bottom plate is formed at an edge of the through hole 23, and the annular wall 24 is configured as the clamping part 22 and defines an accommodating passage 25 for accommodating the first heat dissipating body 1. In an embodiment according to the present invention, it is provided that the geometric outline of the accommodating passage 25 is

so configured that the first heat dissipating body 1 can be held in the accommodating passage 25 in a manner of interference fit. And in the present example, the first heat dissipating body 1 is in a form of cylinder, and accordingly, the accommodating passage 25 also has a circular cross-section, wherein the circumferential surface of the cylinder abuts on the inner wall of the accommodating passage 25. In other unshown examples of the present invention, the first heat dissipating body 1 may also be prismoid, e.g. a triangular prism or a quadrangular prism, and accordingly, the cross-section of the accommodating passage 25 shall also be correspondingly a triangle or a quadrangle etc.

It shall be emphasized that the cross-section of the first heat dissipating body 1 shall be slightly greater than that of the accommodating passage 25 no matter which outline the first heat dissipating body 1 has, so that the abutting part 12 of the first heat dissipating body 1 can abut on the inner wall of the accommodating passage 25 with a certain force when the first heat dissipating body 1 is placed in the accommodating passage 25, so as to form the so-called interference fit.

In addition, it can further be seen from Figure 3 that at least one assembly hole 26 for a fastening bolt is formed on the bottom plate. In the present example, three assembly holes 26 arranged in an equal interval are formed on the bottom plate. An unshown fastening bolt passes through the assembly hole 26 and is screwed to a corresponding position of the illuminating device, e.g. on the housing.

Figure 4 shows a sectional view of the illuminating device 200 according to the present invention. The illuminating device 200 shown in Figure 4 is an LED retrofit lamp for re-

placing traditional incandescent lamps. It can be seen from the figure that the illuminating device 200 comprises a housing 3, a light source 4, and a driver 5 accommodated in the housing 3, wherein the illuminating device 200 further comprises a heat dissipating structure 100, wherein the light source 4 is arranged on the first heat dissipating body 1 of the heat dissipating structure 100 in thermal contact with the same, and the heat dissipating structure 100 is fixed on the housing 3 by means of the second heat dissipating body 2. It can further be seen from the figure that the light source 4 includes a circuit board 41 and at least one LED chip 42 arranged on the circuit board 41, wherein the circuit board 41 is in thermal contact with the bearing part 12 of the first heat dissipating body 1. The second heat dissipating body 2 substantially closes the upper opening of the housing 3, after being fixed on the housing 3. Hereby, as a support structure of the first heat dissipating body 1, the second heat dissipating body 2 holds the first heat dissipating body 1 at a fixed position. Heat from the light source 4 is rapidly conducted through the first heat dissipating body 1, and dissipated through the second heat dissipating body 2 to ambient environment.

The above is merely preferred embodiments of the present invention but not to limit the present invention. For the person skilled in the art, the present invention may have various alterations and changes. Any alterations, equivalent substitutions, improvements, within the spirit and principle of the present invention, should be covered in the protection scope of the present invention.

List of reference signs

1	first heat dissipating body
11	bearing part
12	abutting part
2	second heat dissipating body
21	mounting part
22	clamping part
23	through hole
24	annular wall
25	accommodating passage
26	assembly hole
3	housing
4	light source
41	circuit board
42	LED chip
5	driver
100	heat dissipating structure
200	illuminating device

Patent claims

1. A heat dissipating structure (100) for an illuminating device, comprising: a first heat dissipating body (1) and a second heat dissipating body (2), characterized in that the first heat dissipating body (1) is made of a metal by a first manufacturing process, and the second heat dissipating body (2) is made of a metal by a second manufacturing process, wherein the capacity of heat transmission of the first heat dissipating body (1) is higher than that of the second heat dissipating body (2), and the first heat dissipating body (1) and the second heat dissipating body (2) are assembled together in heat conduction with each other.

2. The heat dissipating structure (100) according to Claim 1, characterized in that the first heat dissipating body (1) is configured as a metallic extrusion part, and the second heat dissipating body (2) is configured as a metallic stamping part.

3. The heat dissipating structure (100) according to Claim 2, characterized in that the second heat dissipating body (2) partially surrounds the first heat dissipating body (1) in a manner of interference fit.

4. The heat dissipating structure (100) according to any of Claims 1 to 3, characterized in that the first heat dissipating body (1) is configured as a solid mass, wherein heat from a heat source of the illuminating device is conducted through the first heat dissipating body (1) to the second heat dissipating body (2).

5. The heat dissipating structure (100) according to Claim

2, characterized in that the second heat dissipating body (2) is made of a sheet metal.

6. The heat dissipating structure (100) according to Claim 4, characterized in that the first heat dissipating body (1) includes a bearing part (11) in thermal contact with the heat source of the illuminating device, and an abutting part (12) in thermal contact with the second heat dissipating body (2).

7. The heat dissipating structure (100) according to Claim 6, characterized in that the first heat dissipating body (1) is configured to be columnar, wherein the first heat dissipating body (1) includes two end surfaces and a circumferential surface formed between the end surfaces, wherein one of the end surfaces is configured as the bearing part (11), and the circumferential surface is configured as the abutting part (12).

8. The heat dissipating structure (100) according to Claim 6, characterized in that the second heat dissipating body (2) includes a mounting part (21) for mounting on the illuminating device, and a clamping part (22) for being in thermal contact with the abutting part (12).

9. The heat dissipating structure (100) according to Claim 8, characterized in that the second heat dissipating body (2) includes a bottom plate configured as the mounting part (21) and a through hole (23) formed in the center of the bottom plate, an annular wall (24) extending away from the bottom plate is formed at an edge of the through hole (23), and the annular wall (24) is configured as the clamping part (22) and defines an accommodating passage (25) for accommodating the first

heat dissipating body (1).

10. The heat dissipating structure (100) according to Claim 9, characterized in that the geometric outline of the accommodating passage (25) is so configured that the first heat dissipating body (1) is capable of being held in the accommodating passage (25) in a manner of interference fit.

11. The heat dissipating structure (100) according to Claim 10, characterized in that the first heat dissipating body (1) is in a form of cylinder, and the accommodating passage (25) has a circular cross-section, wherein the circumferential surface of the cylinder abuts on the inner wall of the accommodating passage (25).

12. The heat dissipating structure (100) according to Claim 11, characterized in that at least one assembly hole (26) for fastening bolt is formed on the bottom plate.

13. The heat dissipating structure (100) according to Claim 1 or 2, characterized in that the first heat dissipating body (1) and the second heat dissipating body (2) are made of aluminum.

14. An illuminating device (200), comprising a housing (3), a light source (4), and a driver (5) accommodated in the housing (3), characterized in that the illuminating device (200) further comprises a heat dissipating structure (100) according to any of Claims 1 to 13, wherein the light source (4) is arranged on the first heat dissipating body (1) of the heat dissipating structure (100) in thermal contact with the same, and the heat dissipating structure (100) is fixed on the

housing (3) by means of the second heat dissipating body (2) .

15. The illuminating device (200) according to Claim 14, characterized in that the light source (4) includes a circuit board (41) and at least one LED chip (42) arranged on the circuit board (41), wherein the circuit board (41) is in thermal contact with the first heat dissipating body (1) .

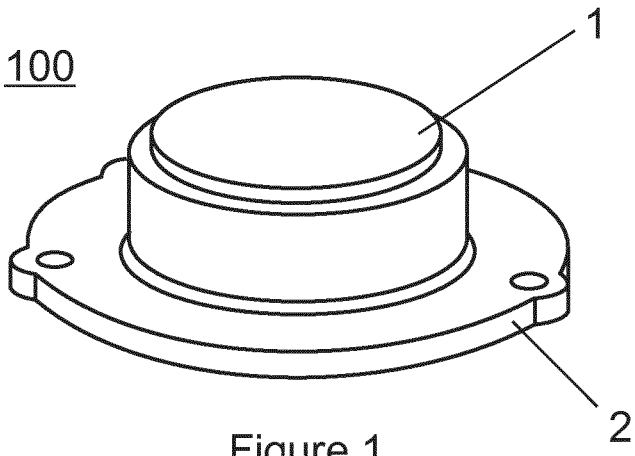

Figure 1

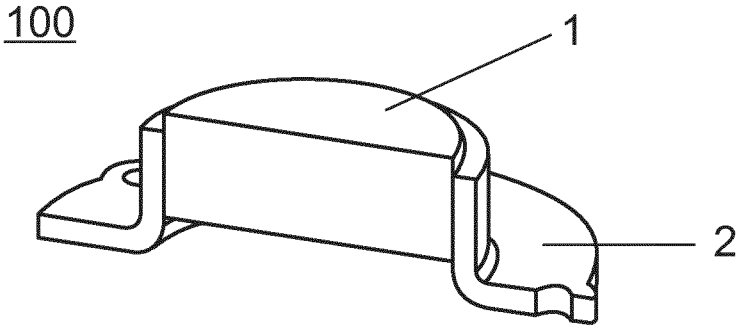

Figure 2

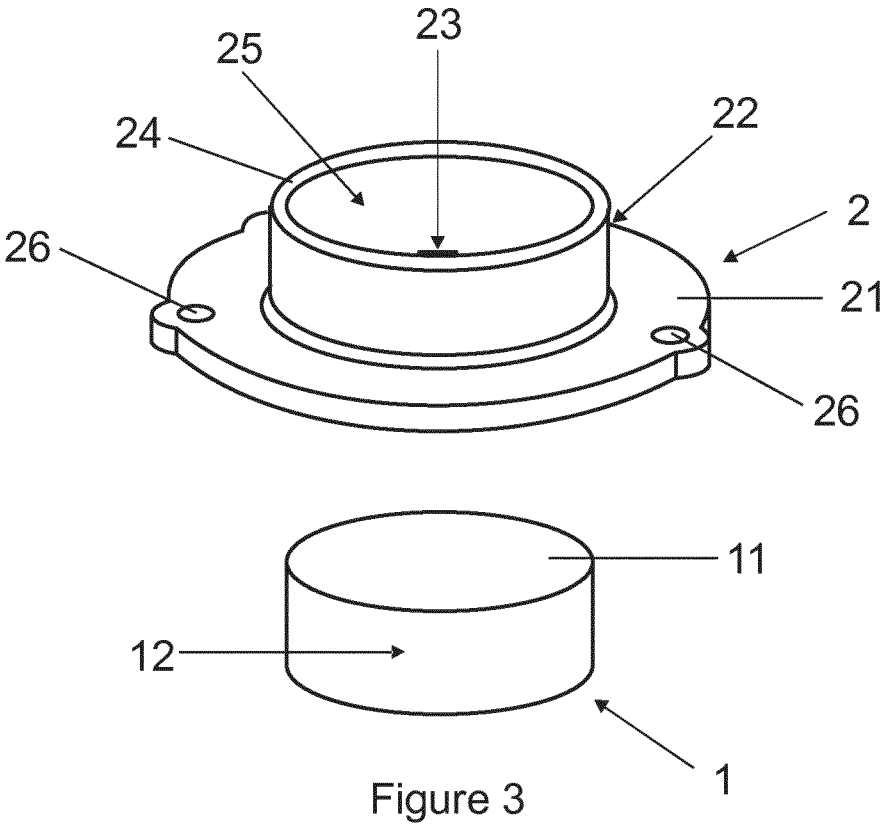

Figure 3

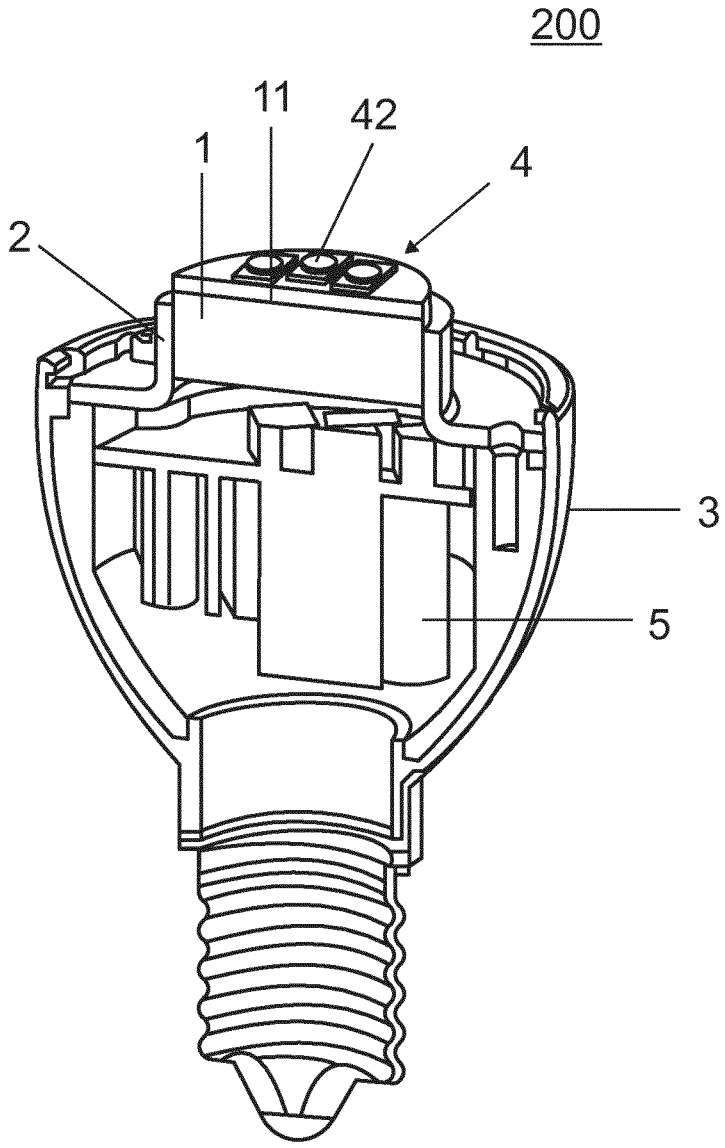

Figure 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/058342

A. CLASSIFICATION OF SUBJECT MATTER
INV. F21V29/00 F21K99/00
ADD. F21Y101/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F21V F21K F21Y H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	CN 101 338 886 A (KAI HU [CN]) 7 January 2009 (2009-01-07) the whol e document	1-15
X	US 2012/013237 Al (LEE WEN-JEN [TW]) 19 January 2012 (2012-01-19) paragraph [0034] - paragraph [0044] ; f i gure 2a	1-15
X	US 2011/068687 Al (TAKAHASI KENZI [JP] ET AL) 24 March 2011 (2011-03-24) paragraph [0355] - paragraph [0373] ; f i gures 22 , 23	1-6, 8-10, 13-15

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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 June 2014	07/07/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Thi baut, Arthur

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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