(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 015 763 A1

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
04.05.2016 Bulletin 2016/18

(21) Application number: **14813963.7**

(22) Date of filing: **05.05.2014**

(51) Int Cl.:
F21V 29/00 *(2015.01)* ***F21S 8/00*** *(2006.01)*
F21W 131/402 *(2006.01)* ***F21Y 101/00*** *(2016.01)*

(86) International application number:
PCT/CN2014/076819

(87) International publication number:
WO 2014/201918 (24.12.2014 Gazette 2014/52)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **21.06.2013 CN 201310263361**

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(54) **LAMP RADIATOR AND LED LAMP FOR MINING USE**

(57) Disclosed are a lamp radiator and an LED lamp for mining use having the lamp radiator. The lamp radiator comprises a heat source plate (1), a fixed ring (2), a fixed plate (3) and a plurality of heat dissipation fins (4), wherein the plurality of heat dissipation fins (4) form a circular array and there are gaps among the heat dissipation fins (4). The upper end of each heat dissipation fin (4) is fixed to the fixed ring (2) and the fixed plate (3), and the lower end of each heat dissipation fin (4) is fixed to the heat source plate (1) and is in direct contact with the heat source plate (1). The lamp radiator is provided with the plurality of heat dissipation fins (4) and there are gaps among the heat dissipation fins (4), which are beneficial for the hot gas circulation and able to accelerate the heat dissipation; and in addition, the lamp radiator is not a single component and can significantly reduce the weight of the lamp.

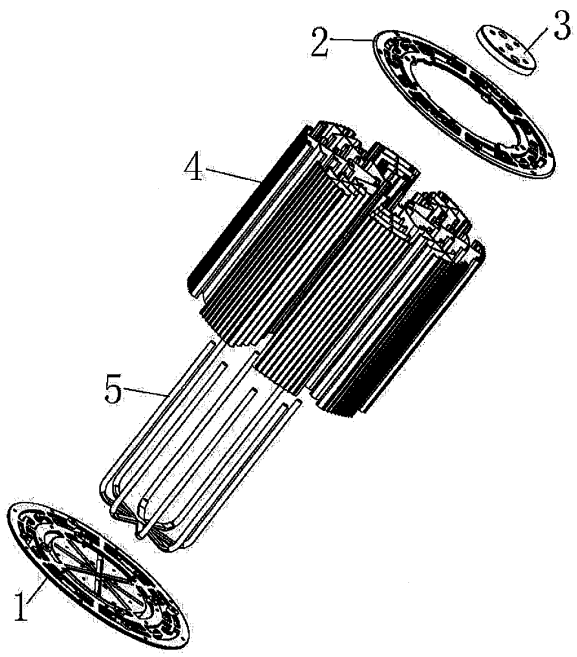

Figure 4

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Description

Technical Field

[0001] The present invention relates to a radiator and a lamp for mining use, and in particular to a lamp radiator and a LED lamp for mining use.

Background of Invention

[0002] In the market of mining lamps, incandescent lamps and energy-saving lamps are commonly used. Compared with incandescent lamps and energy-saving lamps, LED consumes less energy and has a longer life time that can be more than 50 thousand hours. Moreover, LED can operate normally when it is switched on and off at a high frequency. However, if the energy-saving lamps are switched on and off frequently, the filaments thereof will become black and then damaged quickly. LED can be encapsulated in a solid body and LED belongs to a cold light source which is easy to be transported and installed. In addition, LED has a great vibration tolerance and it can be installed in any tiny and closed device. Besides, LED will not pollute the environment since it does not include mercury and other harmful substances.

[0003] Some of the existing mining lamps also use LED as the light source but the radiator (figures 1 and 2) of the mining lamps is an integrated structure and thus it is difficult to make a mould of the overall extrusion. Due to lack of spare parts, the internal liquidity of the radiator is poor. Therefore it is not easy for the hot air to disperse, leading to poor heat dissipation performance. Furthermore, as the cooling fins of the radiator are thick, the radiator is heavy and it ends up with waste of materials and poor heat dissipation.

Summary of Invention

[0004] In response to the shortcomings above, the purpose of this invention is to provide a lamp radiator with better heat dissipation performance and a lighter weight for mining lamps so as to solve the problems of poor heat dissipation performance and heavy weight.

[0005] Another purpose of this invention is to provide an LED lamp for mining use which includes a lamps radiator with better heat dissipation performance and lighter weight.

[0006] To solve the technical problem above, the present invention makes use of the following technical solutions.

[0007] Disclosed is a lamp radiator which includes a heat source plate, a fixed ring, a fixed plate and a plurality of heat dissipation fins. The plurality of heat dissipation fins form a circular array and there are gaps among the heat dissipation fins. The upper end of each dissipation fin is fixed to the fixed ring and fixed plate, and the lower end of each dissipation fin is fixed to the heat source plate and is in direct contact with the heat source plate.

[0008] Preferably, the lamp radiator also includes a heat pipe. The lower end of the heat pipe is welded with the heat source plate, and the upper end of the heat pipe is welded with the heat dissipation fin.

[0009] Preferably, the heat source plate is equipped with a groove for placing the heat pipe. The lower end of the heat pipe is welded with the groove of the heat source plate. The heat dissipation fin is equipped with a groove for placing the heat pipe. The upper end of the heat pipe is welded with the groove of the heat dissipation fin.

[0010] Preferably, the heat pipe is L-shaped. The cross section of the lower end of the heat pipe is half-round while the cross section of the upper end of the heat pipe is round.

[0011] Preferably, the number of the heat dissipation fins is N, where $2 \leq N \leq 16$, and the number of the heat pipes welded on each heat dissipation fin is M, where $1 \leq M \leq 10$.

[0012] Preferably, the cross section of the heat dissipation fin is fishbone-shaped, and there is a gap among each heat dissipation fin.

[0013] Preferably, the cross section of the heat dissipation fin is paper fan-shaped. And there is a gap among each heat dissipation fin.

[0014] Preferably, the materials for manufacturing the heat dissipation fins are aluminum or copper, or other alloys such as magnesium alloy, zinc alloy, etc.

[0015] Preferably, the heat pipe is hollow and is filled with liquid and vacuumized (0.1 barometric pressure). The materials for manufacturing the heat pipes are copper or aluminum. The liquid is water or other freezing medium such as ammonia, Freon, etc.

[0016] Disclosed is also a LED lamp for mining use, which comprises the lamp radiator as mentioned above.

[0017] Compared with the existing technology, this invention has the following beneficial effects:

1) The lamp radiator and the LED lamp for mining use include multiple heat dissipation fins. The heat dissipation fins are arranged to form a circular array, and there are gaps among the heat dissipation fins. This arrangement is beneficial for hot gas circulation and able to accelerate heat dissipation.

2) The lamp radiator and the LED lamp for mining use include multiple heat dissipation fins. The lamp radiator is not a single component, so the weight of the lamp radiator and the lamp can be reduced a lot. This design not only reduces the cost, but also greatly increases the security of the lamp when hanged for use.

3) The lamp radiator and the LED lamp for mining use include heat pipes.

The lower end of the heat pipe is welded with the groove of the heat source plate and the upper end of the heat pipe is welded with the groove of the heat dissipation fin. Under this design, the heat of the heat source plate can be easily conducted to the heat dissipation fins, resulting in better heat dissipation.

Description of Figures

[0018]

Figure 1 is the schematic diagram of existing radiator;
Figure 2 is the cross section diagram of figure 1;
Figure 3 is the schematic diagram of the lamp radiator in one embodiment of the present invention (the screw is not shown in the figure);
Figure 4 is the exploded diagram of figure 3 (the screw is not shown in figure);
Figure 5 is the schematic diagram of the heat pipe;
Figure 6 is the schematic diagram of the heat source plate;
Figure 7 is the schematic diagram of the heat dissipation fin;
Figure 8 is the cross section diagram of multiple heat dissipation fins in figure 4;
Figure 9 is the cross section diagram of a heat dissipation fin in figure 8;
Figure 10 is the schematic diagram of another kind of heat dissipation fin;
Figure 11 is the cross section diagram of the multiple heat dissipation fins of the lamp radiator in another embodiment;
Figure 12 is the cross section diagram of a heat dissipation fin in figure 11;
Figure 13 is the schematic diagram of a LED lamp for mining use that comprises the lamp radiator of the present invention.

Detailed Description

[0019] In order to better understand the invention, further description of the invention will be described below by combination of the appended drawings and specific embodiments.

[0020] Referring to figures 1 to 9, the lamp radiator of the present invention mainly includes a heat source plate 1 (the heat source plate is equipped with a heat source, such as LED light source, but it is not shown in figures), a fixed ring 2, a fixed plate 3 and a plurality of heat dissipation fins 4. The plurality of heat dissipation fins 4 form a circular array, and there are gaps among the heat dissipation fins 4. The upper end of the heat dissipation fin 4 can be fixed on the fixed ring 2 and the fixed plate 3 through screws (not shown in the figures). The lower end of the heat dissipation fin 4 can be fixed on the heat source plate 1 through screws (not shown in the figures) and is in direct contact with heat source plate 1. The lamp radiator has multiple heat dissipation fins 4. There are gaps among the heat dissipation fins 4. This arrangement is beneficial for hot gas circulation and able to accelerate the heat dissipation. The heat dissipation fins 4 not only function for heat dissipation, but also for fixing the structure. In a specific design, the fixed ring 2 and the fixed plate 3 can be designed into a single component to attain a fixing effect. The lamp radiator includes multiple heat dissipation fins 4. The lamp radiator is not a single component, so the weight of the lamp radiator can be reduced a lot. This design not only reduces the cost, but also greatly increases the security of the lamp when hanged for use.

[0021] In addition, in order to speed up heat dissipation, the lamp radiator can also include a heat pipe 5. The lower end of the heat pipe 501 is welded with the heat source plate 1 and the upper end of the heat pipe 502 is welded with the heat dissipation fin 4. In order to increase the contact area of the heat pipe 5 with the heat source plate 1 and the heat dissipation fin 4, the heat source plate 1 includes a groove 101 for placing the heat pipe 5. The lower end of the heat pipe 501 is welded with the groove 101 of the heat source plate 1. The heat dissipation fin 4 also includes a groove 401 for placing the heat pipe 5. The upper end of the heat pipe 502 is welded with the groove 401 of the heat dissipation fin 4. The heat pipe 5, heat source plate 1 and heat dissipation fin 4 can be welded together under high temperature condition using polymer materials (such as glue, high polymer resin, etc.) or metal welding agent (such as tin, aluminum, etc.). The heat pipe 5 can be designed into L-shaped. The cross section of the lower end of the heat pipe 501 can be half-round so as to match with the groove 101 of the heat source plate 1. The cross section of the heat pipe 502 can be round so as to match with the groove 401 of the heat dissipation fin 4.

[0022] The number of the heat dissipation fins 4 is N, where $2 \leq N \leq 16$, and N=8 in this embodiment. The number of the heat pipes 5 welded on each heat dissipation fin 4 is M, where $1 \leq M \leq 10$, and M=1 in this embodiment. The number and size of the heat dissipation fins 4 and the heat pipes 5 welded on each heat dissipation fin 4 can be designed according to different needs. For example, radiators with different power can be manufactured by controlling the length and size of the heat dissipation fins 4.

[0023] The cross section of the heat dissipation fin 4 can be fishbone-shaped (refer to figures 7, 8 and 9). There are gaps among each fin 402 of the heat dissipation fin 4. In figures 10, 11 and 12, the heat dissipation fin 4 in another embodiment is shown. In this embodiment, the cross section of heat dissipation fin 4 is paper fan-shaped. There are gaps among each fin 402' of the heat dissipation fin 4.

[0024] The materials for manufacturing the heat dissipation fins 4 can be aluminum or copper, or other alloys such as magnesium alloy, zinc alloy, etc. The heat pipe 5 is hollow and is filled with liquid and vacuumized (0.1 barometric pressure). The liquid is water or other freezing medium such as ammonia, Freon, etc. The materials for manufacturing the heat pipe 5 are copper or aluminum. The heat pipe 5 is able to transfer heat rapidly, and thus the heat can be quickly transferred from the heat source plate 1 to the heat dissipation fins.

[0025] The lower end of the heat pipe of the lamp radiator is welded with the groove of heat source plate while

the upper end of the heat pipe is welded with the groove of the heat dissipation fin. Under this design, the heat of the heat source plate can be easily conducted to the heat dissipation fin, resulting in better heat dissipation.

[0026] Now turning to figure 13, a LED lamp for mining use with the aforesaid lamp radiator is shown. The LED lamp for mining use has better heat dissipation performance and lighter weight.

[0027] The lamp radiator and the LED lamp for mining use of the present invention include multiple heat dissipation fins. The heat dissipation fins are arranged to form circular array, and there are gaps among the heat dissipation fins. This arrangement is beneficial for hot gas circulation and able to accelerate heat dissipation. Besides, the lamp radiator is not a single component, so the weight of the lamp radiator and the lamp can be reduced a lot. This design not only reduces the cost, but also greatly increases the security of the lamp hanged for use. In addition, there exists heat pipe which is able to conduct the heat of the heat source plate to the heat dissipation fin easily, resulting in better heat dissipation.

[0028] The above describes the preferred embodiments of the present invention, which are not used for limiting the invention. The skilled in the art may understand that any modification, equivalent replacement or improvement, etc., made within the spirits and principles of the present invention shall fall into the scope of the present invention.

Claims

1. A lamp radiator comprising a heat source plate, a fixed ring, a fixed plate and a plurality of heat dissipation fins, wherein said plurality of heat dissipation fins form a circular array and there are gaps among said heat dissipation fins, an upper end of each said dissipation fin being fixed to said fixed ring and said fixed plate, and a lower end of each said dissipation fin being fixed to said heat source plate and being in direct contact with said heat source plate.

2. The lamp radiator according to claim 1 further comprising a heat pipe, a lower end of said heat pipe being welded with said heat source plate, and an upper end of said heat pipe being welded with said heat dissipation fin.

3. The lamp radiator according to claim 2, wherein said heat source plate is equipped with a groove for placing said heat pipe, said lower end of said heat pipe being welded with said groove of said heat source plate, said heat dissipation fin being equipped with a groove for placing the heat pipe, said upper end of said heat pipe being welded with said groove of said heat dissipation fin.

4. The lamp radiator according to claim 2 or claim 3, wherein said heat pipe is L-shaped, a cross section of said lower end of said heat pipe being half-round and a cross section of said upper end of said heat pipe being round.

5. The lamp radiator according to claim 2 or claim 3, wherein a number of said heat dissipation fins is N, where $2 \leq N \leq 16$, and a number of said heat pipes welded on each said heat dissipation fin is M, where $1 \leq M \leq 10$.

6. The lamp radiator according to claim 2 or claim 3, wherein a cross section of said heat dissipation fin is fishbone-shaped, and there is a gap among each said heat dissipation fin.

7. The lamp radiator according to claim 2 or claim 3, wherein a cross section of said heat dissipation fin is paper fan-shaped and there is a gap among each said heat dissipation fin.

8. The lamp radiator according to claim 2 or claim 3, wherein materials for manufacturing said heat dissipation fins are aluminum, copper, magnesium alloy or zinc alloy.

9. The lamp radiator according to claim 2 or claim 3, wherein said heat pipe is hollow and is filled with liquid and vacuumized, materials for manufacturing said heat pipes being copper or aluminum, said liquid being water, ammonia or Freon.

10. A LED lamp for mining use comprising said lamp radiator of claims 1 to 9.

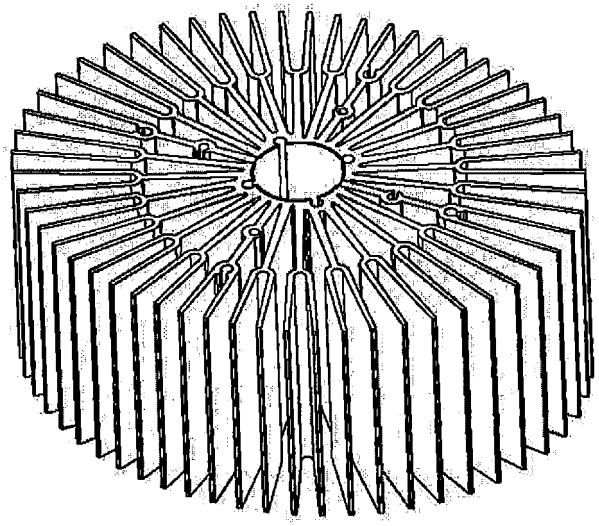

Figure 1

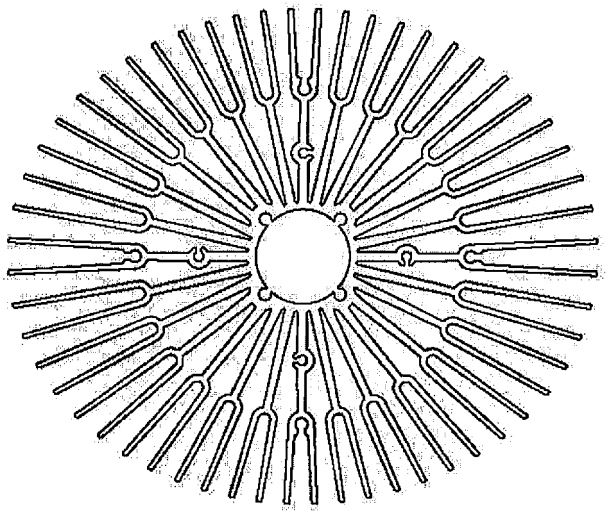

Figure 2

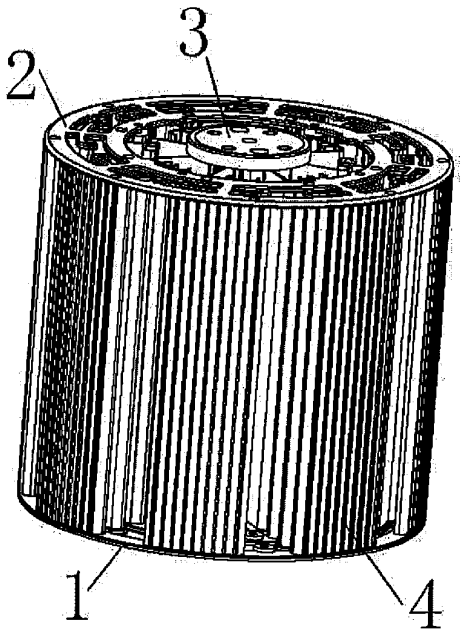

Figure 3

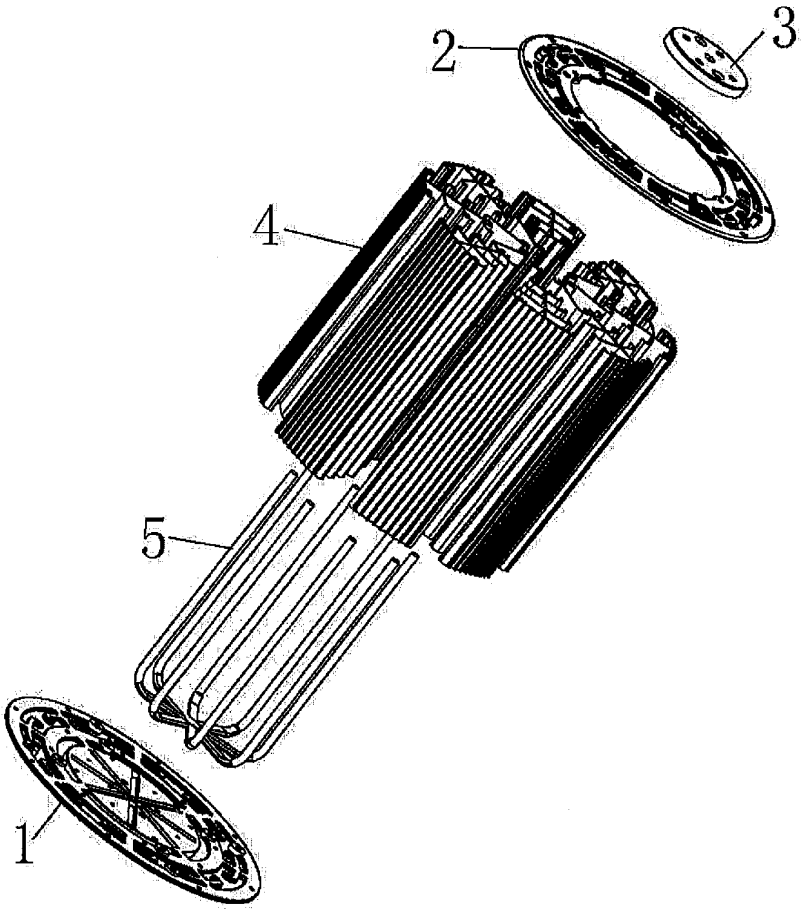

Figure 4

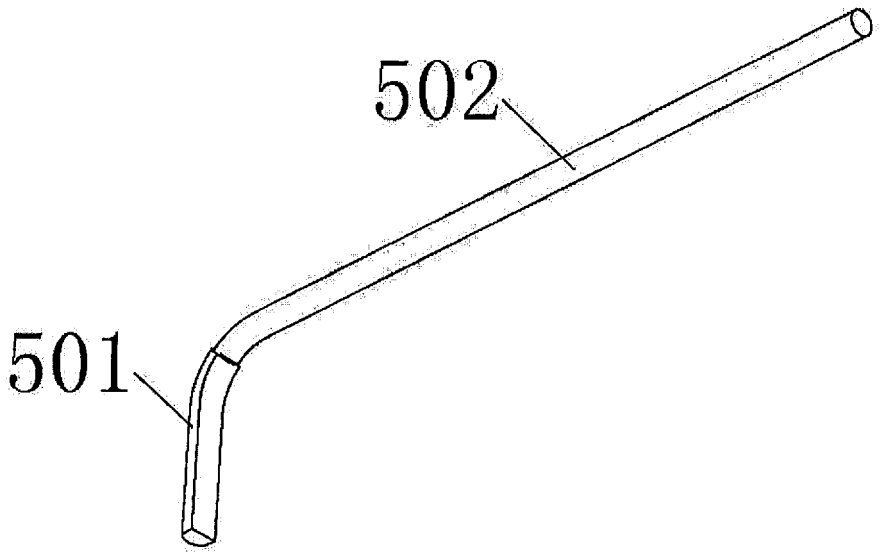

Figure 5

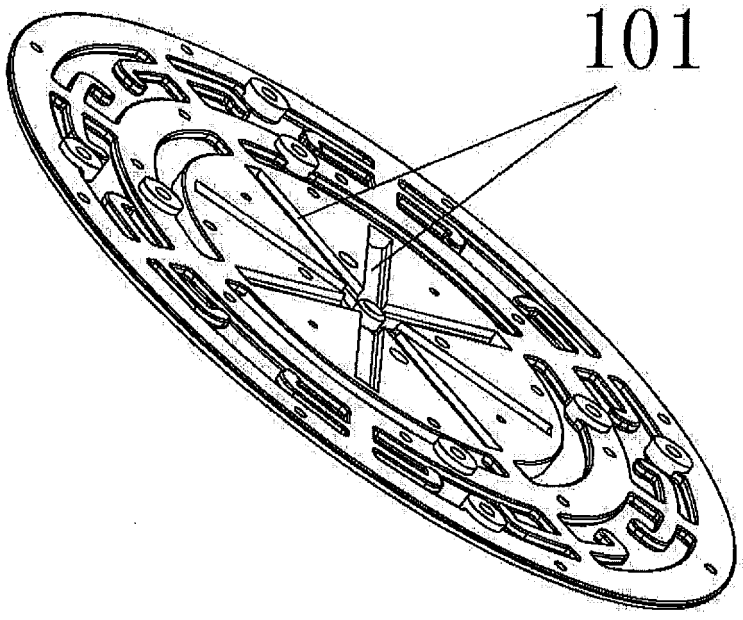

Figure 6

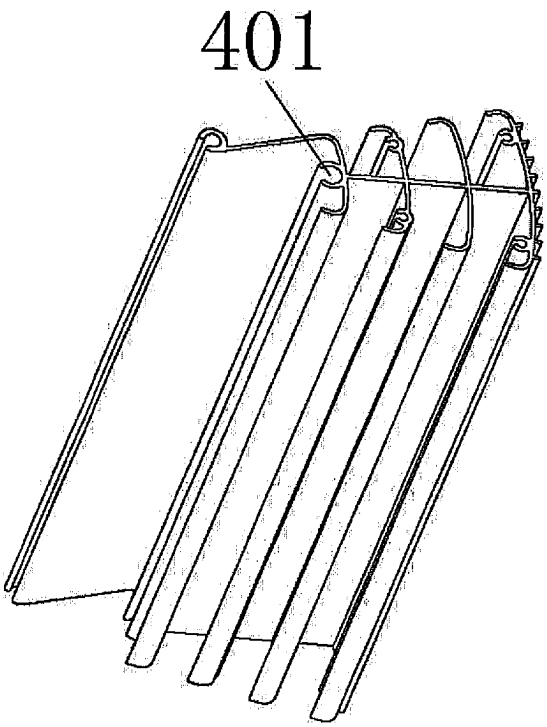

Figure 7

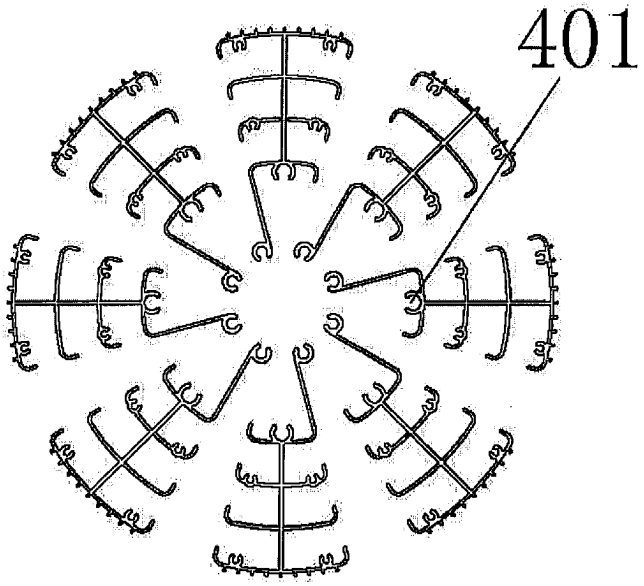

Figure 8

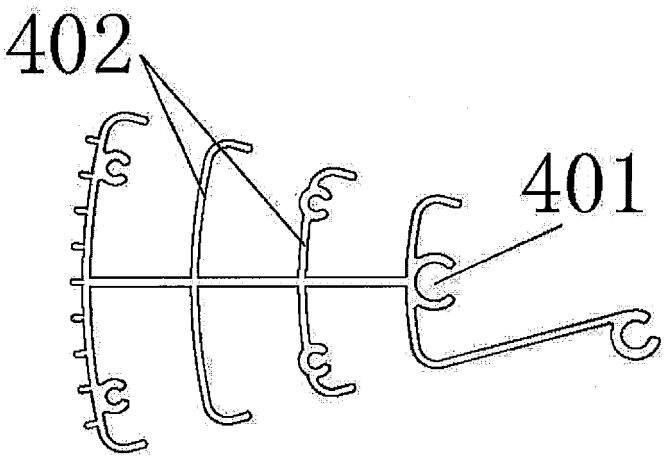

Figure 9

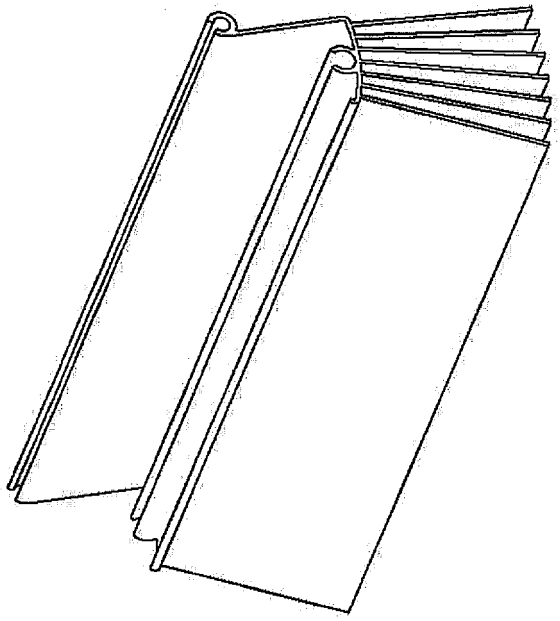

Figure 10

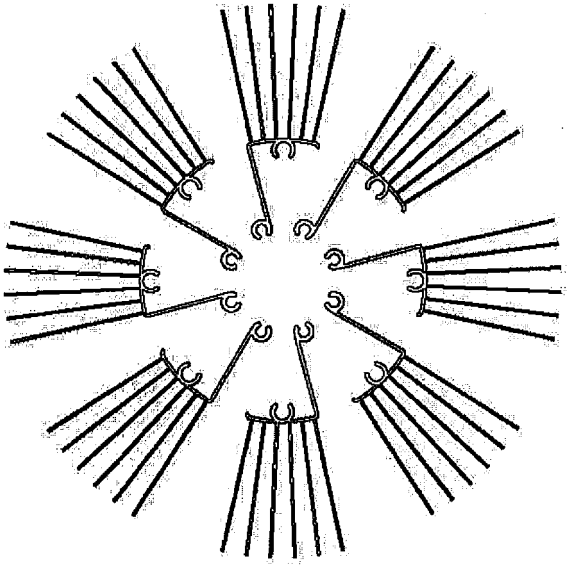

Figure 11

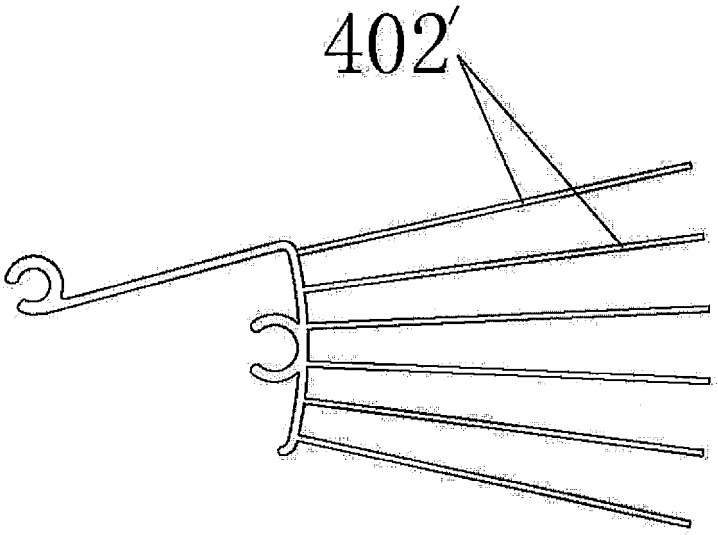

Figure 12

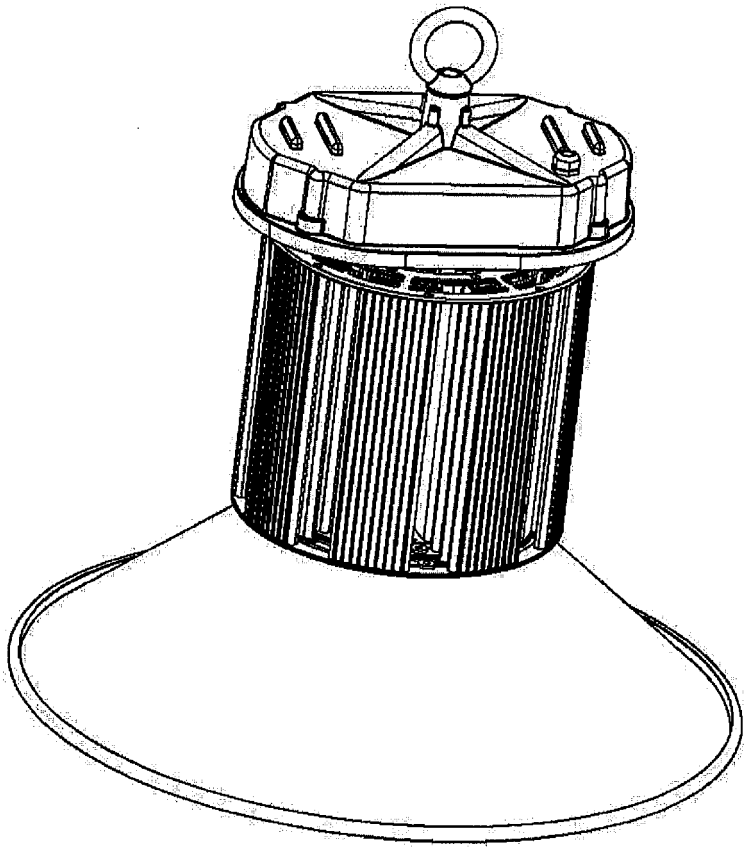

Figure 13

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/076819

A. CLASSIFICATION OF SUBJECT MATTER

F21V 29/00 (2006.01) i; F21S 8/00 (2006.01) i; F21W 131/402 (2006.01) n; F21Y 101/02 (2006.01) n
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)

F21

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)

CPRSABS; CNABS; CNKI; VEN: lamp?, cool+, radiat+, fast+, fix+, annul+, ring?, board?, mine, industral, mining, heat, pipe?, thermotub

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN103307582A (SHENZHEN YAORONG TECHNOLOGY CO LTD) 18 September2013 (18.09.2013) claims 1-10	1-10
E	CN203605194U (SHENZHEN YAORONG TECHNOLOGY CO LTD) 21 May 2014 (21.05.2014) description, paragraphs [0035] to [0042] and figures 3-13	1-10
X	CN103115343A (SHENZHEN YAORONG TECHNOLOGY CO LTD) 22 May 2013 (22.05.2013) description, paragraphs [0033] to [0041] and figures 1-6	1-10

☒ Further documents are listed in the continuation of Box C. ☒ 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
04 August 2014	12 August 2014

Name and mailing address of the ISA	Authorized officer
State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	LI, Qi Telephone No. (86-10) 010-62089303

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/076819

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	CN202274356U (ZHEJIANG SHIMING OPTOELECTRONIC TECHNOLO) 13 June 2012 (13.06.2012) the whole document	1-10
A	CN202274371U (SHANGHAI HUANDONG OPTOELECTRONIC SCI&T) 13 June 2012 (13.06.2012) the whole document	1-10
A	CN202484767U (WEIFANG GOER LIGHT CO LTD) 10 October 2012 (10.10.2012) the whole document	1-10
A	KR20120102419A (PARK SANG HOE) 18 September 2012 (18.09.2012) the whole document	1-10
A	WO2011126475A1 (COOPER TECHNOLOGIES CO et al.) 13 October 2011 (13.10.2011) the whole document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/076819

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 103307582 A	18 September 2013	None	
CN 203605194 U	21 May 2014	None	
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