



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

(43) Date of publication:
27.02.2019 Bulletin 2019/09

(51) Int Cl.:
F21V 29/503^(2015.01) F21V 29/70^(2015.01)
F21V 29/83^(2015.01)

(21) Application number: **17814510.8**

(86) International application number:
PCT/CN2017/083628

(22) Date of filing: **09.05.2017**

(87) International publication number:
WO 2017/219772 (28.12.2017 Gazette 2017/52)

(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
Designated Validation States:
MA MD

- **XIAO, Liuhua**
Suzhou City
Jiangsu 215211 (CN)
- **BAI, Kun**
Suzhou City
Jiangsu 215211 (CN)
- **WANG, Hongbo**
Suzhou City
Jiangsu 215211 (CN)

(30) Priority: **23.06.2016 CN 201610463893**

(71) Applicant: **Opple Lighting Co., Ltd.**
Shanghai 201201 (CN)

(74) Representative: **dompatent von Kreisler Selting Werner - Partnerschaft von Patent- und Rechtsanwälten mbB**
Deichmannhaus am Dom
Bahnhofsvorplatz 1
50667 Köln (DE)

(72) Inventors:
• **CHENG, Zhengguang**
Suzhou City
Jiangsu 215211 (CN)

(54) **LIGHTING DEVICE**

(57) The present disclosure discloses an illuminator device including a housing, a heat dissipation member at an end of the housing, a light source module configured to include an end in thermal contact with the heat dissipation member, an optical member at another end of the light source module, and a driving power supply module; the light source module and the housing are respectively provided at two ends of the heat dissipation member; by the additional heat dissipation member in the illuminator device and a plurality of channels communicating inside with outside of the illuminator device and penetrating through the housing and the heat dissipation member, the heat emitted by the light source module in the illuminator device can be effectively and rapidly dissipated through the channels. Therefore, the illuminator device has good heat dissipation effect, so the service life of the light source module in the illuminator device is prolonged.

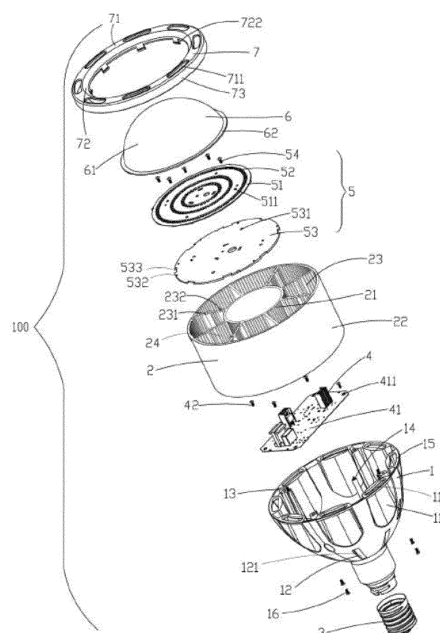


FIG. 2

Description

Technical Field

[0001] The present disclosure belongs to the field of semiconductor illumination technology, and in particular relates to an illuminator device.

Background

[0002] After a lamp, especially a high-power lamp, is illuminated and used for a long time, the temperature of the entire lamp will be high, and the service life of the lamp will be greatly shortened if the lamp cannot effectively dissipate heat. Therefore, the high-power lamp is generally provided with a heat dissipation structure between a lamp housing and an enclosure. Most of current heat dissipation structures are made of aluminum alloy and provided with a plurality of fins which are closely arranged, so the structure is complex. Thus, the entire lamp has large weight, which exceeds the weight that a lamp holder (e.g., the standard lamp holder E27 or E40) of the lamp can bear. Therefore, the illuminator device also needs to be additionally equipped with a safety chain. The safety chain is connected between a mounting bracket and a light source, thus not only increasing the cost of the high-power lamp but also being inconvenient to replace the light source.

Summary

[0003] In order to solve the above problem, the present disclosure provides an illuminator device with good heat dissipation effect.

[0004] To achieve the above object, the present disclosure provides an illuminator device which includes a housing, a heat dissipation member provided at an end of the housing, a light source module configured to include an end in thermal contact with the heat dissipation member, an optical member provided at another end of the light source module, and a driving power supply module electrically connected with the light source module, the light source module and the housing are respectively provided at two ends of the heat dissipation member, a plurality of channels communicating inside of the illuminator device with outside of the illuminator device are provided in the illuminator device, and the plurality of channels penetrate through the housing and the heat dissipation member.

[0005] Further, the illuminator device further includes an enclosure which positions the optical member at the another end of the light source module.

[0006] Further, the housing is formed with a plurality of first through grooves; a plurality of pipes are formed in the heat dissipation member; the enclosure is provided with a plurality of first openings; the plurality of pipes are respectively communicated with the plurality of first through grooves and the plurality of first openings; and

the plurality of first through grooves, the plurality of pipes and the plurality of first openings form the plurality of channels.

[0007] Further, each of the first through grooves includes a first port and a first groove which are communicated with each other; the first port is provided at the first end face and communicated with at least one of the plurality of pipes; and the first groove is formed by denting the outer surface of the side wall.

[0008] Further, the housing is formed with a plurality of second through grooves; and the plurality of second through grooves penetrate through both an inner surface and the outer surface of the side wall of the housing.

[0009] Further, each of the second through grooves includes at least one second port and a second groove which are communicated with each other; the at least one second port penetrates through the inner surface and the outer surface of the side wall of the housing and is communicated with at least one of the plurality of pipes; and the second groove is formed by denting the outer surface of the side wall.

[0010] Further, the heat dissipation member is toroidal columnar and includes an inner ring, an outer ring and a plurality of connecting plates connecting the inner ring and the outer ring; and the plurality of pipes are formed by enclosure of the inner ring, the outer ring and the plurality of connecting plates.

[0011] Further, the light source module includes a substrate and a light source provided on a side of the substrate; and emergent light from the light source is emitted at least after light homogenization or light distribution by the optical member.

[0012] Further, the light source is annularly arranged.

[0013] Further, the illuminator device further includes a heat homogenization plate which is provided on another side of the substrate and is in thermal contact with the heat dissipation member.

[0014] Further, the light source module and the driving power supply module are separately provided; and the driving power supply module is fixed in the housing.

[0015] Further, the light source module and the driving power supply module are provided in a one-piece form.

[0016] Further, the optical member includes an edge part and a central part; the enclosure is provided around the edge part of the optical member; and the central part of the optical member is protruded out of an upper surface of the enclosure.

[0017] Further, the enclosure is combined with the heat homogenization plate.

[0018] Further, the heat dissipation member includes a first end and a second end arranged in an upper-lower direction; and the housing is fixedly connected with the second end of the heat dissipation member and bonded to the second end.

[0019] Further, the heat dissipation member includes a first end and a second end arranged in an upper-lower direction; and the light source module is fixedly connected with the first end of the heat dissipation member and

bonded to the first end.

[0020] Further, the illuminator device further includes a lamp holder which is electrically connected with the driving power supply module and configured to electrically connect the illuminator device to an external power supply.

[0021] The advantages of the present disclosure are: Compared with the prior art, in the illuminator device provided by the embodiments of the present disclosure, by utilization of an external heat dissipation member and the arrangement of a plurality of channels communicating the inside of the illuminator device with the outside of the illuminator device, the convection between the air outside the illuminator device and the air inside the illuminator device can be realized by utilization of the channels. Thus, the heat emitted by the light source module in the illuminator device can be effectively and rapidly dissipated through the channels. Therefore, the illuminator device has good heat dissipation effect, and then the service life of the light source module in the illuminator device is prolonged.

[0022] The foregoing is only the brief description of the technical solutions of the present disclosure. Implementation may be made according to the content of the description for more clear understanding of the technical means of the present disclosure. Moreover, the preferred embodiments of the present disclosure will be given below for more obvious and easy understanding of the above and other objectives, characteristics and advantages of the present disclosure.

Brief Description of the Drawings

[0023] The accompanying drawings illustrated here are only provided for further understanding of the present disclosure and constitute one part of the present disclosure.

[0024] The exemplary embodiments of the present disclosure and the description thereof are used for explaining the present disclosure and do not constitute an improper limitation of the present disclosure. In the accompanying drawings:

FIG. 1 is a schematic three-dimensional assembly view of an illuminator device provided by a preferred embodiment of the present disclosure;

FIG. 2 is a schematic exploded view of FIG. 1;

FIG. 3 is a schematic exploded view of FIG. 1 from another viewpoint;

FIG. 4 is a schematic view of a housing in the illuminator device provided by the preferred embodiment of the present disclosure;

FIG. 5 is a schematic view of the housing in FIG. 4 from another viewpoint;

FIG. 6 is a schematic view of the housing in FIG. 4 from still another viewpoint;

FIG. 7 is a schematic view of a heat dissipation member in the illuminator device provided by the preferred

embodiment of the present disclosure; and

FIG. 8 is a schematic sectional view along the A-A line in FIG. 1.

Detailed Description

[0025] In order to make objects, technical details and advantages of the embodiments of the disclosure apparent, the technical solutions of the embodiments will be described in a clearly and fully understandable way in connection with the embodiments of the disclosure and related drawings. Apparently, the described embodiments are just a part but not all of the embodiments of the disclosure. Based on the described embodiments herein, those skilled in the art can obtain other embodiment(s), without any inventive work, which should be within the scope of the disclosure.

[0026] FIG. 1 to FIG. 3 illustrate an illuminator device 100 provided by the embodiment of the present disclosure, which is a high-power light bulb. The illuminator device 100 includes a housing 1, a heat dissipation member 2 provided at an end of the housing 1, a light source module 5 configured to include an end in thermal contact with the heat dissipation member 2, an optical member 6 provided at another end of the light source module 5, an enclosure 7 connected with the light source module 5 and configured to position the optical member 6 at the end of the light source module 5, a lamp holder 3 connected to another end of the housing 1, and a driving power supply module 4 accommodated into the housing 1 and electrically connected with the light source module 5. In the illuminator device 100, the light source module 5 and the housing 1 are respectively provided at two ends of the heat dissipation member 2. The heat dissipation member 2 is in thermal contact with the light source module 5, so that the heat emitted by the light source module 5 can be transferred to the heat dissipation member 2 and then be dissipated to the outside of the illuminator device 100 through the heat dissipation member 2. The heat transfer medium may be air or other heat-conducting materials.

[0027] As shown in FIG. 8, a plurality of channels 8 communicating the inside of the illuminator device 100 with the outside of the illuminator device 100 are provided in the illuminator device 100. In the illuminator device 100, each channel 8 penetrates through the housing 1, the heat dissipation member 2 and the enclosure 7. The channels 8 can realize the convection between the air outside the illuminator device 100 and the air inside the illuminator device 100. The illuminator device 100 may be a high-power LED lamp for indoor lighting, which may be mounted on a mounting base such as a ceiling. The lamp holder 3 is electrically connected with the internal driving power supply module so as to electrically connect the illuminator device 100 to the commercial power.

[0028] Detailed description will be given below to the components and the connecting relationships between the components in the illuminator device 100, provided

by the embodiment of the present disclosure.

[0029] As shown in FIG. 2, FIG. 4 and FIG. 5, the housing 1 is in the shape of a cap and is formed in a one-piece form by an insulating material. The housing 1 is provided with a plurality of first through grooves 11 and a plurality of second through grooves 12. The housing 1 is provided therein with a plurality of first positioning columns 13 connected with the heat dissipation member 2 and a plurality of second positioning columns 14 for supporting the light source module 5. A horizontal end face is provided at an end of the housing 1 and bonded to an end of the heat dissipation member 2. The horizontal end face of the housing 1 may be defined to be a first end face 15 of the housing 1. Another end of the housing 1 is connected with the lamp holder 3; an outer surface of another end of the housing 1 is provided with screw threads; and the lamp holder 3 may be in threaded connection with the another end of the housing 1.

[0030] Specifically, the first through grooves 11 extend to an outer surface of a side wall of the housing 1 from the first end face 15 of the housing 1. The first through groove 11 is communicated with at least one channel 8 and includes a first port 111 and a first groove 112 which are communicated with each other. The first port 111 is provided at the first end face 15. The first groove 112 is formed by denting the outer surface of the side wall. By adoption of the first through grooves 11, the inner space of the housing 1 may be communicated with the outside of the illuminator device 100.

[0031] Specifically, the second through grooves 12 penetrate through an inner surface and the outer surface of the side wall of the housing 1. The second through groove 12 is communicated with at least one channel 8. The second through groove 12 includes two second ports 121 and one second groove 122, in which the second ports 121 penetrate through the inner surface and the outer surface of the side wall of the housing 1; the second groove 122 is formed by denting the outer surface of the side wall; and the two second ports 121 are respectively formed on two sides of the second groove 122. The second through grooves 12 further enhance the communication between the inner space of the housing 1 and the outer space of the illuminator device 100. Other embodiments may also adopt the form of only arranging the first through grooves or the second through grooves.

[0032] As shown in FIG. 4, a plurality of first positioning columns 13 are formed inside the housing 1; a top surface of the first positioning column 13 is flush with the first end face 15; and a first positioning hole 131 which extends from the top surface of the first positioning column 13 to the outer surface of the housing 1 is formed in the first positioning column 13. With reference to FIG. 5 and FIG. 8, a plurality of second positioning columns 14 are provided inside the housing 1; a top surface of the second positioning column 14 is lower than the first end face 15; and the top surfaces of the plurality of second positioning columns 14 form a receiving surface for placing the driving power supply module 4 together. Second positioning

holes 141 are formed in the second positioning columns 14 respectively.

[0033] As shown in FIG. 3 and FIG. 7, the heat dissipation member 2 is toroidal columnar and made of a metallic material with good thermal conductivity such as aluminum, and the outside diameter of the heat dissipation member 2 is flush with the outside diameter of the housing 1. The heat dissipation member 2 includes a first end (not signed) and a second end (not signed) arranged in an upper-lower direction, the first end of the heat dissipation member 2 is fixedly connected with the light source module 5, and the second end of the heat dissipation member 2 is fixedly connected with the housing 1. The heat dissipation member 2 includes a round inner ring 21, a round outer ring 22, and a plurality of connecting parts 23 extending along a radial direction and connecting the inner ring 21 and the outer ring 22. Specifically, the inner ring 21 and the outer ring 22 are concentrically arranged, and the plurality of connecting parts 23 extend along a vertical direction and uniformly distributed between the inner ring 21 and the outer ring 22. The shape of the connecting part 23 is not limited to be a linear plate, or may also be curved, etc. By adoption of the above design, a plurality of pipes 24 extending longitudinally are formed in the heat dissipation member 2. The pipes 24 are formed due to enclosure of the inner ring 21, the outer ring 22 and the connecting parts 23. Moreover, the connecting parts 23 are provided with a plurality of vertical third positioning holes 231 and vertical fourth positioning holes 232, in which the third positioning holes 231 correspond to the first positioning holes 131.

[0034] As shown in FIG. 2, FIG. 3, FIG. 4 and FIG. 7, the illuminator device 100 further includes a plurality of first screws 16. The first screws 16 penetrate through the first positioning holes 131 of the first positioning columns 13 and are accommodated into the third positioning holes 231 to realize the fixed connection between the housing 1 and the heat dissipation member 2. The wall surfaces of the plurality of pipes 24 of the heat dissipation member 2 are provided with a plurality of vertical protruding strips 25. The protruding strips 25 are configured to increase the internal surface area of the heat dissipation member 2 and enhance the heat dissipation effect. Other embodiments may also adopt other connecting means such as bonding connection, fastener connection or welding connection.

[0035] The heat dissipation member 2 is preferably made of aluminum profile. The heat dissipation member with required length is cut from an aluminum profile matrix with corresponding diameter according to different lamp powers, luminous fluxes and photoelectric parameters. The powers may range from tens of watts to hundreds of watts, and the luminous fluxes may range from hundreds of lumens to tens of thousands of lumens. The traditional high-power light sources such as high-power fluorescent lamps and high-power metal halide lamps can be well replaced. Meanwhile, one set of aluminum profile mold can obtain a plurality of illuminator devices

provided by the embodiment of the disclosure with different powers, so the production cost can be greatly reduced.

[0036] As shown in FIG. 2 and FIG. 3, the light source module 5 includes a second substrate 51, a light source 52 provided on a side of the second substrate 51, and a heat homogenization plate 53 provided on another side of the second substrate 51. The heat homogenization plate 53 is in thermal contact with the heat dissipation member 2, and emergent light from the light source 52 is emitted at least after light homogenization or light distribution by the optical member 6. In the embodiment of the present disclosure, the light source adopts a light-emitting diode (LED) light source and is annularly arranged, the light source may be provided to be an annular LED light source, or the light source may be provided to include a plurality of concentric annular LED light sources. In other embodiments, the light source may adopt TL light sources or other light sources.

[0037] The second substrate 51 may be a printed circuit board, and the second substrate 51 is provided with a plurality of fifth positioning holes 511. The heat homogenization plate 53 is a vacuum cavity having a fine structure at an inner wall, is made of metal with good thermal conductivity such as copper, and is configured to enhance heat dissipation. A surface of the heat homogenization plate 53 is provided with a plurality of sixth positioning holes 531, and the circumference of the heat homogenization plate 53 is further provided with a plurality of seventh positioning holes 532 and a plurality of clamping grooves 533. The illuminator device 100 further includes a plurality of second screws 54. The second screws 54 penetrate through the fifth positioning holes 511 and the sixth positioning holes 531 and are accommodated into the fourth positioning holes 232 to realize the fixed connection between the light source module 5 and the heat dissipation member 2. Moreover, the light source module 5 is bonded to the first end (not signed) of the heat dissipation member 2. In other embodiments, other connecting means such as bonding connection, fastener connection or welding connection may also be adopted.

[0038] As shown in FIG. 2 and FIG. 8, the driving power supply module 4 includes a plurality of elements, including but not limited to an LED driving controller chip, a rectifying chip, a resistor, a capacitor, a fuse wire and a coil, which are all mounted on the first substrate 41 of the driving power supply module 4; through holes 411 corresponding to four second positioning columns 14 are formed at the first substrate 41; and the first substrate 41 is provided on a receiving surface in the housing 1, formed by the four second positioning columns 14. The illuminator device 100 further includes four third screws 42. The third screws 42 penetrate through the through holes 411 and are accommodated into the second positioning columns 14 to fix the first substrate 41 in the housing 1. In other embodiments, the driving power supply module 4 and the light source module 5 may also be

provided in a one-piece form; and the driving power supply module 4 and the light source module 5 may be provided on the same surface or different surfaces of the substrate.

[0039] As shown in FIG. 2 and FIG. 3, in the embodiment of the present disclosure, the optical member 6 adopts a bubble cap, is formed in a one-piece form by an insulating material such as plastic, and is semispherical. The optical member 6 includes a light-transmissive part 61 taken as a central part and protruded out of an upper surface of the enclosure 7, and a horizontal edge part 62 extending to the outside from a side of the light-transmissive part 61. In the embodiment of the present disclosure, the second substrate 51 of the light source module 5 abuts against the heat dissipation member 2 through the edge part 62; and a plurality of notches (not shown in the figures) are formed at the edge part 62 of the light-transmissive part 61. In other embodiments, a TIR lens, a COB lens, a bulb-cap type light homogenizing shade, or a combination of a lens and a bulb cap may also be taken as the optical member; and as for the annular light source, the optical member may also be correspondingly set to be annular.

[0040] As shown in FIG. 2, FIG. 3, FIG. 4 and FIG. 8, the enclosure 7 is in the shape of a circular ring and is arranged around the edge part 62 of the optical member 6. The enclosure 7 includes a horizontal part 71 and a first vertical part 72 and a second vertical part 73 which are provided on two sides of the horizontal part 71 respectively. The outside diameter of the enclosure 7 is flush with the outside diameter of the heat dissipation member 2. A plurality of positioning columns 721 and elastic clamping arms 722 are provided at the first vertical part 72. The positioning columns 721 may cooperate with the seventh positioning holes 532 at the heat homogenization plate 53. The elastic clamping arms 722 penetrate through the plurality of notches (not shown in the figure) of the edge part 62 and the clamping grooves 533 formed at the edge of the heat homogenization plate 53, and are clamped into the edge of the heat homogenization plate 53. Thus, the combination of the enclosure 7 and the heat homogenization plate 53 is realized, so the fixed connection between the enclosure 7 and the light source module 5 can be realized. A plurality of first openings 711 are formed at the horizontal part 71. The first openings 711 are aligned with the first through grooves 11 in an upper-lower direction. The pipes 24 are respectively communicated with the first through grooves 11 and the first openings 711. The first openings 711, the pipes 24 and the first through holes 11 form the channels 8. The airflow from the outside of the illuminator device 100 enters the first openings 711, penetrates through the channels 8 and then the pipes 24 of the heat dissipation member 2, and is discharged from the first ports 112 and the second ports 122 of the housing 1, so as to form internal and external convection and achieve effective heat dissipation. In other embodiments, the enclosure may be removed; the structure of the optical member is adjusted

and designed to be flush with the outside diameter of the heat dissipation member 2 and be fixedly connected with the heat dissipation member 2; and the optical member is provided with a structure taken as one part of the channel for heat dissipation.

[0041] In summary, the illuminator device 100 provided by the embodiments of the present disclosure is provided with a plurality of channels communicating the inside of the illuminator device 100 with the outside of the illuminator device 100; and the channels may be utilized to realize the convection between the air outside the illuminator device 100 and the air inside the illuminator device 100.

[0042] With reference to FIG. 7 and FIG. 8, the flow of the heat dissipation airflow is divided into at least two parts: one path aligned in the upper-lower direction has a rapid first flow rate; and the other path diffused into the large-size pipes 24 has a second flow rate, the second flow rate is lower than the first flow rate, and the path of airflow can fully exchange heat with the inner walls of the pipes 24. Thus, the heat emitted by the light source module 5 in the illuminator device 100 can be effectively and rapidly dissipated through the channels 8. Therefore, the illuminator device 100 has good heat dissipation effect, and then the service life of the light source module 5 in the illuminator device 100 can be prolonged. On the other hand, the heat dissipation member 2 has simple structure and light weight, so the weight of the entire illuminator device 100 is reduced and the light source module 5 may be replaced without the need of the additional installation of a safety chain, so that the illuminator device 100 is easy to assemble and disassemble.

[0043] The foregoing preferred embodiments are provided for further detailed description of the objectives, the technical solutions and the advantages of the present disclosure. It should be understood that the foregoing is only the preferred embodiments of the present disclosure and not intended to limit the present disclosure. Any modification, equivalent replacement, improvement or the like made within the spirit and the principle of the present disclosure shall fall within the scope of protection of the present disclosure.

[0044] In addition, it should be also noted that: the language used in the description is mainly selected for the purpose of readability and teaching, and is not selected for the purpose of explaining or limiting the subject of the present disclosure. Therefore, many modifications and variations will be apparent to those skilled in the art without departing from the scope and the spirit of the disclosure. The disclosure of the present disclosure is illustrative and not restrictive as for the scope of the disclosure. The scope of the present disclosure shall be defined by the appended claims.

Claims

1. An illuminator device, comprising a housing, a heat

dissipation member provided at an end of the housing, a light source module configured to comprise an end in thermal contact with the heat dissipation member, an optical member provided at another end of the light source module, and a driving power supply module electrically connected with the light source module, wherein the light source module and the housing are respectively provided at two ends of the heat dissipation member, a plurality of channels communicating inside of the illuminator device with outside of the illuminator device are provided in the illuminator device, and the plurality of channels penetrate through the housing and the heat dissipation member.

2. The illuminator device according to claim 1, wherein the illuminator device further comprises an enclosure which positions the optical member at the another end of the light source module.

3. The illuminator device according to claim 2, wherein the housing is formed with a plurality of first through grooves; a plurality of pipes are formed in the heat dissipation member; the enclosure is provided with a plurality of first openings; the plurality of pipes are respectively communicated with the plurality of first through grooves and the plurality of first openings; and the plurality of first through grooves, the plurality of pipes and the plurality of first openings form the plurality of channels.

4. The illuminator device according to claim 3, wherein the housing is provided with a first end face in contact with an end of the heat dissipation member; and the plurality of first through grooves extend to an outer surface of a side wall of the housing from the first end face.

5. The illuminator device according to claim 4, wherein each of the first through grooves comprises a first port and a first groove which are communicated with each other; the first port is provided at the first end face and communicated with at least one of the plurality of pipes; and the first groove is formed by denting the outer surface of the side wall.

6. The illuminator device according to claim 5, wherein the housing is formed with a plurality of second through grooves; and the plurality of second through grooves penetrate through both an inner surface and the outer surface of the side wall of the housing.

7. The illuminator device according to claim 6, wherein each of the second through grooves comprises at least one second port and a second groove which are communicated with each other; the at least one second port penetrates through the inner surface and the outer surface of the side wall of the housing

and is communicated with at least one of the plurality of pipes; and the second groove is formed by denting the outer surface of the side wall.

8. The illuminator device according to claim 1, wherein the heat dissipation member is toroidal columnar and comprises an inner ring, an outer ring and a plurality of connecting parts connecting the inner ring and the outer ring; and the plurality of pipes are formed by enclosure of the inner ring, the outer ring and the plurality of connecting parts. 5
9. The illuminator device according to claim 1, wherein the light source module comprises a substrate and a light source provided on a side of the substrate; and emergent light from the light source is emitted at least after light homogenization or light distribution by the optical member. 10 15
10. The illuminator device according to claim 9, wherein the light source is annularly arranged. 20
11. The illuminator device according to claim 1, wherein the illuminator device further comprises a heat homogenization plate which is provided on another side of the substrate and is in thermal contact with the heat dissipation member. 25
12. The illuminator device according to claim 1, wherein the light source module and the driving power supply module are separately provided; and the driving power supply module is fixed in the housing. 30
13. The illuminator device according to claim 1, wherein the light source module and the driving power supply module are provided in a one-piece form. 35
14. The illuminator device according to claim 1, wherein the optical member comprises an edge part and a central part; the encloser is provided around the edge part of the optical member; and the central part of the optical member is protruded out of an upper surface of the encloser. 40
15. The illuminator device according to claim 2, wherein the illuminator device further comprises a heat homogenization plate; and the encloser is combined with the heat homogenization plate. 45
16. The illuminator device according to claim 1, wherein the heat dissipation member comprises a first end and a second end arranged in an upper-lower direction; and the housing is fixedly connected with the second end of the heat dissipation member and bonded to the second end. 50 55
17. The illuminator device according to claim 1, wherein the heat dissipation member comprises a first end

and a second end arranged in an upper-lower direction; and the light source module is fixedly connected with the first end of the heat dissipation member and bonded to the first end.

18. The illuminator device according to claim 17, wherein the optical member is a lens or a diffusion shade.
19. The illuminator device according to claim 1, wherein the illuminator device further comprises a lamp holder which is electrically connected with the driving power supply module and configured to electrically connect the illuminator device to an external power supply.

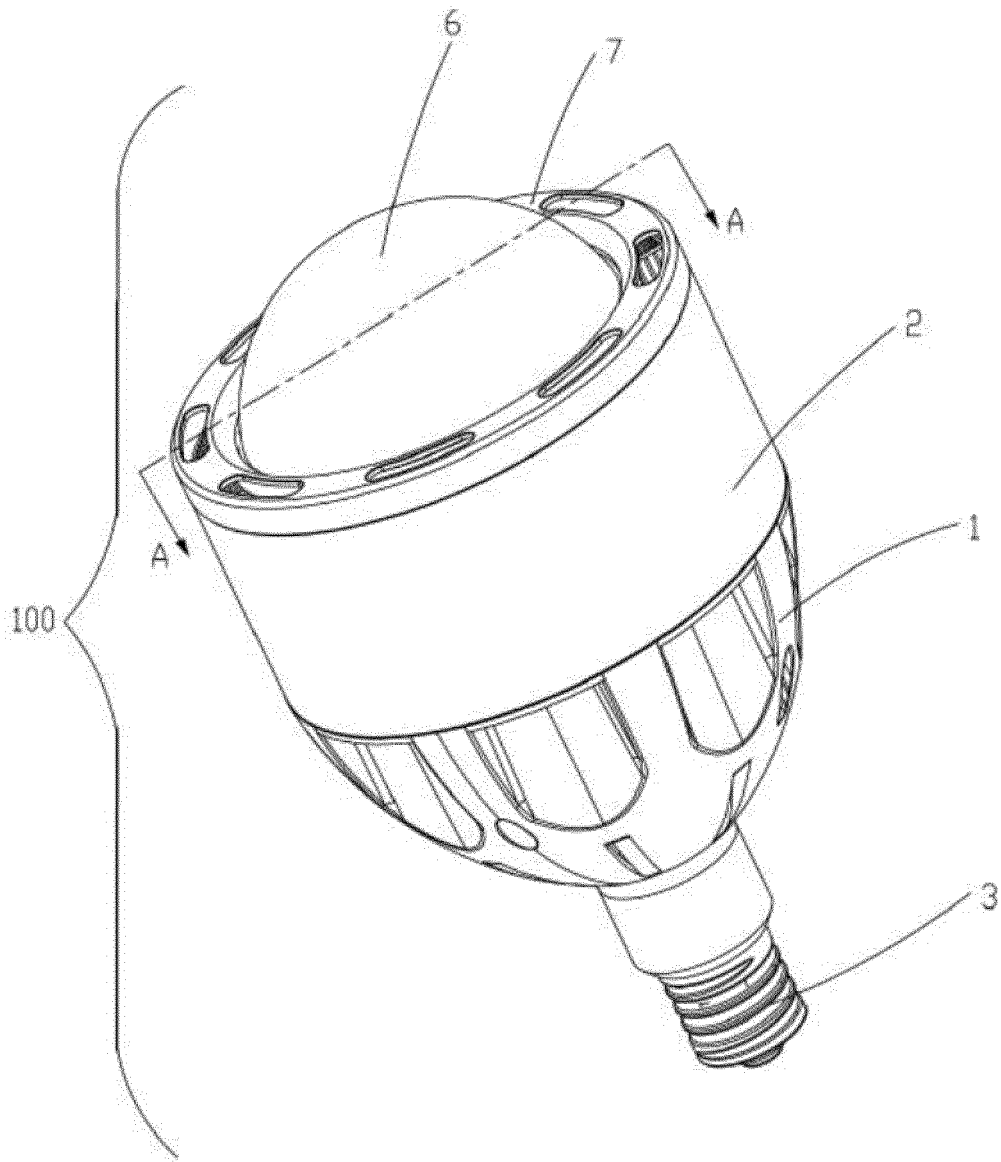


FIG. 1

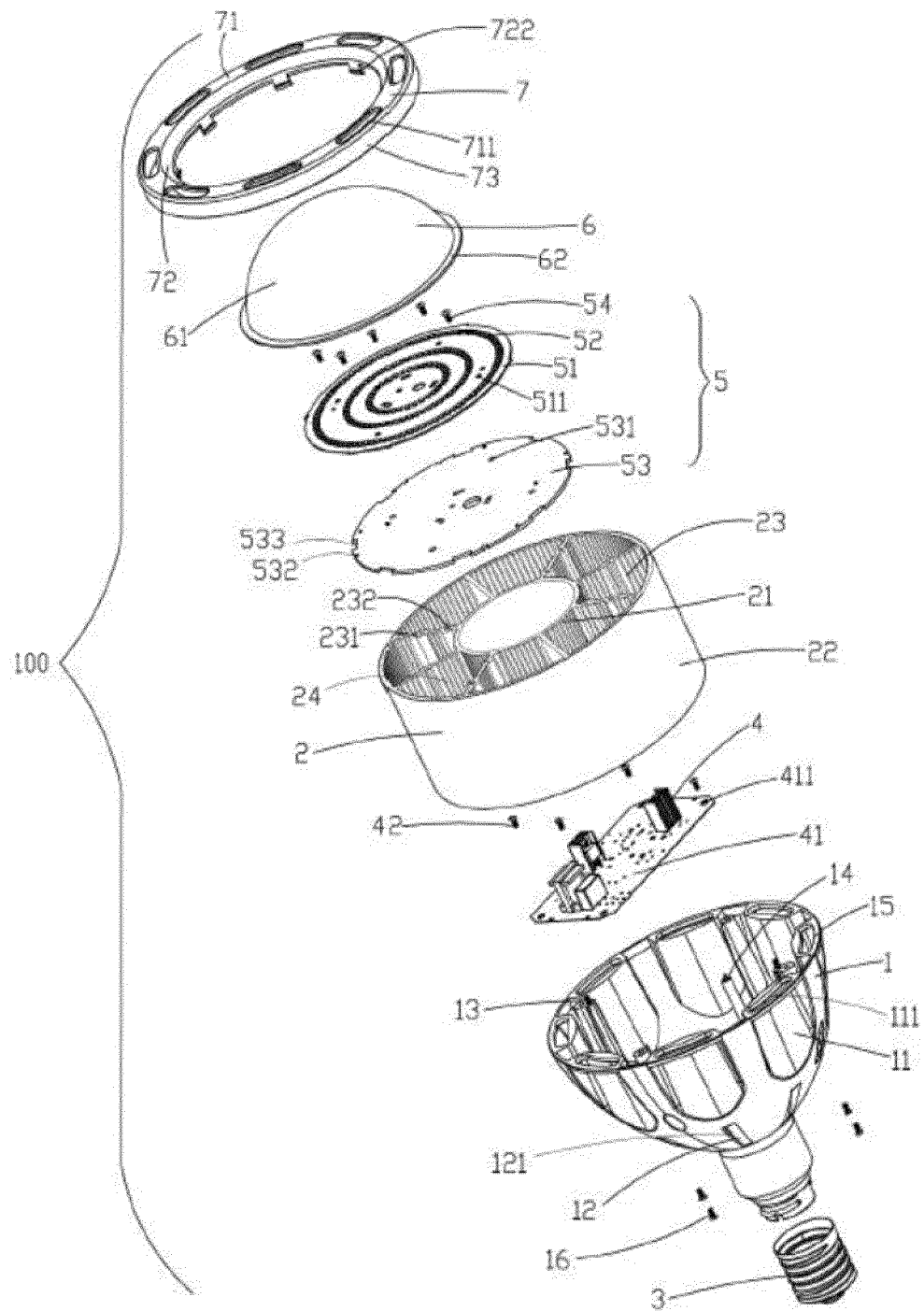


FIG. 2

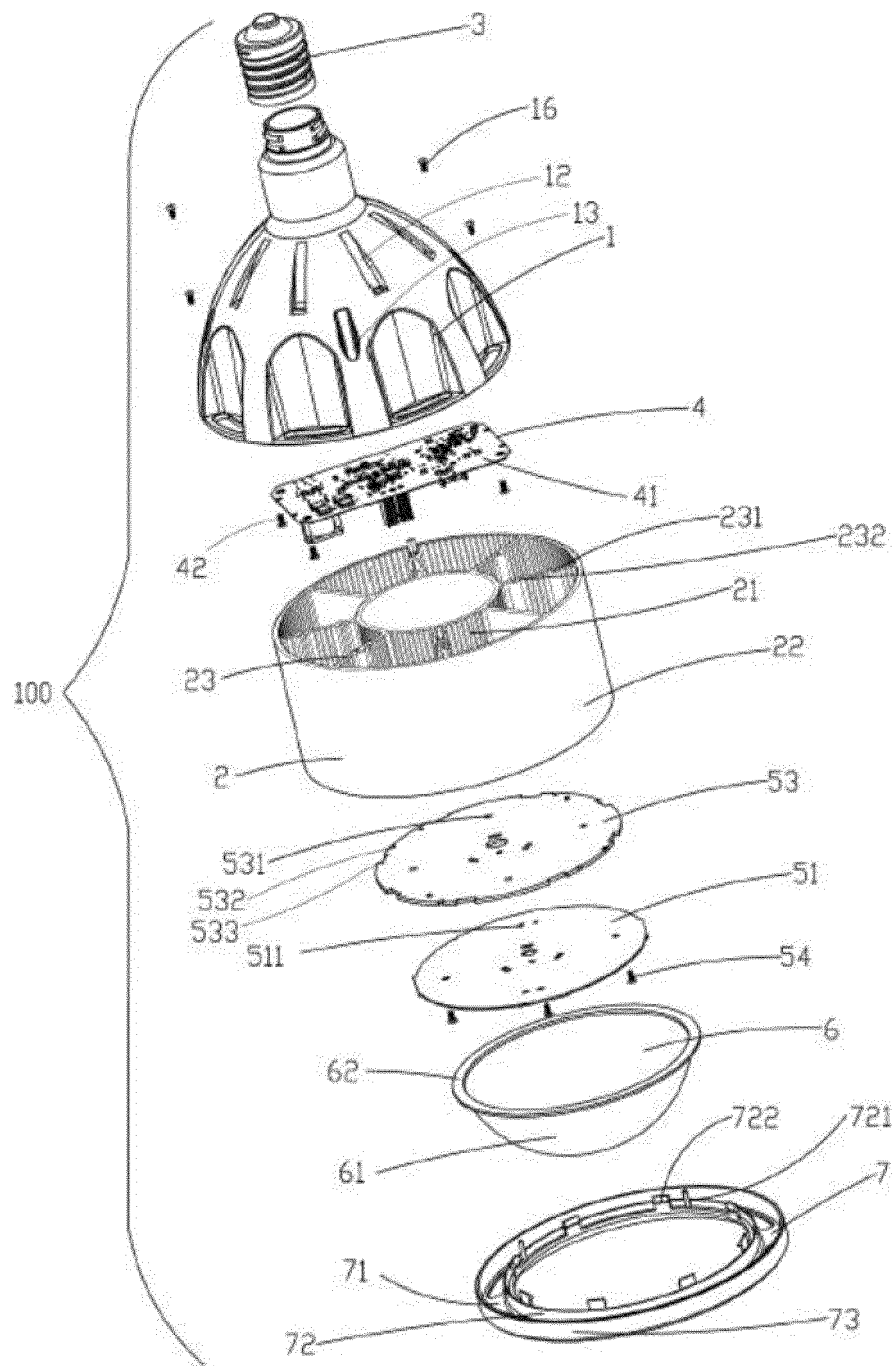


FIG. 3

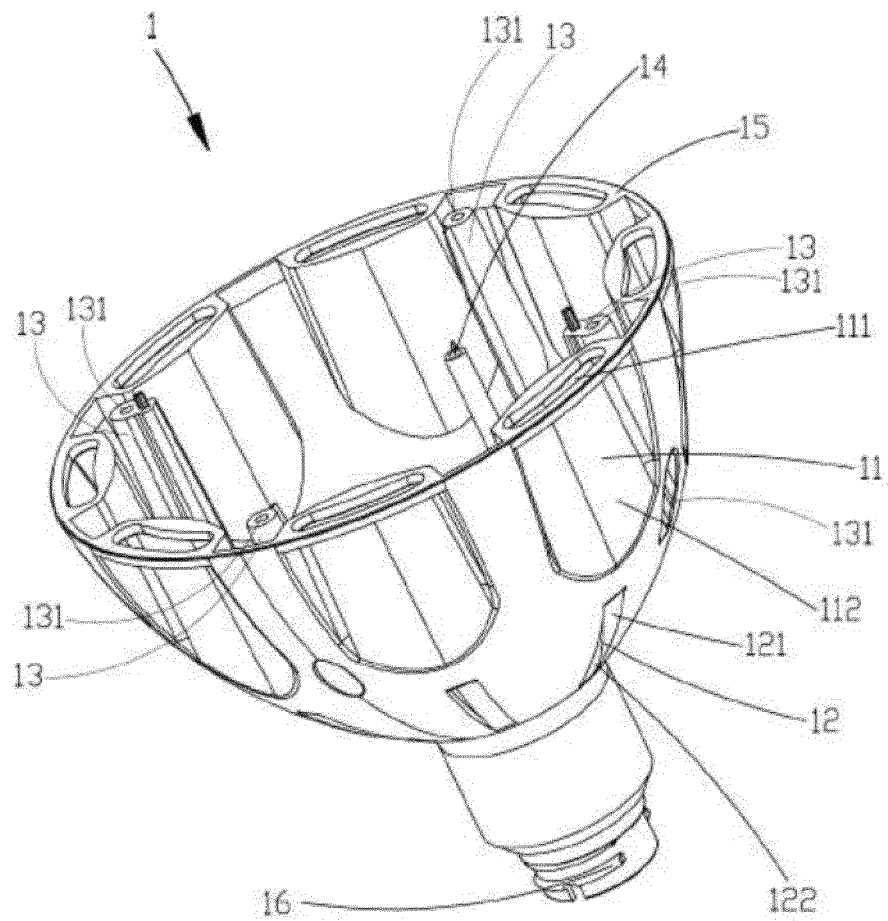


FIG. 4

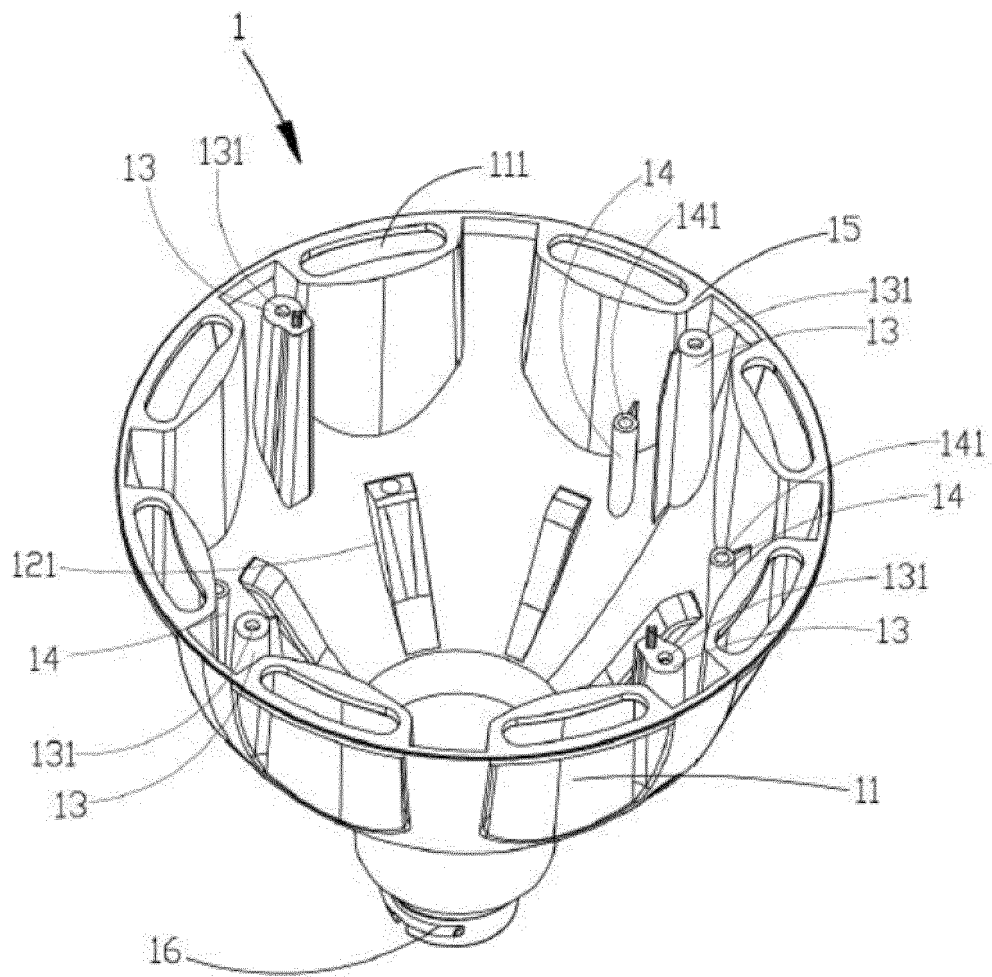


FIG. 5

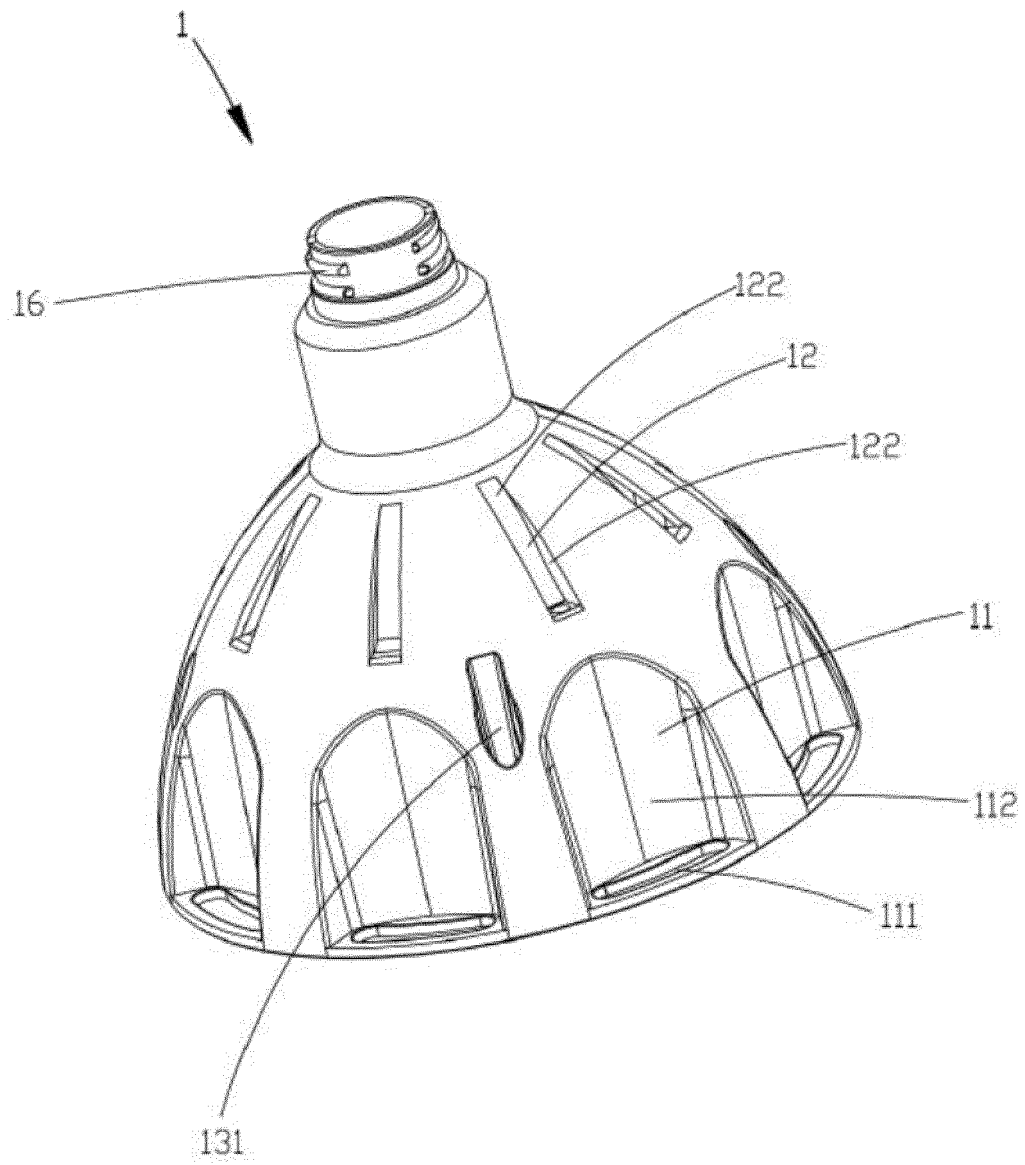


FIG. 6

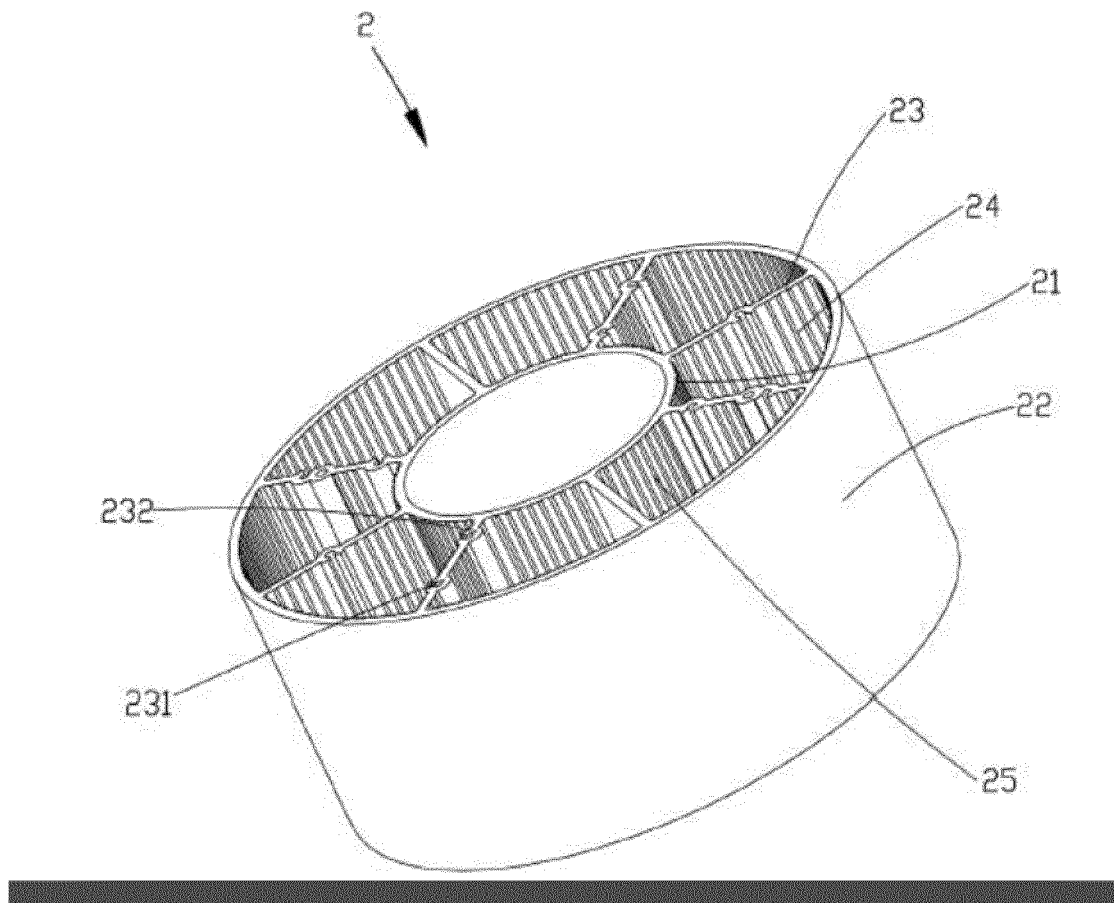


FIG. 7

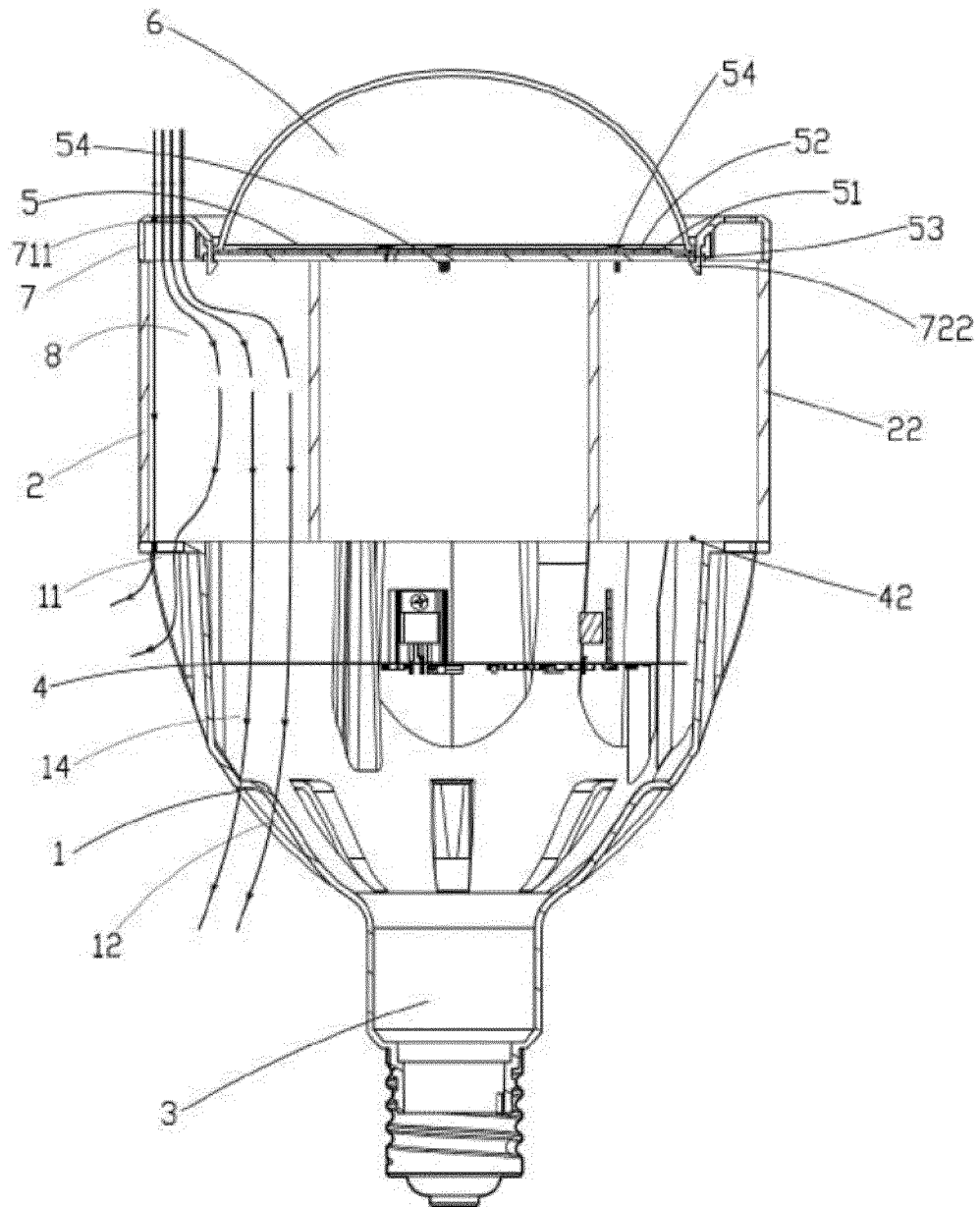


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/083628

A. CLASSIFICATION OF SUBJECT MATTER

F21V 29/503(2015.01) i; F21V 29/70(2015.01) i; F21V 29/83(2015.01) i

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

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)

CNPAT, CNKI, EPODOC, WPI: OPPL LIGHTING; CHENG, Zhengguang; XIAO, Liuhua; BAI, Kun; WANG, Hongbo; light, lighting, drive, pipeline, lighting device, light source, electrically connected, driving power, shell, channel, radiating effect, heat dissipation, groove, hole

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 106051646 A (OPPLE LIGHTING CO., LTD.), 26 October 2016 (26.10.2016), description, paragraphs [0032]-[0047], claims 1-19, and figures 1-8	1-19
PX	CN 205806983 U (OPPLE LIGHTING CO., LTD.), 14 December 2016 (14.12.2016), description, paragraphs [0032]-[0047], claims 1-19, and figures 1-8	1-19
X	CN 204629144 U (CHEN, Zhong), 09 September 2015 (09.09.2015), description, paragraphs [0025]-[0037], and figure 1	1, 9-13, 16-19
X	CN 204437777 U (SHENZHEN KENA INDUSTRY CO., LTD.), 01 July 2015 (01.07.2015), description, paragraphs [0024]-[0034], and figure 1	1-2, 9-19
Y	CN 204629144 U (CHEN, Zhong), 09 September 2015 (09.09.2015), description, paragraphs [0025]-[0037], and figure 1	2-7, 14-15
Y	CN 201259106 Y (BILLION BRIGHT OPTOELECTRONICS CORP), 17 June 2009 (17.06.2009), description, page 3, line 6 to page 4, 4th line from the bottom, and figures 1-2	2-7, 14-15
A	CN 103453335 A (SHENZHEN WANJIA LIGHTING CO., LTD.), 18 December 2013 (18.12.2013), the whole document	1-19

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

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

“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

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

“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

18 July 2017 (18.07.2017)

Date of mailing of the international search report

08 August 2017 (08.08.2017)

Name and mailing address of the ISA/CN:
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

YAO, Yuzhan

Telephone No.: (86-10) 61648433

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2017/083628

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 5600936 B2 (JIMBO DENKI K. K.), 08 October 2014 (08.10.2014), the whole document	1-19
A	US 2013163240 A1 (CHEN, C.Y. et al.), 27 June 2013 (27.06.2013), the whole document	1-19

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2017/083628

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 106051646 A	26 October 2016	None	
CN 205806983 U	14 December 2016	None	
CN 204629144 U	09 September 2015	None	
CN 204437777 U	01 July 2015	None	
CN 201259106 Y	17 June 2009	None	
CN 103453335 A	18 December 2013	CN 103453335 B	20 January 2016
		WO 2013178047 A1	05 December 2013
JP 5600936 B2	08 October 2014	JP 2011138722 A	14 July 2011
US 2013163240 A1	27 June 2013	TW 201326642 A	01 July 2013

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