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(54) FIREPROOF LED LIGHTING

(57) A fireproof LED lamp is provided by the present invention, including a LED circuit board (1), a LED lens (2) and a lamp ring (3) provided with a side wall, wherein the LED circuit board (1) is provided with a LED light (4), the LED circuit board (1), LED light (4) and LED lens (2) are placed in the lamp ring (3), a radiator (5) is provided behind the LED circuit board (1), and a fireproof expansion unit (6) made of a fireproof expansion material is provided on the front and/or on the side of the LED circuit board (1). In case of fire, the fireproof expansion unit will expands to cover the surface of the LED circuit board (1) and gaps around the LED circuit board to prevent the LED circuit board (1) being burnt, and to prevent a flame go out of the gaps of the lamp to effectively prevent the spread of fire.

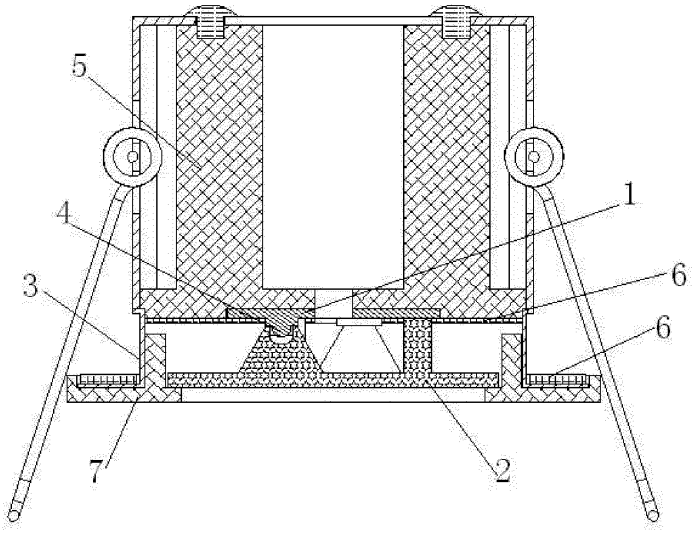


Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to the lighting field, and specifically to an embedded fireproof LED lamp.

BACKGROUND OF THE INVENTION

[0002] An embedded ceiling lamp is generally used in modern interior decoration, household lighting or office lighting, and the most common application of the embedded ceiling lamp is fitted in a through hole in a ceiling. However, most of ceilings of a ceiling system are made of ordinary combustible materials, such as wood, plastics, or the like, when a ceiling is fitted with an embedded ceiling lamp, the ceiling will probably catch alight once the temperature of a lamp bulb in the lamp gets too high. Moreover, when a fire occurs in the room, as the existing embedded lamp, especially the existing embedded LED lamp, generally does not have the function of fireproof, a flame will go up from the gap in the lamp and the gap between the lamp and the ceiling, and the circuit board of the LED lamp will be burnt out by a high temperature that the flame is easier to go out of the burnt lamp to ignite other combustible materials on the ceiling.

[0003] See Figure 11, in some embedded lamps, a lamp shade 10 is provide outside the lamp to achieve fireproof effect, the light source 70, the lamp ring 80 and the radiator 90 of the lamp are placed in the lamp shade 10, and a through hole 60 is provided in the top of the lamp shade 10 for heat dissipating. However, the through hole has a limited ability for heat dissipating such that the heat of the lamp accumulates in a confined space between the lamp shade 10 and the lamp, which leads to a bad heat dissipation effect that the lamp may be burnt or accumulated hair, dust or other combustible materials may be ignited due to overheating. In addition, the lamp shade 10 is provided with a through hole 60 that when there is a fire it is easy for a flame go out of the through hole to make fire spread. Therefore this structure cannot effectively prevent fire.

[0004] British Patent No.2462155 discloses a LED lamp, referring to Figure 12, including a fireproof component 113 that is a sheet metal provided with a hole for sending out the light from which LED light source can shine out. Such structure achieve the function of fireproof by providing a high temperature resistance sheet metal, the LED lamp and circuit board are provided behind the fireproof component to avoid being burnt effectively, and the LED lamp and circuit board contact with the radiator 129 to allow effective heat dissipation by the radiator. However, such structure only has the function of fireproof, and has no function of thermal insulation, while the embedded lamp will reach high temperature in use that surrounding hair, clutter or other combustible materials is easy to be ignited to cause a fire when the temperature is too high, so there is a high risk. In addition, the alignment of the hole of the fireproof component and the light source is easy to have a gap, which will yield no positive fireproof effect, and the fireproof component is easy to form a crack by impact, high temperature or others, which leads to the failure of fireproof.

[0005] Thus, it is necessary to provide a fireproof LED lamp with stable fireproof performance, simple structure, thermal insulation, lower temperature on surface and security.

SUMMARY OF THE INVENTION

[0006] In view of the above, a principal object of the present invention is to provide a fireproof LED lamp with stable fireproof performance, simple structure, thermal insulation and security.

[0007] In order to achieve the purpose of the present invention, according to a preferred embodiment of the present invention, the following solution is presented.

[0008] A fireproof LED lamp is provided by the present invention, including a LED circuit board, a LED lens and a lamp ring provided with a side wall, wherein the LED circuit board is provided with a LED light, the LED circuit board, LED light and LED lens are placed in the lamp ring, a radiator is provided behind the LED circuit board, and a fireproof expansion unit made of a fireproof expansion material is provided on the front and/or on the side of the LED circuit board. Using the lamp structure of the present invention, the fireproof expansion unit will expands to cover the surface of the LED circuit board and gaps around the LED circuit board in case of fire to prevent the LED circuit board being burnt, and to prevent a flame go out of the gaps of the lamp to effectively prevent the spread of fire. Moreover, the fireproof expansion unit still has a function of heat insulation that in general use the fireproof expansion unit provided on the front and/or on the side of the LED circuit board can effectively prevent the heat from the lamp bulb from impacting the LED circuit board.

[0009] Many different arrangements can be used for the fireproof expansion unit.

[0010] Preferably, the fireproof expansion unit can be composed by a plurality of fireproof expansion blocks provided on the front of the LED circuit board. In the case of high temperature or fire, the plurality of fireproof expansion blocks will expend with heat and be connected with each other to form a tight protection layer for thermal insulation and fireproof.

[0011] Preferably, the fireproof expansion unit can be a sheet-like fireproof expansion unit provided on the front of the LED circuit board, on which an opening is arranged corresponding to the LED light, such that light of the LED lamp can transmit through the opening. In the case of high temperature or fire, the sheet-like fireproof expansion unit will expend with heat and fill the opening and surrounding gaps to form a tight protection layer for thermal insulation and fireproof. In addition, the sheet-like

fireproof expansion unit is simple for machining and easy to assemble.

[0012] Preferably, the fireproof expansion unit can be composed by a plurality of fireproof expansion blocks provided on the side of the LED circuit board, which can effectively prevent the LED circuit board from being impacted by a high temperature from a gap on the side of the LED circuit board. In the case of high temperature or fire, the plurality of fireproof expansion blocks will expend with heat and cover the front and side parts of the LED circuit board and surrounding gaps to form a tight protection layer for thermal insulation and fireproof.

[0013] Preferably, the fireproof expansion unit can be an annular fireproof expansion unit provided on the side of the LED circuit board, which can effectively prevent the LED circuit board from being impacted by a high temperature from a gap on the side of the LED circuit board. In the case of high temperature or fire, the fireproof expansion unit will expend with heat and cover the front and side parts of the LED circuit board and surrounding gaps to form a tight protection layer for thermal insulation and fireproof. In addition, the annular fireproof expansion unit is simple for machining and easy to assemble.

[0014] Preferably, the fireproof expansion unit can be arranged both on the front and on the side of the LED circuit board, and its arrangement can be any combination of the above arrangements.

[0015] A cavity may be formed around the LED light and circuit board, which can extend from the side wall of the lamp ring. The fireproof expansion unit also can be arranged on the inner wall of the cavity, and also arranged on the front and/or on the side of the LED circuit board.

[0016] Further, the fireproof LED lamp also includes a face ring, the side wall of the face ring and the side wall of the lamp ring are respectively provided with a bulge and a clip which are matched, and the face ring and the lamp ring are assembled together by the a bulge and clip. The bulge can overcome the resistance of the clip under external force to assemble the face ring on the lamp ring, while the clip can hold the face ring firmly by its elasticity to fasten the face ring on the lamp ring. Such mechanism can achieve rapid assembly of the face ring.

[0017] Another arrangement can be used for the rapid assembly mechanism for the face ring and the lamp ring, where the side wall of the lamp ring is provided with a lug that projects inward, accordingly a pit matched with the lug is provided on the side wall of the face ring, and the side wall of the face ring has certain flexibility to make the face ring assembled in the lamp ring. In addition, a guiding slope is provided on the end of the side wall of the face ring to facilitate the face ring rapid assembly.

[0018] A further arrangement can be used for the assembly mechanism for the face ring, where a clip is provided on the face ring, the section of the side wall of the lamp ring is an inverted trapezoid of which the side at the opening of the lamp ring is smaller. The face ring and the lamp ring can be assembled by the matching of the clip and the inverted trapezoid side wall of the lamp ring. The clip of the assembled face ring is steadily fixed in the inverted trapezoid side wall of the lamp ring, so as to keep the stability of the assembly of the face ring. Such mechanism can achieve rapid assembly of the face ring.

[0019] Compared with prior arts, the present invention has the following advantages:

[0020] In the case of fire, for the LED lamp of the present invention, the fireproof expansion unit will expands to cover the surface of the LED circuit board and gaps around the LED circuit board to prevent the LED circuit board being burnt, and to prevent a flame go out of the gaps of the lamp to effectively prevent the spread of fire. Moreover, the fireproof expansion unit still has a function of heat insulation that in general use the fireproof expansion unit provided on the front and/or on the side of the LED circuit board can effectively prevent the heat from the lamp bulb from impacting the LED circuit board.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figure 1 shows a section view of a fireproof LED lamp according to a first embodiment of the present invention.

Figure 2 shows a section view of a fireproof LED lamp according to a second embodiment of the present invention.

Figure 3 shows a section view of a fireproof LED lamp according to a third embodiment of the present invention.

Figure 4 shows an exploded view of a fireproof LED lamp according to a first embodiment of the present invention.

Figure 5 shows an exploded view of a fireproof LED lamp according to a second embodiment of the present invention.

Figure 6 shows a space diagram of a fireproof LED lamp according to one embodiment of the present invention.

Figure 7 shows a section view of no cavity formed around the LED circuit board.

Figure 8 shows a section view of a cavity formed around the LED circuit board.

Figure 9 shows a schematic view of an assembly structure of for a face ring according to one embodiment of the present invention.

Figure 10 shows a schematic view of an assembly structure of for a face ring according to another em-

bodiment of the present invention.

Figure 11 shows a schematic view of a lamp according to one prior art.

Figure 12 shows a schematic view of a lamp according to another prior art.

DETAILED DESCRIPTION OF THE INVENTION

[0022] Please refer to Figures 1-6. The fireproof LED lamp of the present invention includes a LED circuit board 1, a LED lens 2, a lamp ring 3 provided with a first side wall, and a face ring 7 provided with a second side wall, wherein the LED circuit board is provided with a LED light 4, the LED circuit board 1, LED light 4 and LED lens 2 are placed in the lamp ring 3, the face ring 7 is placed on the outside of the lamp ring 3, a radiator 5 is provided behind the LED circuit board 1, and a fireproof expansion unit 6 made of a fireproof expansion material is provided on the front and/or on the side of the LED circuit board 1, and the whole fireproof LED lamp is mounted on a ceiling by a mounting bracket 8. Using the lamp structure of the present invention, the fireproof expansion unit will expands to cover the surface of the LED circuit board and gaps around the LED circuit board in case of fire to prevent the LED circuit board being burnt, and to prevent a flame go out of the gaps of the lamp to effectively prevent the spread of fire. Moreover, the fireproof expansion unit still has a function of heat insulation that in general use the fireproof expansion unit provided on the front and/or on the side of the LED circuit board can effectively prevent the heat from the lamp bulb from impacting the LED circuit board.

[0023] Many different arrangements can be used for the fireproof expansion unit. The fireproof expansion unit can be arranged as one or more fireproof expansion blocks, and can be arranged on the front or on the side of the LED circuit board.

[0024] As shown in Figures 1 and 4, in the first embodiment, the fireproof expansion unit is a sheet-like fireproof expansion unit 6 provided on the front of the LED circuit board 1, on which an opening 61 is arranged corresponding to the LED light 4, such that light of the LED light can transmit through the opening. In the case of high temperature or fire, the sheet-like fireproof expansion unit will expend with heat and fill the opening and surrounding gaps to form a tight protection layer for thermal insulation and fireproof. In addition, the sheet-like fireproof expansion unit is simple for machining and easy to assemble.

[0025] As shown in Figures 2 and 5, in the second embodiment, the fireproof expansion unit is an annular fireproof expansion unit provided on the side of the LED circuit board, preferably, the fireproof expansion unit can be attached on the inside of the side wall of the lamp ring. Such the fireproof expansion unit can also effectively prevent the LED circuit board from being impacted by a high temperature from a gap on the side of the LED circuit board. In the case of high temperature or fire, the fireproof expansion unit will expend with heat and cover the front and side parts of the LED circuit board and surrounding gaps to form a tight protection layer for thermal insulation and fireproof. In addition, the annular fireproof expansion unit is simple for machining and easy to assemble.

[0026] Please refer to Figure 3. In the third embodiment, the fireproof expansion unit is arranged both on the front and on the side of the LED circuit board, such that the fireproof expansion unit will has expended with heat at 180 degrees Celsius and form an integral wafer-like fire protection layer which has good performance in heat insulation and fire proofing that even the lamp and other component is burnt at about 600 degrees Celsius the fire protection layer will never be affected.

[0027] Please refer to Figure 7. The lamp ring can be flush with the LED circuit board, and the fireproof expansion unit is arranged on the front surface of the LED circuit board. In addition, as shown in Figure 8, a cavity may be formed around the LED light and circuit board, and the fireproof expansion unit also can be arranged on the inner wall of the cavity. The cavity is also arranged on the front and/or on the side of the LED circuit board.

[0028] Please refer to Figure 7. As a preferable embodiment, the side wall of the face ring 7 and the side wall of the lamp ring 3 are respectively provided with a clip 71 and a bulge 31 which are matched, and the face ring and the lamp ring are assembled together by the a bulge and clip. The bulge can overcome the resistance of the clip under external force to assemble the face ring on the lamp ring, while the clip can hold the face ring firmly by its elasticity to fasten the face ring on the lamp ring. Such mechanism can achieve rapid assembly of the face ring.

[0029] Please refer to Figure 7. Another arrangement as shown in Figure 10 can be used for the rapid assembly mechanism for the face ring and the lamp ring, where the side wall of the lamp ring 3 is provided with a lug 32 that projects inward, accordingly a pit 73 matched with the lug 32 is provided on the side wall of the face ring 7, and the side wall of the face ring 7 has certain flexibility to make the face ring 7 assembled in the lamp ring 3. In addition, a guiding slope 74 is provided on the end of the side wall of the face ring 7 to facilitate the face ring rapid assembly.

[0030] A further arrangement can be used for the assembly mechanism for the face ring (not shown), where a clip is provided on the face ring, the section of the side wall of the lamp ring is an inverted trapezoid of which the side at the opening of the lamp ring is smaller. The face ring and the lamp ring can be assembled by the matching of the clip and the inverted trapezoid side wall of the lamp ring. The clip of the assembled face ring is steadily fixed in the inverted trapezoid side wall of the lamp ring, so as to keep the stability of the assembly of the face ring.

[0031] The described embodiments of the present invention are presented for the purpose of illustration, not limitation. Those skilled in the art will recognize that the

present invention can be practiced with modification within the spirit and scope of the claims.

Claims

1. A fireproof LED lamp, comprising a LED circuit board, a LED lens and a lamp ring provided with a side wall, wherein the LED circuit board is provided with a LED light; the LED circuit board, the LED light and the LED lens are placed in the lamp ring, a radiator is provided behind the LED circuit board, **characterized in that** a fireproof expansion unit made of a fireproof expansion material is provided on the front and/or on the side of the LED circuit board.

2. The fireproof LED lamp of claim 1, **characterized in that** the fireproof expansion unit is composed by a plurality of fireproof expansion blocks provided on the front of the LED circuit board.

3. The fireproof LED lamp of claim 1, **characterized in that** the fireproof expansion unit is a sheet-like fireproof expansion unit provided on the front of the LED circuit board, in which an opening is provided corresponding to the LED light.

4. The fireproof LED lamp of claim 1, **characterized in that** the fireproof expansion unit is composed by a plurality of fireproof expansion blocks provided on the side of the LED circuit board.

5. The fireproof LED lamp of claim 1, **characterized in that** the fireproof expansion unit is an annular fireproof expansion unit provided on the side of the LED circuit board.

6. The fireproof LED lamp of claim 1, further comprising a face ring, **characterized in that** the side wall of the face ring and the side wall of the lamp ring are respectively provided with a bulge and a clip which are matched to each other, and the face ring and the lamp ring are assembled together by the bulge and the clip.

7. The fireproof LED lamp of claim 1, further comprising a face ring, **characterized in that** a clip is provided on the face ring, the section of the side wall of the lamp ring is an inverted trapezoid of which the side at the opening of the lamp ring is smaller, and the face ring and the lamp ring are assembled by matching the clip to the inverted trapezoid side wall of the lamp ring.

8. The fireproof LED lamp of claim 1, further comprising a face ring, **characterized in that** the side wall of the lamp ring is provided with a lug that projects inward, accordingly a pit matched with the lug is provided on the side wall of the face ring, and the face ring and the lamp ring are assembled by the matching of the lug and the pit.

9. The fireproof LED lamp of claim 8, **characterized in that** a guiding slope is provided on the end of the side wall of the face ring.

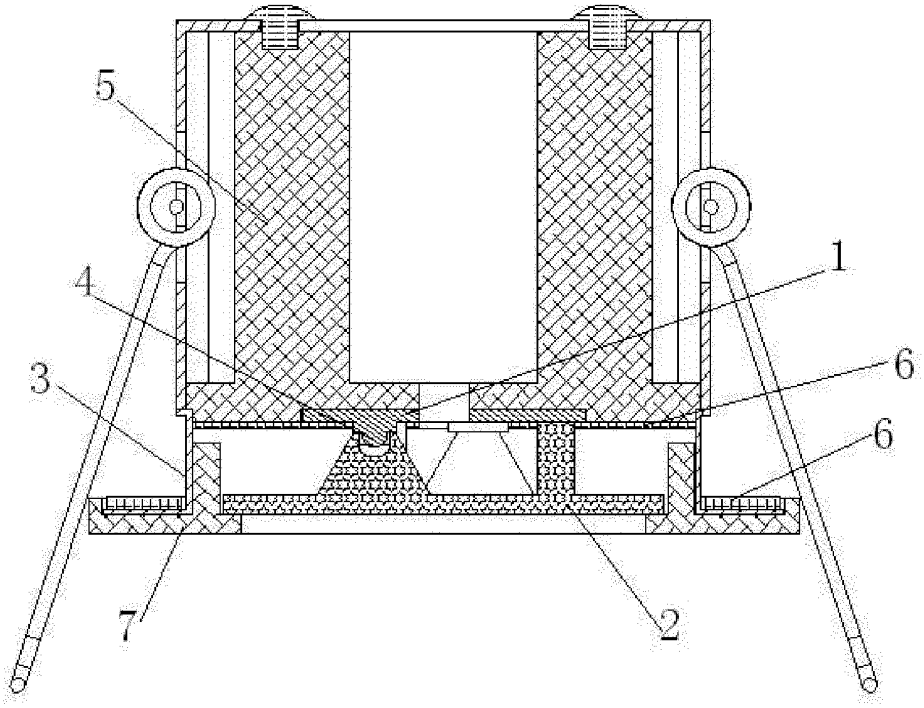


Fig. 1

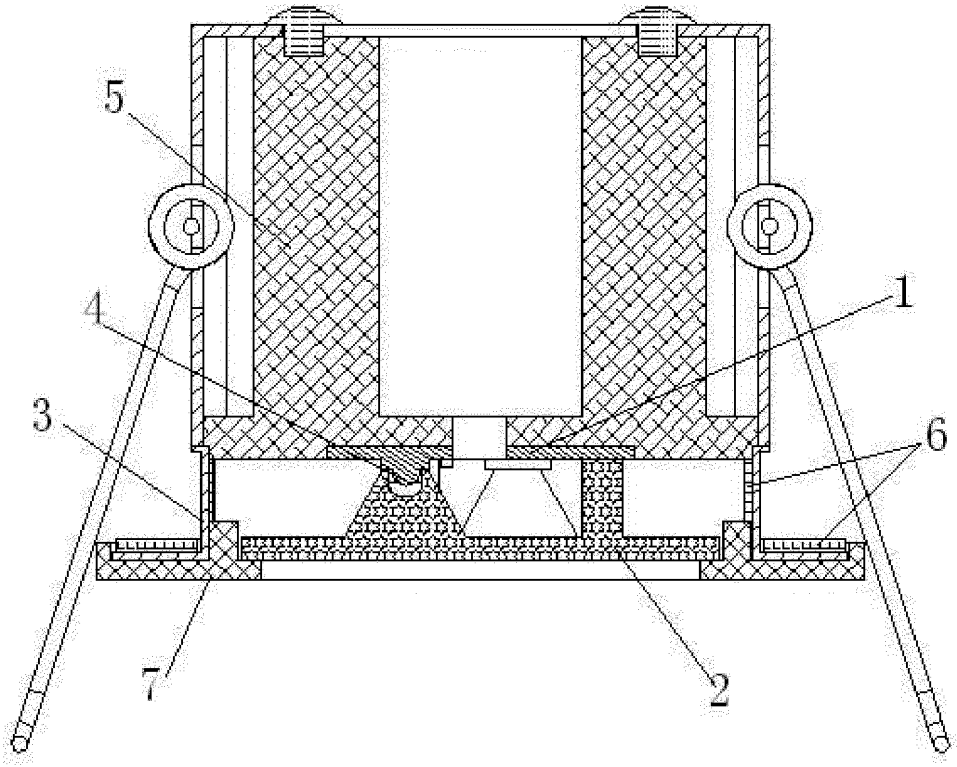


Fig. 2

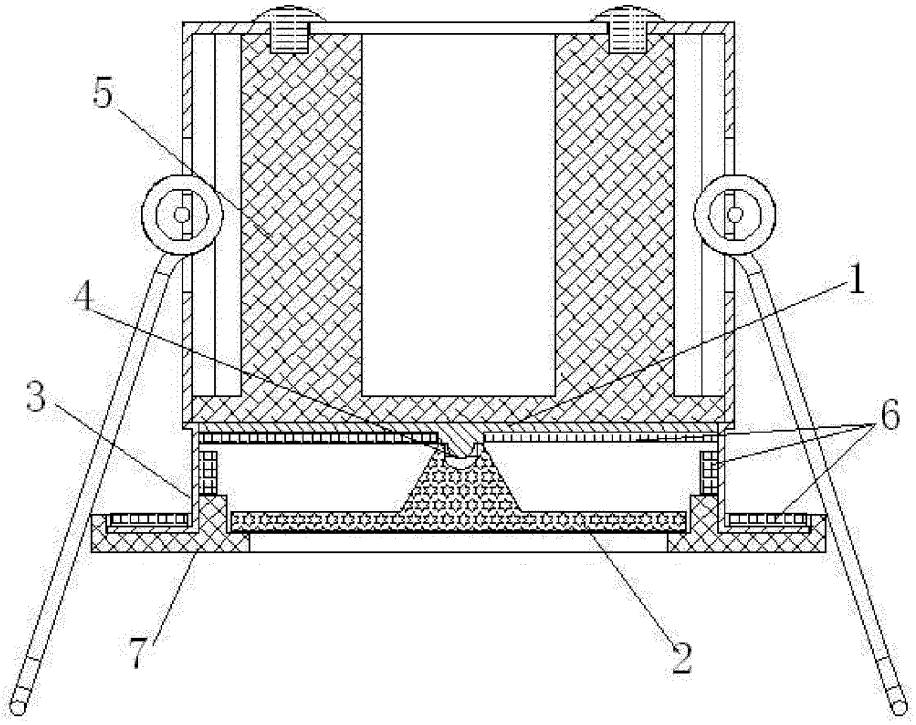


Fig. 3

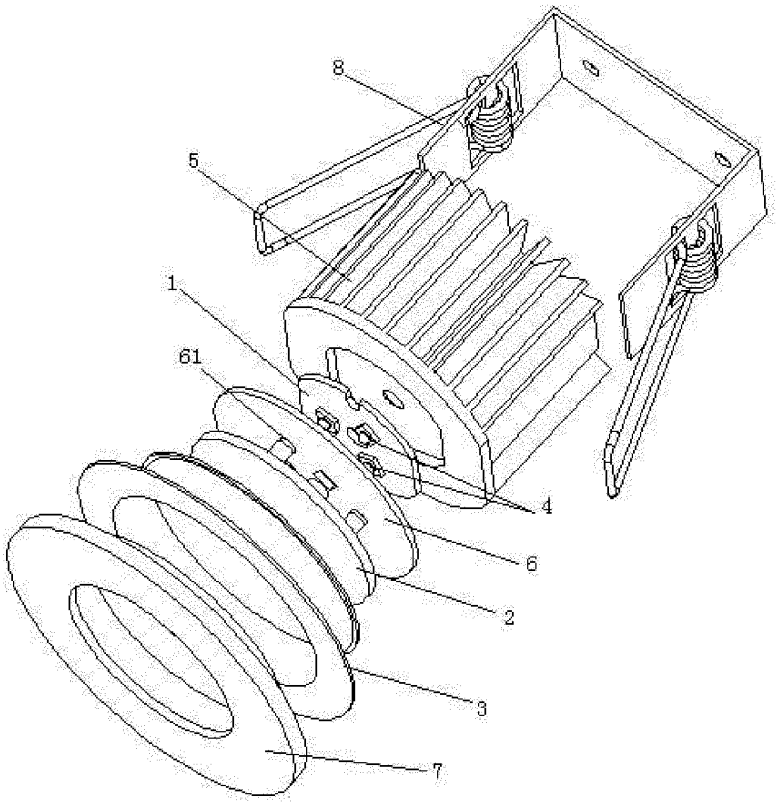


Fig. 4

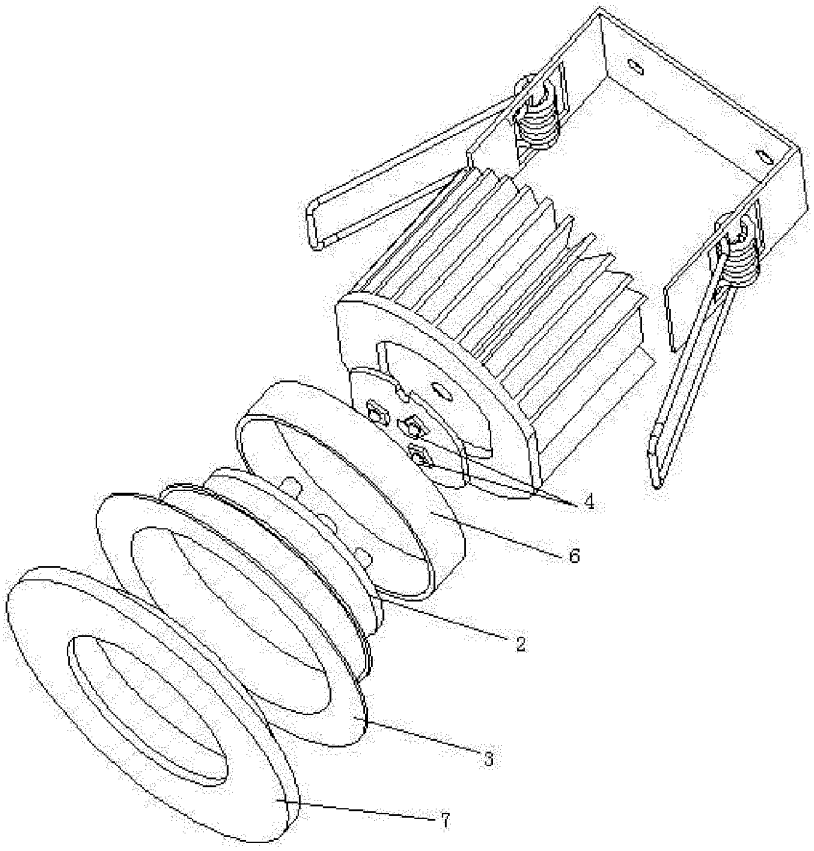


Fig. 5

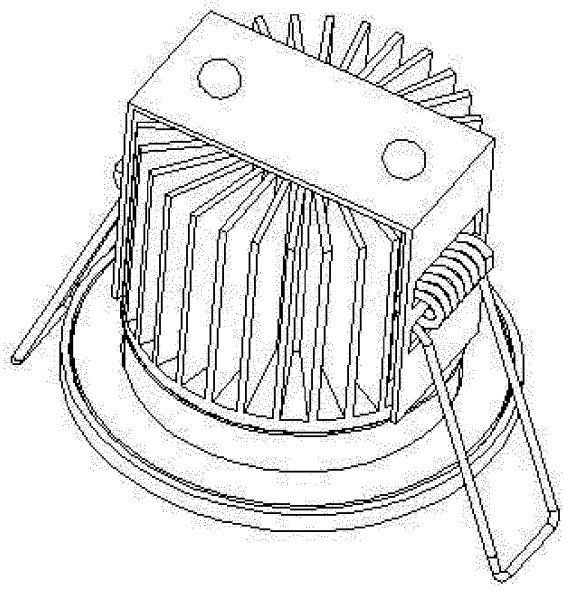


Fig. 6

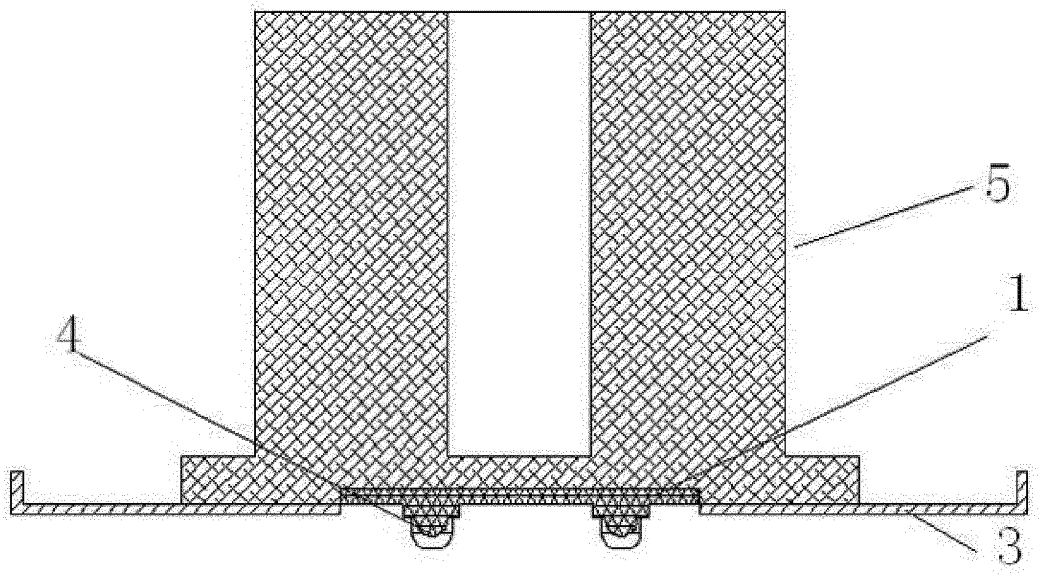


Fig. 7

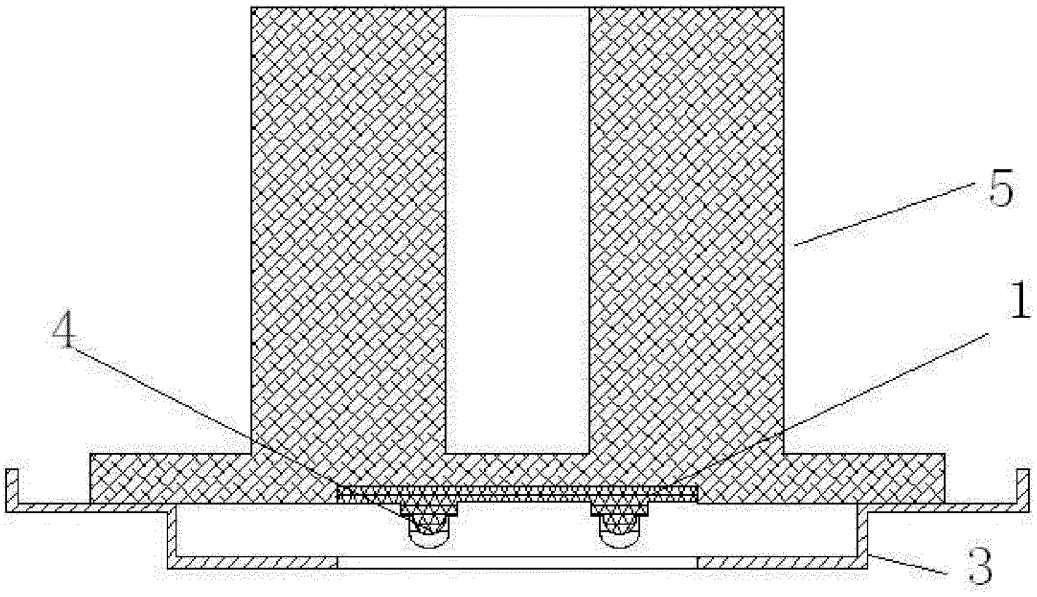


Fig. 8

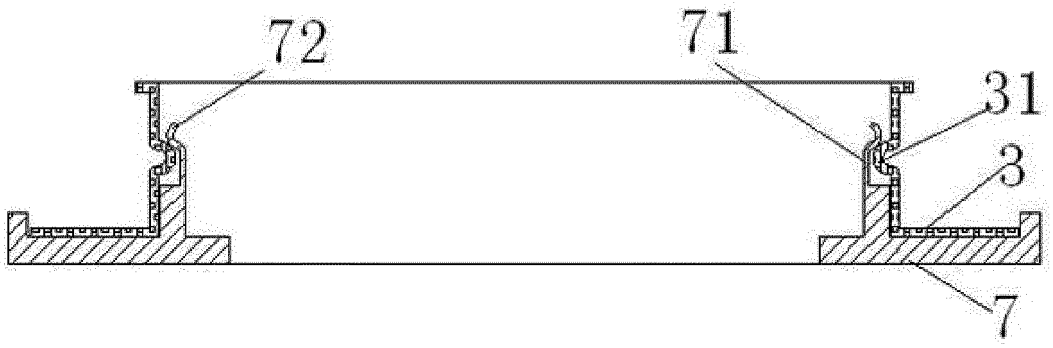


Fig. 9

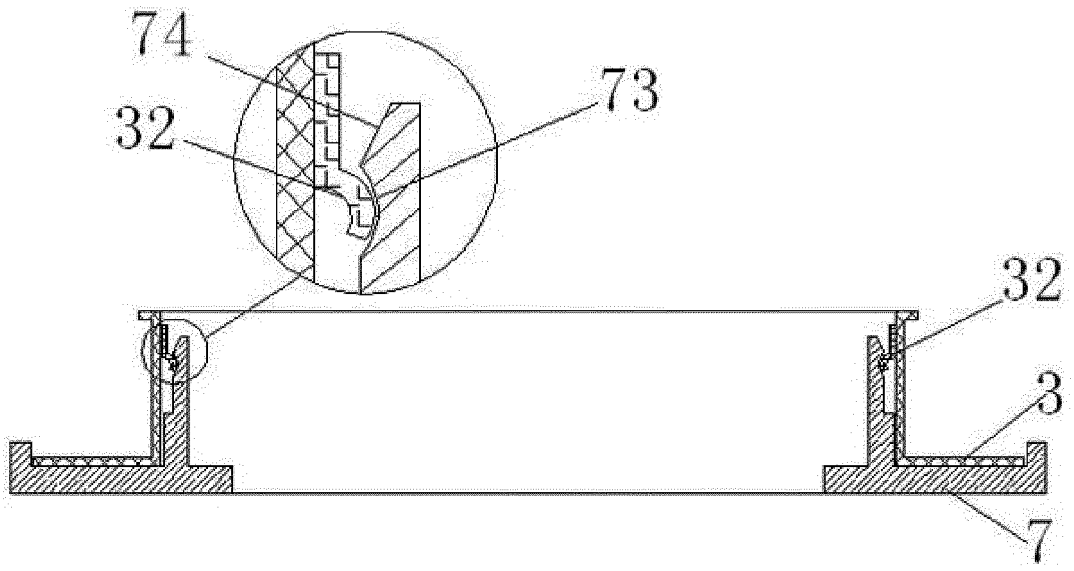


Fig. 10

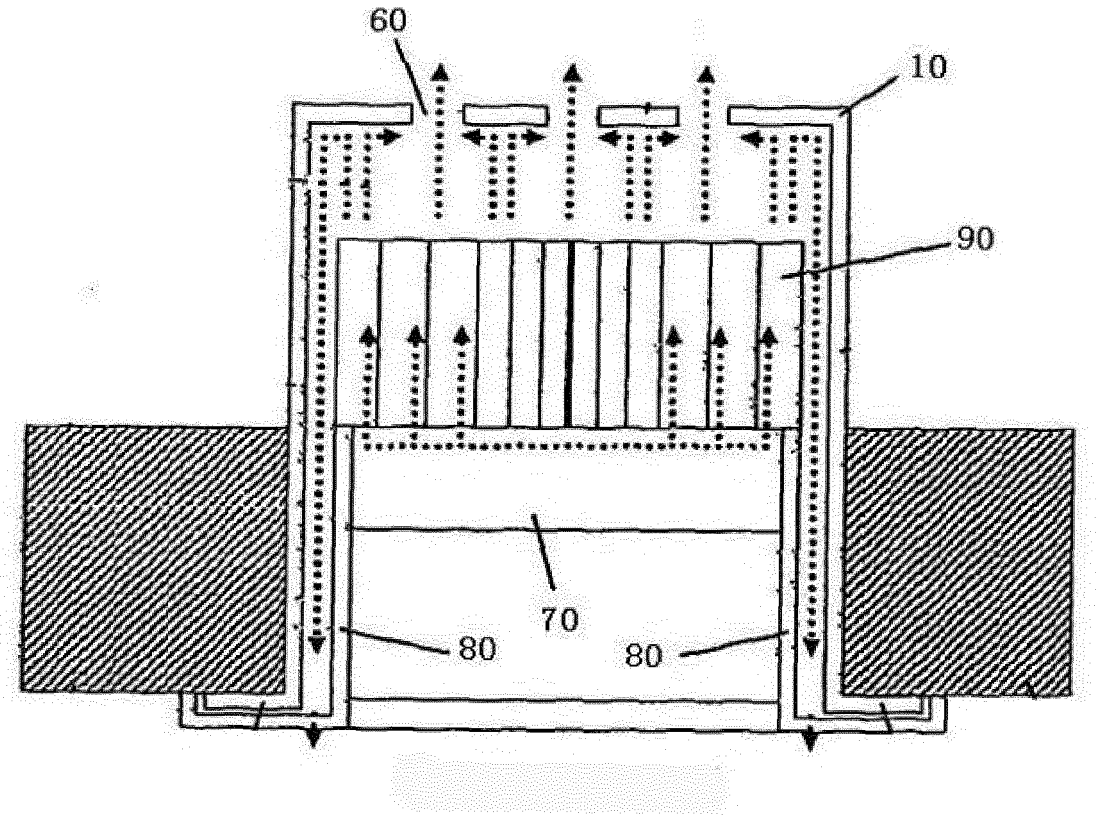


Fig. 11

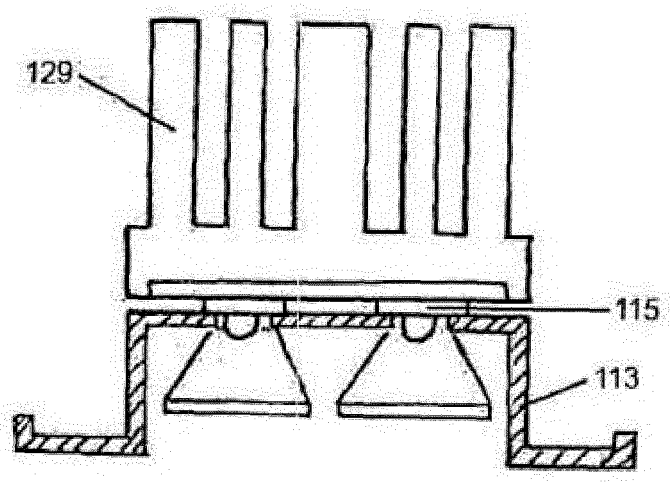


Fig. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/083610

A. CLASSIFICATION OF SUBJECT MATTER

see the extra sheet

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)

IPC: F21S, F21V, F21Y

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)

CNABS,VEN,CNKI lamp, fire, expand, inflate, fireproof

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 202284754 U (WU, Liangju) 27 Jun. 2012 (27.06.2012) claims 1-9	1-9
Y	CN 201836676 U (SHENZHEN BESON TECHNOLOGY CO LTD) 18 May 2011 (18.05.2011) description, page 2, paragraphs [0012]-[0019], figures 1-3	1-9
Y	CN 2771649 Y (YU, Ruyi) 12 Apr. 2006 (12.04.2006) description, page 3, lines 15-22, figures 1-2	1-9
Y	CN 102162586 A (FAN, Jinjing) 24 Aug. 2011 (24.08.2011) description, page 2 paragraphs [0026]-[0036], figures 3A, 3B, 4	1-9
Y	CN 201983012 U (ZHOU, Jiaxiang) 21 Sept. 2011 (21.09.2011) description, page 2 paragraphs [0021]-[0024], figure 3	1-9
A	US 2002/0109989 A1 (CHUANG T) 15 Aug. 2002 (15.08.2002) the whole document	1-9

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 Jan. 2013 (22.01.2013)	31 Jan. 2013 (31.01.2013)
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer XU, Min Telephone No. (86-10) **62085623**

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2012/083610

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 202284754 U	27.06.2012	None	
CN 201836676 U	18.05.2011	None	
CN 2771649 Y	12.04.2006	None	
CN 102162586 A	24.08.2011	None	
CN 201983012 U	21.09.2011	None	
US 2002/0109989 A1	15.08.2002	None	

Form PCT/ISA /210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2012/083610

A. CLASSIFICATION OF SUBJECT MATTER

F21S 8/02 (2006.01) i

F21V 25/12 (2006.01) i

F21V 17/16 (2006.01) i

F21Y 101/02 (2006.01) n

Form PCT/ISA /210 (extra sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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