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(54) **Reflective light emitting diode lamp**

(57) A reflective LED lamp (200) includes a metallic shell (2), a reflecting member (3), and an LED unit. The metallic shell (2) includes a surrounding wall (22) formed with a mounting hole unit, and an accommodating space (23) defined by the surrounding wall (22). The reflecting member (3) is disposed within the accommodating space (23), and includes a reflection region unit configured as at least one concaved curve surface. The LED unit is disposed within the mounting hole unit in the shell (2) for emitting light onto the reflection region unit of the reflecting member (3), so that the light is reflected by the reflection region unit out of the shell (2).

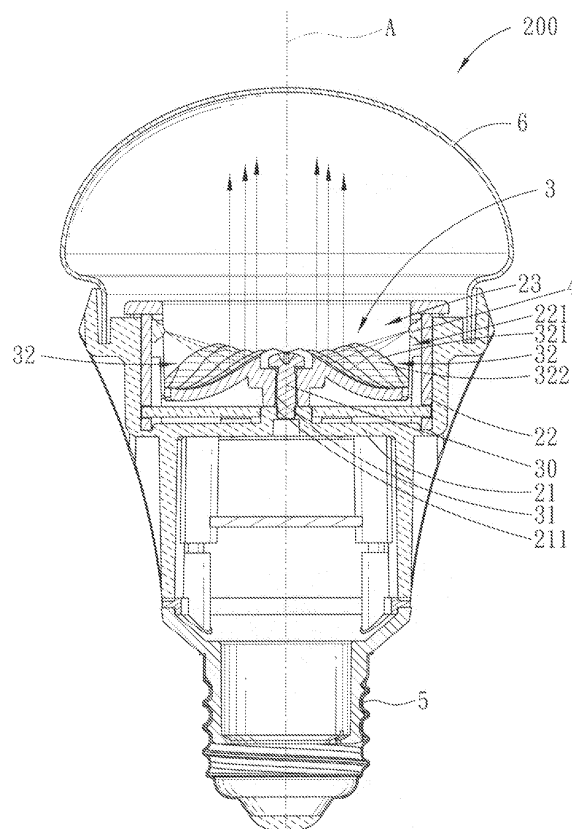


FIG. 5

Description

[0001] This invention relates to a lamp, and more particularly to a reflective light emitting diode (LED) lamp.

[0002] Referring to Fig. 1, a conventional reflective lamp 1 disclosed in Taiwanese Patent Publication No. 200933075 (Application No. 97102136) includes a metallic sleeve 11, and a conical reflecting surface 12 disposed at the center of an end wall of the sleeve 11. A surrounding wall 111 of the sleeve 11 is formed with a mounting hole 112 for receiving an LED 13.

[0003] A light 131 emitted from the LED 13 is incident on the conical reflecting surface 12 to form reflected light 132, and is transmitted out of the sleeve 11.

[0004] Since the sleeve 11 is metallic, heat can be dissipated quickly from the LED 13. Furthermore, since the light 132 transmitted out of the sleeve 11 is reflected light, glare can be avoided.

[0005] The object of this invention is to provide a reflective light emitting diode lamp that has a good heat-dissipating effect and that includes a non-conical light-reflecting surface capable of reflecting light before the light is transmitted out of the lamp, so as to avoid glare.

[0006] According to this invention, a reflective LED lamp comprises:

- a metallic shell including a surrounding wall formed with a mounting hole unit, and an accommodating space defined by the surrounding wall;
- a reflecting member disposed within the accommodating space and including a reflection region unit configured as at least one concaved curve surface; and
- an LED unit disposed within the mounting hole unit in the shell for emitting light onto the reflection region unit of the reflecting member, so that the light is reflected by the reflection region unit out of the shell.

[0007] Since the LED unit is disposed within the metallic shell, heat can be dissipated quickly therefrom during use of the lamp. Furthermore, since the light is reflected by the reflection region unit before it is transmitted out of the shell, glare is avoided.

[0008] These and other features and advantages of this invention will become apparent in the following detailed description of the preferred embodiments of this invention, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic view of a conventional reflective lamp disclosed in Taiwanese Patent Publication No. 200933075;

Fig. 2 is a perspective view of the preferred embodiment of a reflective LED lamp according to this invention, a light-permeable cover being shown by phantom lines;

Fig. 3 is a top view of the first preferred embodiment, the light-permeable cover being removed for brevity;

Fig. 4 is a partly sectional side view of the first preferred embodiment, illustrating light paths;

Fig. 5 is a sectional view of the first preferred embodiment, illustrating the light paths; and

Fig. 6 is a sectional view of the second preferred embodiment of a reflective LED lamp according to this invention, illustrating light paths.

[0009] Before the present invention is described in greater detail in connection with the preferred embodiments, it should be noted that similar elements and structures are designated by like reference numerals throughout the entire disclosure.

[0010] Referring to Fig. 2, the first preferred embodiment of a reflective LED lamp 200 according to this invention includes a heat-dissipating metallic shell 2, a reflecting member 3, an LED unit including a plurality of LEDs 4, and a conductive lamp base 5. The lamp base 5 is connected to the metallic shell 2 along a lamp axis (A) (see Fig. 5).

[0011] With further reference to Figs. 3, 4, and 5, the shell 2 is made of a thermally conductive material, such as aluminum, and includes a base wall 21 (see Fig. 5), and a surrounding wall 22 disposed about the lamp axis (A) and connected integrally to an outer periphery of the base wall 21 to define an accommodating space 23 that is open upwardly. The reflecting member 3 is made of glass, and is disposed within the accommodating space 23. A bolt 30 extends through a central hole 31 in the reflecting member 3 to engage a threaded hole 211 in the base wall 21, such that the reflecting member 3 is secured on the base wall 21 and in the accommodating space 23.

[0012] The reflecting member 3 has a reflection region unit including a plurality of interconnected reflection regions 32 each configured as a concaved curve surface. In this embodiment, the reflecting member 3 is made of a heat-resistant plastic material, such as ABS, and is plated with an aluminum film for light-reflecting purposes. The surrounding wall 22 is formed with a mounting hole unit including a plurality of angularly equidistant mounting holes 221 arranged along a circle. The reflection regions 32 correspond respectively to the mounting holes 221. Each of the LEDs 4 is mounted on a circuit board (not shown), and is connected electrically to the lamp base 5 by a power transmission cable (not shown). As such, the LEDs 4 can emit light therefrom when electricity is supplied to the circuit boards. The LEDs 4 are located respectively within the mounting holes 221 for emitting light onto the reflection regions 32, respectively. The light incident on the reflection regions 32 is reflected out of the shell 2 through a light-permeable cover 6 mounted on a top end of the sleeve 2.

[0013] Since the LEDs 4 are disposed respectively within the mounting holes 221 in the surrounding wall 22 of the metallic shell 2, heat can be dissipated quickly from the LEDs 4 via the shell 2. The shell 2 further includes a plurality of heat-dissipating fins 24 extending from an out-

er surface of the surrounding wall 22 of the shell 2 for promoting the heat-dissipating effect of the shell 2. Since the LEDs 4 are concealed within the shell 2, glare resulting from looking directly at the LEDs 4 can be avoided.

[0014] Each of the LEDs 4 is disposed at a focal point of the corresponding reflection region 32, so that the light beams reflected by the reflection regions 32 are parallel to each other and the lamp axis (A). Since the mounting holes 221 are angularly equidistant, the reflected light has a symmetrical and uniform light shape. Each of the reflection regions 32 has a plurality of reflecting surfaces 321. Any two adjacent ones of the reflecting surfaces 321 are interconnected by a connecting portion 322. Areas of the reflecting surfaces 321 of each of the reflection regions 32 increase gradually in an upward direction away from the lamp base 5 (i.e., the area of an upper one of any adjacent pair of the reflecting surfaces 321 is greater than that of a lower one of the same), and inclination angles of the reflecting surfaces 321 of each of the reflection regions 32 also increase gradually in the direction (i.e., the inclination angle of an upper one of any adjacent pair of the reflecting surfaces 321 is greater than that of a lower one of the same), so as to optimize the light shape of the light reflected by the reflection regions 32, thereby avoiding glare.

[0015] In this embodiment, the lamp 200 includes three reflection regions 32, three mounting holes 221, and three LEDs 4. Alternately, the number of these components may be changed to one, two, or more than three.

[0016] In view of the above, the lamp 200 of this invention has the following advantages:

- (1) Heat can be dissipated quickly from the LEDs 4 through the metallic shell 2.
- (2) The LEDs 4 are kept out of direct sight of the user to avoid glare resulting from the direct sight.
- (3) Since the LEDs 4 are disposed respectively at the focal points of the reflection regions 32, the light beams reflected by the reflection regions 32 are parallel to each other.
- (4) The mounting holes 221 in the surrounding wall 22 are angularly equidistant, and the reflection regions 32 correspond respectively to the mounting holes 221. As such, when light is reflected by the reflection regions 32, it has a relatively symmetrical and uniform light shape.

[0017] Fig. 6 shows the second preferred embodiment of a reflective LED lamp 200 according to this invention, which is similar in construction to the first preferred embodiment. In this embodiment, each of the reflection regions 32 has first, second, and third reflection sections 323, 324, 325. The second reflection section 324 is connected between the first and third reflection sections 323, 325, such that it is farther from the lamp base 5 (see Fig. 5) than the first reflection section 323, and nearer to the lamp base 5 (see Fig. 5) than the third reflection section 325. In this embodiment, each of the LEDs 4 is located

at a focal point (F) of the second reflecting section 324 of the corresponding reflection region 32, such that the light beams reflected from the second reflecting section 324 are parallel to the lamp axis (A). The first reflecting section 323 of each of the reflection regions 32 is shaped such that each of the light beams reflected therefrom is inclined, and advances in a direction away from the lamp axis (A). The third reflecting section 325 of each of the reflection regions 32 is shaped such that each of the light beams reflected therefrom is inclined, and advances in a direction toward the lamp axis (A).

Claims

1. A reflective LED lamp (200) including:

a metallic shell (2) including a surrounding wall (22) disposed about a lamp axis (A) and formed with a mounting hole unit, and an accommodating space (23) defined by said surrounding wall (22);
a reflecting member (3) disposed within said accommodating space (23) and including a reflection region unit; and
an LED unit disposed within said mounting hole unit in said shell (2) for emitting light onto said reflection region unit of said reflecting member (3), so that the light is reflected by said reflection region unit out of said shell (2);
characterized by said reflection region unit being configured as at least one concaved curve surface.

2. The reflective LED lamp (200) as claimed in Claim 1, **characterized in that** said mounting hole unit of said shell (2) includes a mounting hole (221), said reflection region unit of said reflecting member (3) includes a reflection region (32) configured as said concaved curve surface, and said LED unit includes an LED (4).

3. The reflective LED lamp (200) as claimed in Claim 2, further **characterized in that** said reflection region (32) has a focal point, at which said LED (4) is disposed.

4. The reflective LED lamp (200) as claimed in Claim 3, further **characterized in that** said reflection region (32) further has a plurality of reflecting surfaces (321), any two adjacent ones of which are interconnected.

5. The reflective LED lamp (200) as claimed in Claim 4, further **characterized by** a lamp base (5) connected to the metallic shell (2) along the lamp axis (A), areas of said reflecting surfaces (321) increasing gradually in a direction away from the lamp base (5).

6. The reflective LED lamp (200) as claimed in Claim 5, further **characterized in that** inclination angles of said reflecting surfaces (321) increase gradually in the direction. 5
7. The reflective LED lamp (200) as claimed in Claim 1, **characterized in that** said shell (2) further includes a plurality of heat-dissipating fins (24) extending from an outer surface of said surrounding wall (22). 10
8. The reflective LED lamp (200) as claimed in Claim 1, **characterized in that:**
- said mounting hole unit of shell (2) includes a plurality of mounting holes (221); 15
- said reflection region unit of reflecting member (3) includes a plurality of reflection regions (32) each configured as said concaved curve surface; and 20
- said LED unit includes a plurality of LEDs (4) disposed respectively within said mounting holes (221) in said shell (2), each of said LEDs (4) emitting the light onto a respective one of said reflection regions (32) of said reflecting member (3), so that the light is reflected out of said shell (2). 25
9. The reflective LED lamp (200) as claimed in Claim 8, further **characterized in that** each of said reflection regions (32) has a focal point, said LEDs (4) being disposed respectively at said focal points of said reflection regions (32). 30
10. The reflective LED lamp (200) as claimed in Claim 9, further **characterized in that** each of said reflection regions (32) further has a plurality of reflecting surfaces (321), any two adjacent ones of which are interconnected. 35
- 40
11. The reflective LED lamp (200) as claimed in Claim 10, further **characterized by** a lamp base (5) connected to the metallic shell (2) along the lamp axis (A), areas of said reflecting surfaces (321) of each of said reflection regions (32) increasing gradually in an direction away from the lamp base (5). 45
12. The reflective LED lamp (200) as claimed in Claim 11, further **characterized in that** inclination angles of said reflecting surfaces (321) of each of said reflection regions (32) increase gradually in the direction. 50
13. The reflective LED lamp (200) as claimed in Claim 8, further **characterized in that** said shell (2) further includes a plurality of heat-dissipating fins (24) extending from an outer surface of said surrounding wall (22) . 55

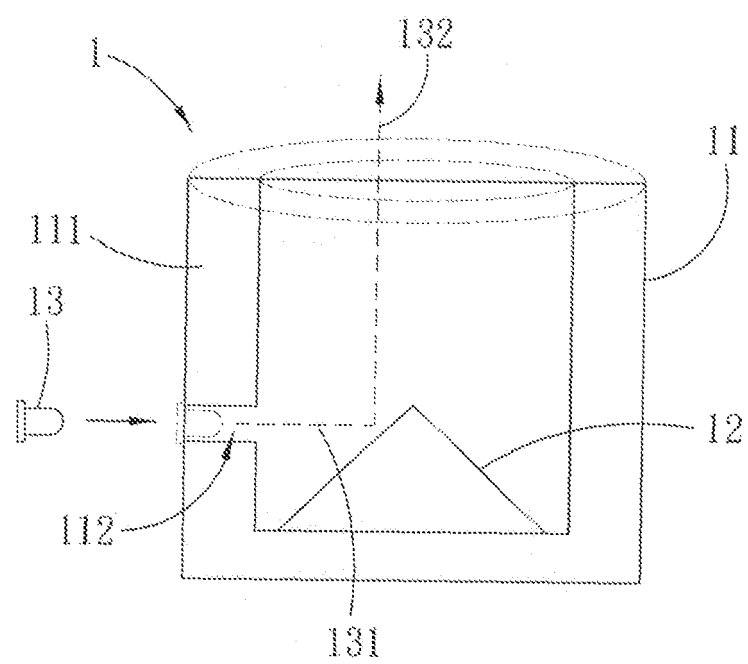


FIG. 1 PRIOR ART

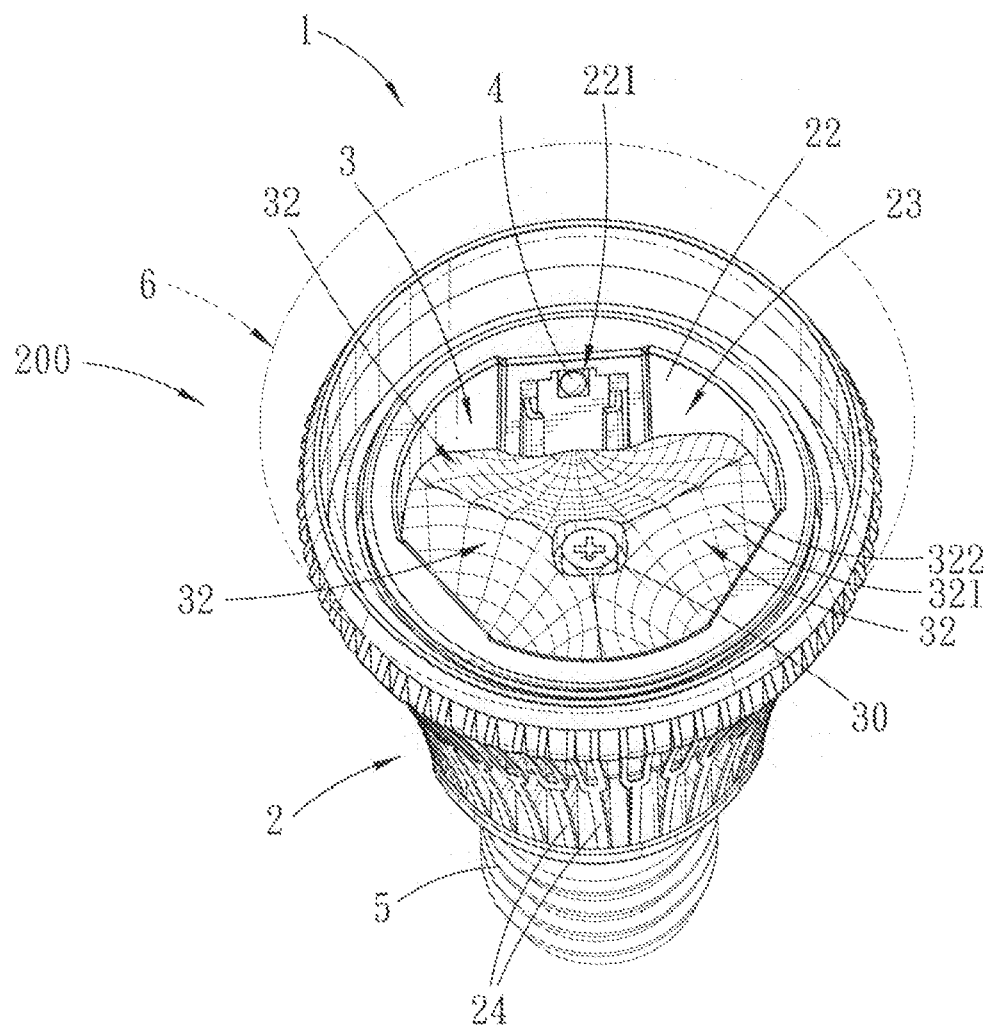


FIG. 2

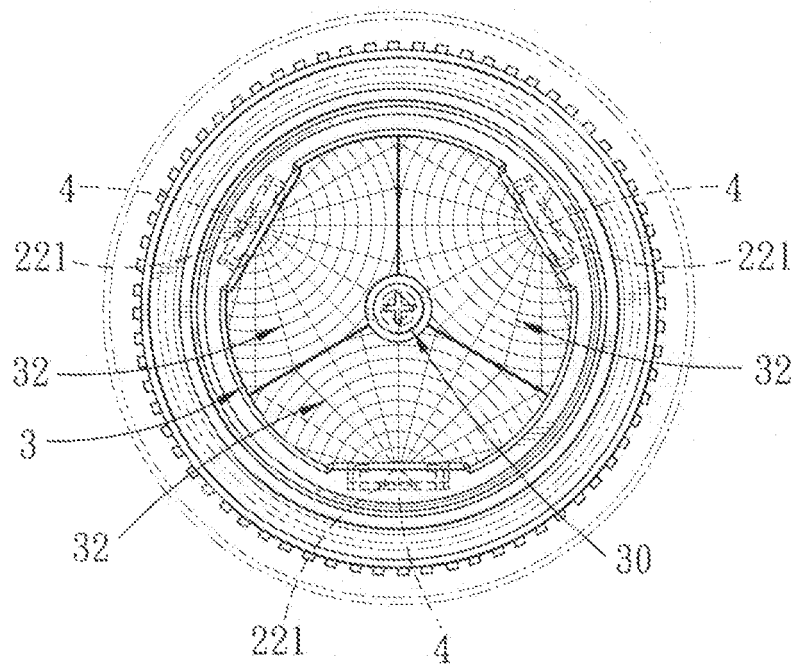


FIG. 3

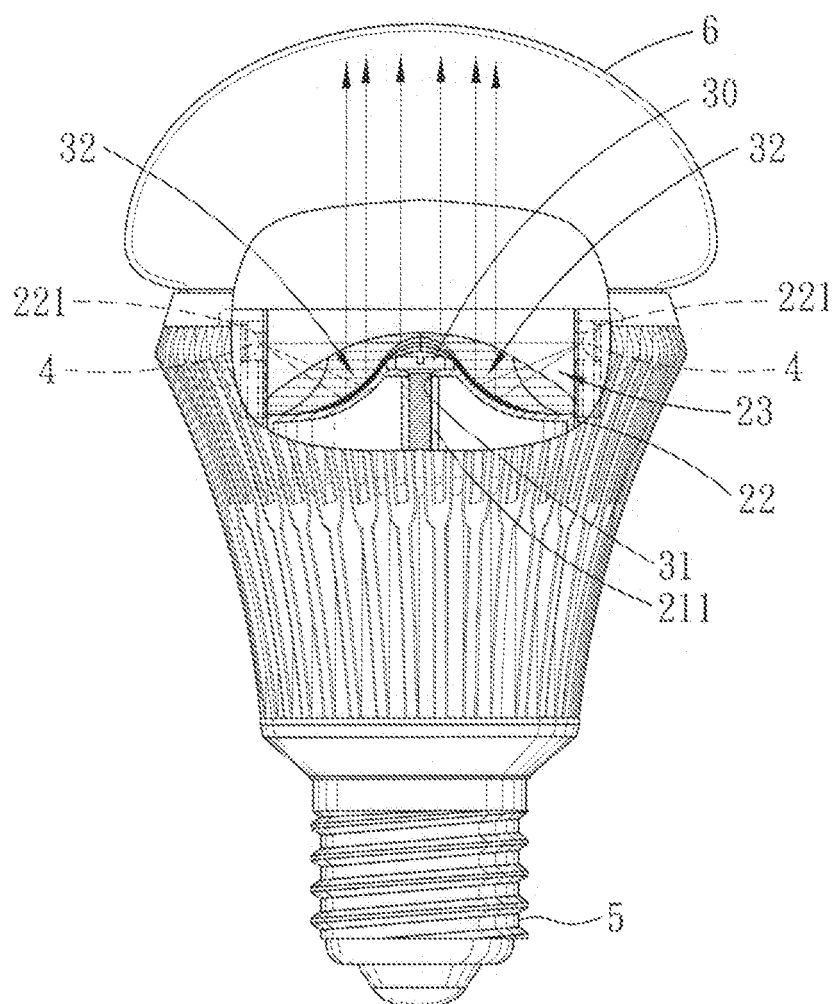


FIG. 4

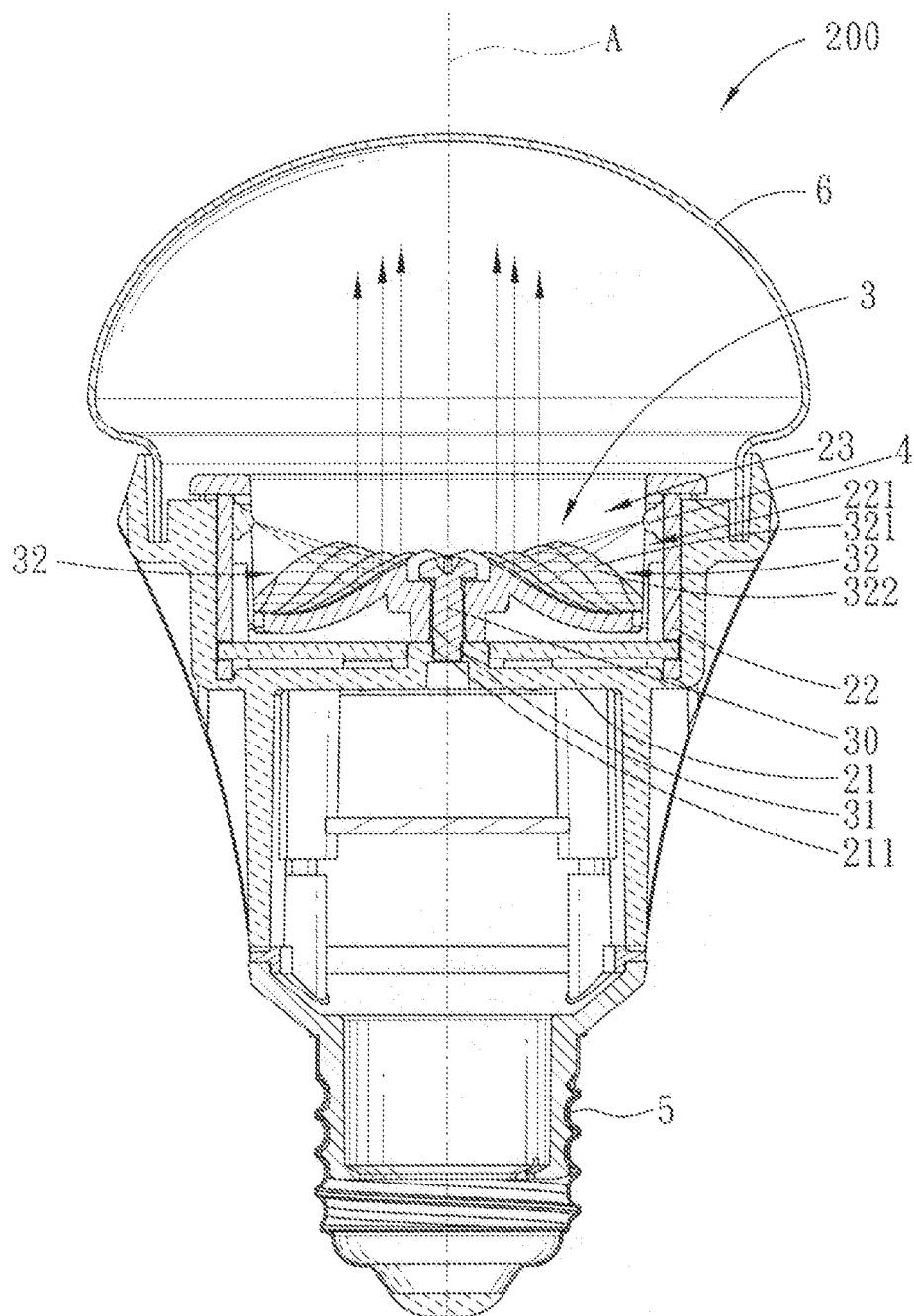


FIG. 5

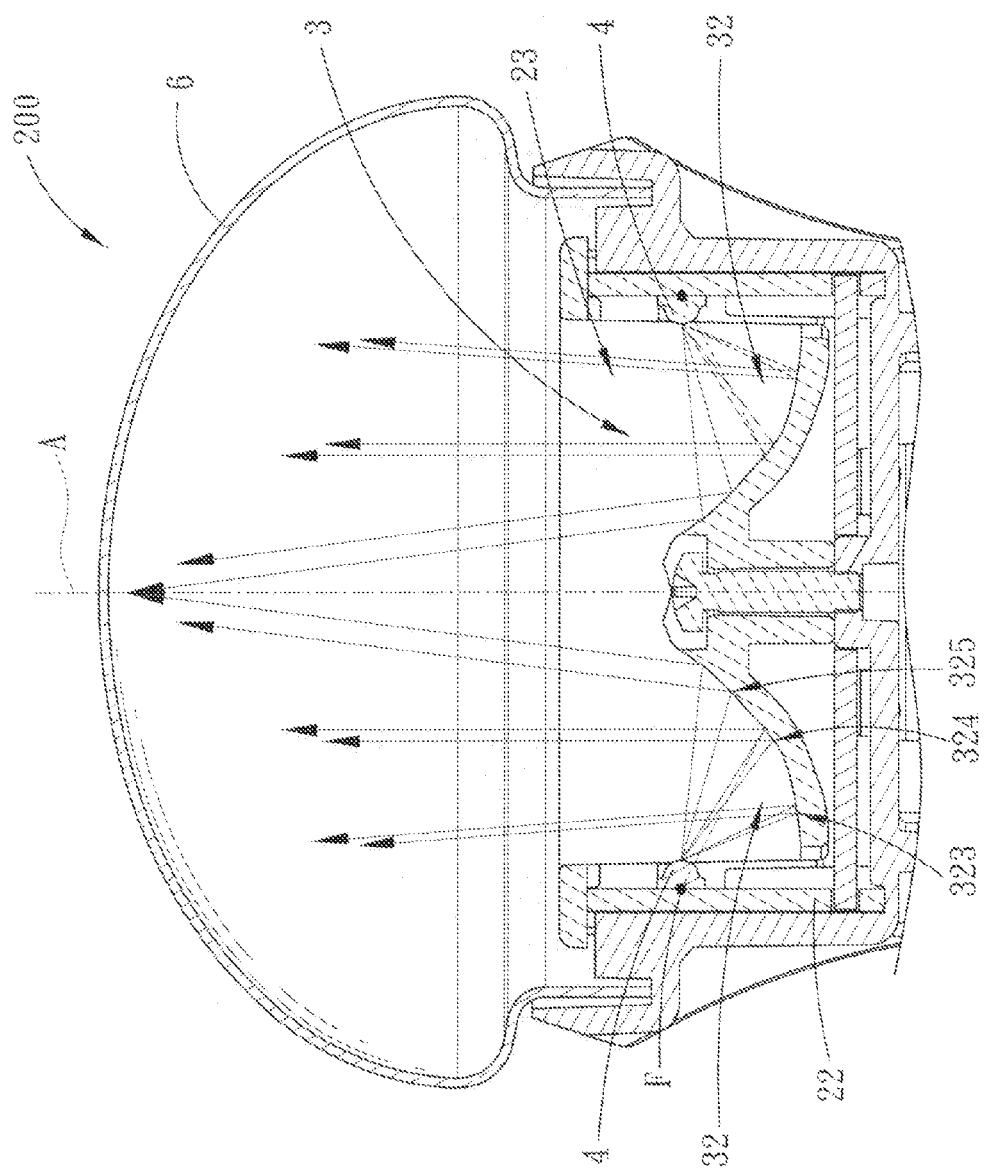


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 11 15 2854

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Y	* paragraph [0002] - paragraph [0004] * * paragraph [0012] - paragraph [0014] * * paragraph [0018] * * figures 2,3,5-7 *	7,13	
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Y	* paragraph [0003] * * paragraph [0030] * * paragraph [0032] - paragraph [0035] * * paragraphs [0057], [0059] * * figures 1,2,5 *	3-13	
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Y	* paragraph [0015] - paragraph [0026] * * figures 1-4 *	1-13	
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	* paragraph [0033] - paragraph [0041] * * paragraph [0050] * * figures 1-3 *		
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	* page 1, paragraph 1 - page 2, paragraph 2 * * page 6, paragraph 8 - page 7, paragraph 1 * * figures 1,2,6 *		
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 July 2011	Examiner Arsac England, Sally
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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The members are as contained in the European Patent Office EDP file on
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25-07-2011

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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