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

(11) **EP 3 640 530 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.04.2020 Bulletin 2020/17

(21) Application number: **19179898.2**

(22) Date of filing: **13.06.2019**

(51) Int Cl.:
F21S 8/04 *(2006.01)* ***F21V 23/00*** *(2015.01)*
F21V 29/83 *(2015.01)* ***F21V 31/00*** *(2006.01)*
F21Y 115/10 *(2016.01)* *F21Y 103/33* *(2016.01)*
F21Y 107/60 *(2016.01)*

(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:
KH MA MD TN

(30) Priority: **16.10.2018 CN 201811204025**

(71) Applicant: **Zopoise Technology (Zhuzhou) Co., Ltd.**
Zhuzhou City, Hunan 412003 (CN)

(72) Inventors:
- **PI, Bruce**
  Zhuzhou City, Hunan Province, 412003 (CN)
- **KANG, Wei**
  Zhuzhou City, Hunan Province, 412003 (CN)
- **HUANG, Shichang**
  Zhuzhou City, Hunan Province, 412003 (CN)

(74) Representative: **Viering, Jentschura & Partner mbB**
Patent- und Rechtsanwälte
Am Brauhaus 8
01099 Dresden (DE)

(54) **LAMP**

(57) The embodiment of the disclosure discloses a lamp, including a power source (10), a central light emitting module (20) and at least one edge light emitting module (30); where, a venting hole (210) is provided on a center of the central light emitting module (20), the power source (10) is provided over the venting hole (210), and the power source (10) and the central light emitting module (20) are separated by a first gap (D1); each edge light emitting module (30) of the at least one edge light emitting module (30) is provided around a periphery of the central light emitting module (20); the innermost edge light emitting module (30) of the at least one edge light emitting module (30) and the central light emitting module (20), and two adjacent edge light emitting modules (30) of the at least one edge light emitting module (30), are separated by a second gap (D2) respectively. The lamp of the embodiment of the disclosure may solve the technical problem that the heat dissipation performance is still poor in the LED high shed lamp with large light emitting area at the present stage.

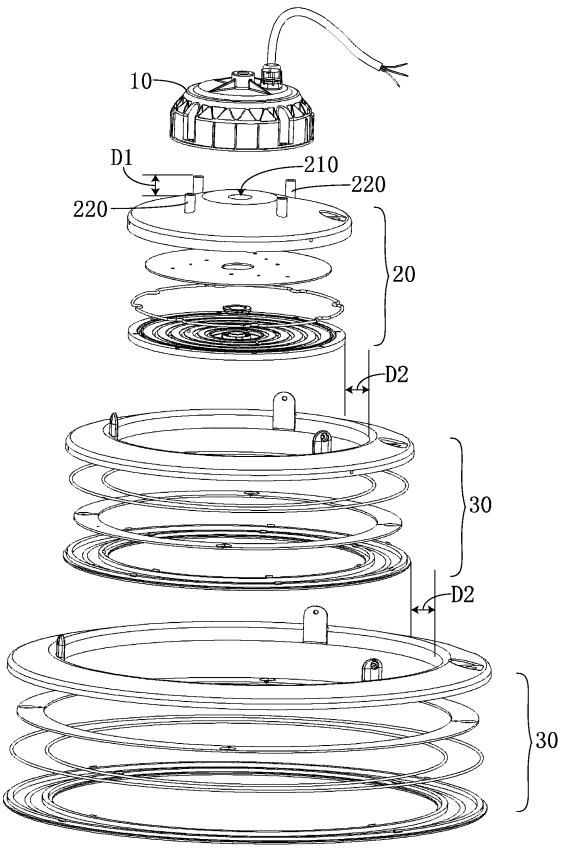

FIG. 1

EP 3 640 530 A1

Description

TECHNICAL FIELD

[0001] The disclosure relates to the field of light emitting technology, and in particular to a lamp.

BACKGROUND

[0002] A LED high shed light, also called a LED high bay light, are an important part of urban industrial light emitting. They are mainly used in high-space, large-area industrial plants. Due to the large-area characteristics of their application scenario, a large light emitting area is required by the LED high shed light.

[0003] As the light emitting area of the LED high shed light grows, its heat dissipation performance is bound to decrease. At this stage, most works are focused on the heat sink to improve the heat dissipation performance of the lamp. However, after the lamp is used for a long time, the overall temperature of the lamp is high, the improvement of the heat sink at this time provide barely no help with the heat dissipation performance of the lamp.

[0004] In short, at the present stage, there is still a technical problem of poor heat dissipation performance in the LED high shed light with large light emitting area.

SUMMARY

[0005] In view of this, the embodiment of the present disclosure provides a lamp for solving the technical problem that the heat dissipation performance is still poor in the LED high shed lamp with large light emitting area at the present stage.

[0006] The embodiment of the present disclosure provides a light, including a power source, a central light emitting module, and at least one edge light emitting module;

where, a venting hole is provided on a center of the central light emitting module, the power source is provided over the venting hole, and the power source and the central light emitting module are separated by a first gap;

each edge light emitting module of the at least one edge light emitting module is provided around a periphery of the central light emitting module;

an innermost edge light emitting module of the at least one edge light emitting module and the central light emitting module, and two adjacent edge light emitting modules of the at least one edge light emitting module, are separated by a second gap respectively.

[0007] Further, the each edge light emitting module of the at least one edge light emitting module and the central light emitting module are in a same plane.

[0008] Further, a first connecting plate is provided on a side of the each edge light emitting module of the at least one edge light emitting module close to the central light emitting module, and the first connecting plate is used to connect the central light emitting module or a side of the each edge light emitting module of the at least one edge light emitting module away from the central light emitting module.

[0009] Further, the each edge light emitting module of the at least one edge light emitting module is located at a side of the central light emitting module depart from the power source, and is in a direction from the power source to the central light emitting module, and the power source, the central light emitting module, and the at least one edge light emitting module form a tower structure.

[0010] Further, a second connecting plate is provided on a side of the each edge light emitting module of the at least one edge light emitting module close to the central light emitting module, and a top of the second connecting plate is used to connect a bottom of the central light emitting module or a bottom of the a side of the each edge light emitting module away from the central light emitting module.

[0011] Further, a heat sink, a light source assembly and a lens are provided on the each edge light emitting module of the at least one edge light emitting module and the central light emitting module respectively;

the lens is connected to the heat sink to form a closed space;

the light source assembly is disposed on the heat sink within the closed space.

[0012] Further, a sealing ring is provided between the heat sink and the lens.

[0013] Further, the lamp includes an electrical connector;

where, the electrical connector has an input end and at least two output ends, the input end is connected to the power source, and the at least two output ends are connected to the light source assembly of the at least one edge light emitting module and the light source assembly of the central light emitting module by a cable respectively.

[0014] Further, a through hole is provided on the at least one edge light emitting module and the heat sink of the central light emitting module respectively;

a waterproof rubber head is provided on each of the through hole, and one end of the cable pass through the waterproof rubber head is connected to each of the at least two output ends, and the other end is connected to the light source assembly.

[0015] Further, the light source assembly comprises a substrate and a plurality of LED lamp beads; the substrate is provided on the heat sink, and the plurality of LED lamp beads are provided on a side of the substrate depart from the heat sink.

[0016] The lamp provided by the embodiment of the disclosure includes a power source, a central light emitting module and at least one edge light emitting module. Meanwhile, the power source and the central light emitting module are separated by a first gap, and the innermost edge light emitting module of the at least one edge light emitting module and the central light emitting module, and two adjacent edge light emitting modules of the

at least one edge light emitting module, are separated by a second gap respectively, such that each module is not in contact with other components, that is, being one separate heat dissipation individual , the contact area with the air is increased and the overall heat dissipation effect is improved thereby.

BRIEF DESCRIPTION OF DRAWINGS

[0017] In order to describe the technical solutions in the embodiments of the present disclosure or the prior art more clearly, the drawings required to be used for descriptions about the embodiments or the prior art will be simply introduced below. It is apparent that the drawings described below are some embodiments of the present invention. Those of ordinary skill in the art may further obtain other drawings according to these drawings without creative work.

FIG. 1 is a schematic exploded view of a three-dimensional structure of a lamp according to an embodiment of the present disclosure;
FIG. 2 is a cross-sectional view of a lamp according to an embodiment of the present disclosure;
FIG. 3 is a cross-sectional view of another lamp according to an embodiment of the present disclosure; and
FIG. 4 is a schematic exploded view of another three-dimensional structure of a lamp according to an embodiment of the present disclosure.

DESCRIPTION OF EMBODIMENTS

[0018] Implementations of the present disclosure will be described in detail below with reference to the accompanying drawings and embodiments, so that the implementation process of solving the technical problem by applying the technical means and achieving technical effect can be fully understood and implemented.

[0019] Certain terms used throughout the description and claims are used to refer to particular components. Those skilled in the art will understand that hardware manufacturers may call the same component by different nouns. The present description and claims do not use a name difference as a mode for distinguishing the components, but the functional difference of the components is taken as a criterion for distinguishing. The word "comprising" as used throughout the description and claims is an open term and should be interpreted as "comprising but not limited to". "Substantially" means that within an acceptable error range, those skilled in the art will be able to solve the technical problems within a certain error range, basically achieving the technical effects. In addition, the term "coupled" is used herein to include any direct and indirect electrical coupling means. Therefore, if it is described here that a first apparatus is coupled to a second apparatus, it is indicated that the first apparatus may be directly and electrically coupled to the second apparatus or indirectly and electrically coupled to the second apparatus through other apparatuses or coupling means. The description is described as an implementation mode for implementing the present disclosure. However, the description is intended to be illustrative of the general principle of the present disclosure, and is not intended to limit the scope of the present disclosure. The scope of protection of the present disclosure is subject to the definition of the appended claims.

[0020] It is also to be noted that terms "include", "contain" or any other variants thereof are intended to include nonexclusive inclusions, thereby ensuring that a commodity or system including a series of elements not only includes those elements but also includes other elements which are not clearly listed or further includes elements intrinsic to the commodity or the system. Under the condition of no more restrictions, an element defined by statement "including a/an" does not exclude existence of another element which is the same in a commodity or system including the element.

Specific Embodiments

[0021] Please refer to FIG. 1, which is a schematic exploded view of a three-dimensional structure of a lamp according to an embodiment of the present disclosure. The lamp includes a power source 10, a central light emitting module 20, and at least one edge light emitting module 30. In this embodiment, two edge light emitting modules 30 are taken as an example for illustration. However, this does not limit the present disclosure. It should be noted that the number of the edge light emitting module 30 in the present disclosure is greater than or equal to 1.

[0022] A venting hole 210 is provided on a center of the central light emitting module 20, the power source 10 is provided over the venting hole 210, and the power source 10 and the central light emitting module 20 are separated by a first gap D1. Here, a plurality of connecting posts 220 are provided on the central light emitting module 20 facing the power source 10, the plurality of connecting posts 220 are provided around a periphery of the venting hole 210, and the power source 10 is fixed on one end of the connecting posts 220 away from the central light emitting module 20 by screws, such that the power source 10 and the central light emitting module 20 are separated from each other by the first gap D1. It is known that the power source and the light emitting module of the lamp generate heat in the work, that is, the power source and the light emitting module are heat dissipation elements of the lamp respectively, and the two heat dissipation elements are isolated from each other in the embodiment of the disclosure, which helps to enhance the overall heat dissipation performance of the lamp.

[0023] In addition, each of the edge light emitting module 30 is provided around a periphery of the central light emitting module 20. Here, the shape of the at least one edge light emitting module 30 includes but is not limited

to circular ring or rectangular-liked ring structure. Each of the edge light emitting modules 30 is provided around the periphery of the central light emitting module 20 and forms a concentric annulus or rectangular-liked concentric ring with the central light emitting module 20. The innermost edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 20, and two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30, are separated by a second gap respectively.

[0024] Specifically, in one case, each of the edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 20 are in the same plane, and one edge light emitting module 30 of the at least one edge light emitting module 30 that is closest to the central light emitting module 20 and the central light emitting module 20 are separated by a second gap D2, and two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30 are separated by a second gap D2. In other words, two adjacent components of the each edge light emitting module 30 of the at least one edge light emitting module and the central light emitting module 20 have the second gap D2 in a horizontal direction, as shown in FIG. 1. In another case, each edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 20 are not in the same plane, that is, each edge light emitting module 30 of the at least one edge light emitting module 30 is distributed in a longitudinal direction of the lamp. Like the distribution shown by the exploded view of FIG. 1, each edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting 20 are disposed a vertical direction. One edge light emitting module 30 of the at least one edge light emitting module 30 that is closest to the central light emitting module 20 and the central light emitting module 20 are separated by a second gap D2 in height. In other words, two adjacent components of the each edge light emitting module 30 of the at least one edge light emitting module and the central light emitting module 20 have the second gap D2 in height. Here, the second gap D2 is illustrated in two directions (for example, horizontal and vertical). However, in actual application, the second gap D2 may be set according to only one direction, and may also be set both in the two directions at the same time.

[0025] In the above design, by separating the power source 10, the central light source module 20, and each edge light emitting module 30 of the at least one edge light emitting module 30 from each other, the air around the lamp may flow between the first gap D1 and the second gap D2, and perform heat exchange with the power source 10, the central light emitting module 20, and the edge light emitting module 30, thereby achieving independent heat dissipation of a plurality of heat generating individuals, and improving the overall heat dissipation performance of the lamp.

[0026] In addition, it should be noted that the at least one edge light emitting module 30 in the present disclosure can be expanded in an infinite manner, that is, on the basis of ensuring the overall heat dissipation performance of the lamp, the light emitting area of the lamp can be improved. In other words, the technical problem that the heat dissipation performance is still poor in the LED high shed lamp with large light emitting area at the present stage is solved. Referring to FIG. 2, in one embodiment of the present disclosure, each edge light emitting module 30 of the edge light emitting module 30 and the central light emitting module 20 are in the same plane, that is, the light emitting surfaces of the each edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 20 are in the same plane. One edge light emitting module 30 of the at least one edge light emitting module 30 that is closest to the central light emitting module 20 and the central light emitting module 20 are separated by a second gap D2, and two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30 are separated by a second gap D2, that is, two adjacent components of the each edge light emitting module 30 of the at least one edge light emitting module and the central light emitting module 20 have the second gap D2 in a horizontal direction.

[0027] Here, a first connecting plate 310 is provided on a side of the each edge light emitting module of the at least one edge light emitting module close to the central light emitting module, and the first connecting plate 310 is used to connect the central light emitting module or a side of the each light emitting module 30 away from the central light emitting module 20. Specifically, the first connecting plate 310 is provided along a periphery on a side of the each edge light emitting module 30 close to the central light emitting module 20, and is connected to the central light emitting module 20 or a side of the each edge light emitting module 30 away from the central light emitting module 20 by a screw, to realize connections between the central light emitting module 20 and the innermost edge light emitting module 30 of the at least one edge light emitting module 30, and between two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30.

[0028] Referring to FIG. 3, in another embodiment of the present disclosure, each edge light emitting module 30 of the edge light emitting module 30 is located at a side of the central light emitting module 20 depart from the power source 10, and in the direction of the power source 10 to the central light emitting module 20. The power source 10, the central light emitting module 20, and the at least one edge light emitting module 30 form a tower structure. The each edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 20 are respectively disposed in a vertical direction. The each edge light emitting module 30 of the at least one edge light emitting module 30 that is closest to the central light emitting module 20 and the central light emitting module 20 are separated

by a second gap D2 in height, and two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30 are separated by a second gap D2 in height. In other words, two adjacent components of the each edge light emitting module 30 of the at least one edge light emitting module and the central light emitting module 20 have the second gap D2 in height.

[0029] Here, a second connecting plate 320 is provided on a side of the each edge light emitting module 30 of the at least one edge light emitting module 30 close to the central light emitting module 20, and a top of the second connecting plate 320 is used to connect a bottom of the central light emitting module 20 or a bottom of the a side of the each edge light emitting module 30 away from the central light emitting module 20. Specifically, the second connecting plate 320 is disposed along a periphery of a side of each edge light emitting module 30 close to the central light emitting module 20, and is connected to the central light emitting module 20 or a side of each edge light emitting module 30 away from the central light emitting module 20 by using a screw, to realize connections between the central light emitting module 20 and the innermost edge light emitting module 30 of the at least one edge light emitting module 30, and between two adjacent edge light emitting modules 30 of the at least one edge light emitting module 30.

[0030] Referring to FIG. 4, and in conjunction with FIG. 3, each edge light emitting module 30 of the edge light emitting module 30 and the central light emitting module 20 include a heat sink 40, a light source assembly 50, and a lens 60. The lens 60 is connected to the heat sink 40 to form a closed space 410. The light source assembly 50 is disposed on the heat sink 40 within the closed space 410. Specifically, the light source assembly 50 includes a substrate 510 and a plurality of LED lamp beads 520. The substrate 510 is provided on the heat sink 40. Here, the substrate 510 is provided on a side of the heat sink 40 depart from the power source 10. The plurality of LED lamp beads 520 are provided on a side of the substrate 510 depart from the heat sink 40 to form a light emitting surface on the substrate 510, and the lens 60 is connected to a side of the heat sink 40 to depart from the power source 10 to form the closed space 410, so that the substrate 510 is covered in the closed space 410. Here, the connection manner of the lens 60 connected to the heat sink 40 includes but is not limited to buckles or bolts. In other preferred embodiments of the present disclosure, in order to increase the compactness of the closed space 410, a sealing ring 420 is provided between the heat sink 40 and the lens 60. Here, the sealing ring 420 is generally made of elastic material, such as a silica gel or the like. Moreover, since each edge light emitting module 30 of the edge light emitting module 30 and the central light emitting module 20 are annular structures, the sealing ring 420 has an inner ring and an outer ring, which are respectively located on an inner side and an outer circumference of the heat sink 40, so that the compactness at the inner and outer openings of the closed space 410 is ensured.

[0031] Further, the lamp further includes an electrical connector 70, where, the electrical connector 70 has an input end 710 and at least two output ends 720, the input end 710 is connected to the power source 10, and the at least two output ends 720 are connected to the light source assemblies 50 of the at least one edge light emitting module 30 and the central light emitting module 20 by a cable 80 respectively. Here, the electrical connector 70 may be disposed on the power source 10, and the input end 710 is electrically connected to an output end of the power source 10 for providing electrical power to the electrical connector 70. Alternatively, the electrical connector 70 is disposed on the heat sink 40 of the at least one edge light emitting module 30 or the central light emitting module 20, and the input end 710 is electrically connected to the output end of the power source 10 by a cable for providing electrical power to the electrical connector 70. The electrical connector 70 has at least two output ends 720 respectively connected to the light source assemblies 50 of the each edge light emitting module 30 of the at least one edge light emitting module 30 and the central light emitting module 30, specifically connected to the substrate 510 for providing electrical power to the plurality of LED lamp beads 520 respectively.

[0032] Further, the heat sink 40 of the at least one edge light emitting module 30 and the heat sink 40 of the central light emitting module 20 are provided with a through hole 90, a waterproof rubber head 910 is provided on each of the through hole 90, and one end of the cable 80 pass through the waterproof rubber head 910 is connected to the output ends, and the other end is connected to the light source assembly. Specifically, the through hole 90 is disposed on each of the heat sinks 40 for the cable 80 to pass through, so that one end of the cable 80 is connected to the output end 710, and the other end is connected to the substrate 510. The through hole 90 is also provided in the waterproof rubber head 910 for the cable 80 to pass through to seal the closed space 410 and to improve the waterproof performance of the lamp. It should be noted that, in the case that the structures do not conflict, the structures of each part mentioned in the above embodiments may be combined with each other. To avoid repetition, the technical solutions obtained after the combination are not described herein again, but are the technical solutions obtained after combination should also fall within the scope of protection of the present disclosure.

[0033] It is finally to be noted that the above embodiments are adopted not to limit but only to describe the technical solutions of the present invention. Although the present invention has been described with reference to the abovementioned embodiments in detail, those of ordinary skill in the art should know that modifications may still be made to the technical solutions recorded in each embodiment or equivalent replacements may be made to part of technical features therein. These modifications

or replacements do not make the essences of the corresponding technical solutions depart from the spirit and scope of the technical solutions of each embodiment of the present invention.

Claims

1. A lamp, comprising a power source, a central light emitting module, and at least one edge light emitting module;
wherein, a venting hole is provided on a center of the central light emitting module, the power source is provided over the venting hole, and the power source and the central light emitting module are separated by a first gap;
each edge light emitting module of the at least one edge light emitting module is provided around a periphery of the central light emitting module;
an innermost edge light emitting module of the at least one edge light emitting module and the central light emitting module, and two adjacent edge light emitting modules of the at least one edge light emitting module, are separated by a second gap respectively.

2. The lamp according to claim 1, wherein, the each edge light emitting module of the at least one edge light emitting module and the central light emitting module are in a same plane.

3. The lamp according to claim 1, wherein, a first connecting plate is provided on a side of the each edge light emitting module of the at least one edge light emitting module close to the central light emitting module, and the first connecting plate is used to connect the central light emitting module or a side of the each edge light emitting module of the at least one edge light emitting module away from the central light emitting module.

4. The lamp according to claim 1, wherein, the each edge light emitting module of the at least one edge light emitting module is located at a side of the central light emitting module depart from the power source, and is in a direction from the power source to the central light emitting module, and the power source, the central light emitting module, and the at least one edge light emitting module form a tower structure.

5. The lamp according to claim 1, wherein, a second connecting plate is provided on a side of the each edge light emitting module of the at least one edge light emitting module close to the central light emitting module, and a top of the second connecting plate is used to connect a bottom of the central light emitting module or a bottom of the a side of the each edge light emitting module away from the central light emitting module.

6. The lamp according to any one of claims 1-5, wherein, a heat sink, a light source assembly and a lens are provided on the each edge light emitting module of the at least one edge light emitting module and the central light emitting module respectively;
the lens is connected to the heat sink to form a closed space;
the light source assembly is disposed on the heat sink within the closed space.

7. The lamp according to claim 6, wherein, a sealing ring is provided between the heat sink and the lens.

8. The lamp according to claim 6, further comprising an electrical connector;
wherein, the electrical connector has an input end and at least two output ends, the input end is connected to the power source, and the at least two output ends are connected to the light source assembly of the at least one edge light emitting module and the light source assembly of the central light emitting module by a cable respectively.

9. The lamp according to claim 8, wherein, a through hole is provided on the at least one edge light emitting module and the heat sink of the central light emitting module respectively;
a waterproof rubber head is provided on each of the through hole, and one end of the cable pass through the waterproof rubber head is connected to each of the at least two output ends, and the other end is connected to the light source assembly.

10. The lamp according to claim 6, wherein, the light source assembly comprises a substrate and a plurality of LED lamp beads;
the substrate is provided on the heat sink, and the plurality of LED lamp beads are provided on a side of the substrate depart from the heat sink.

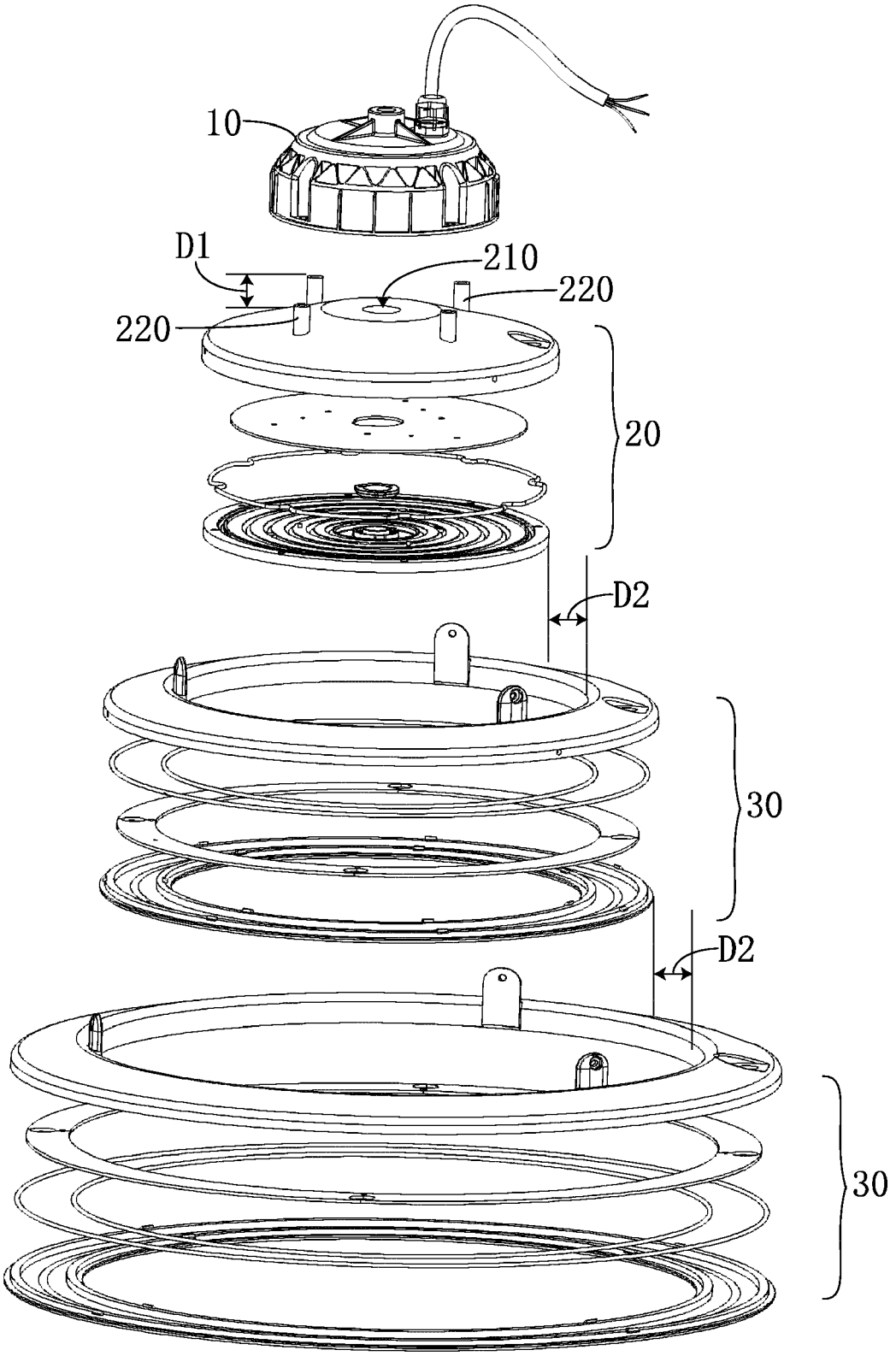

FIG. 1

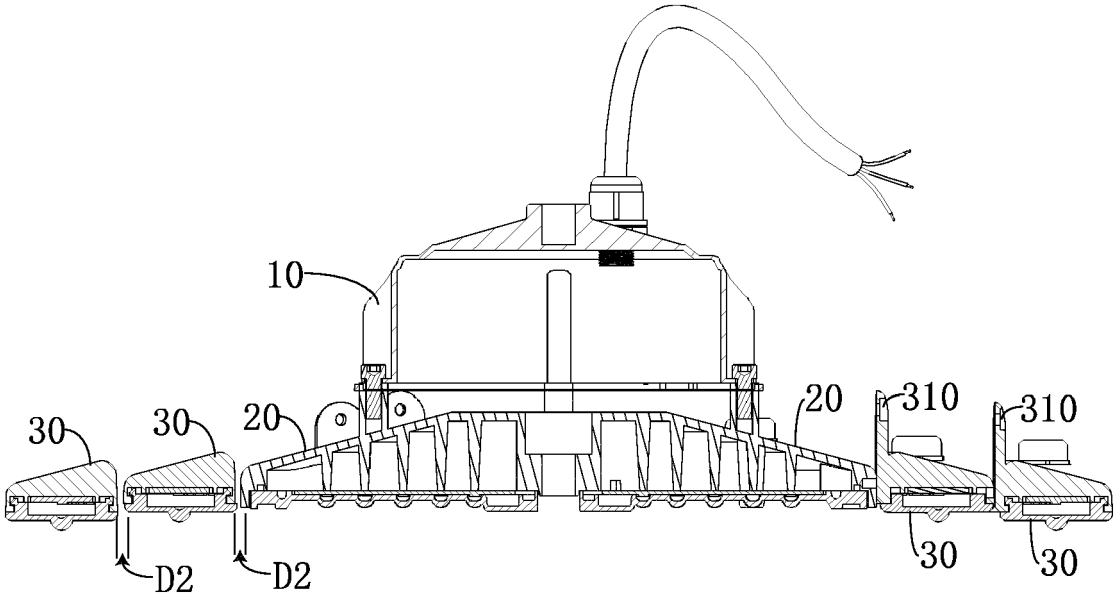
10
30
30
20
20
310
310
30
30
D2
D2

FIG. 2

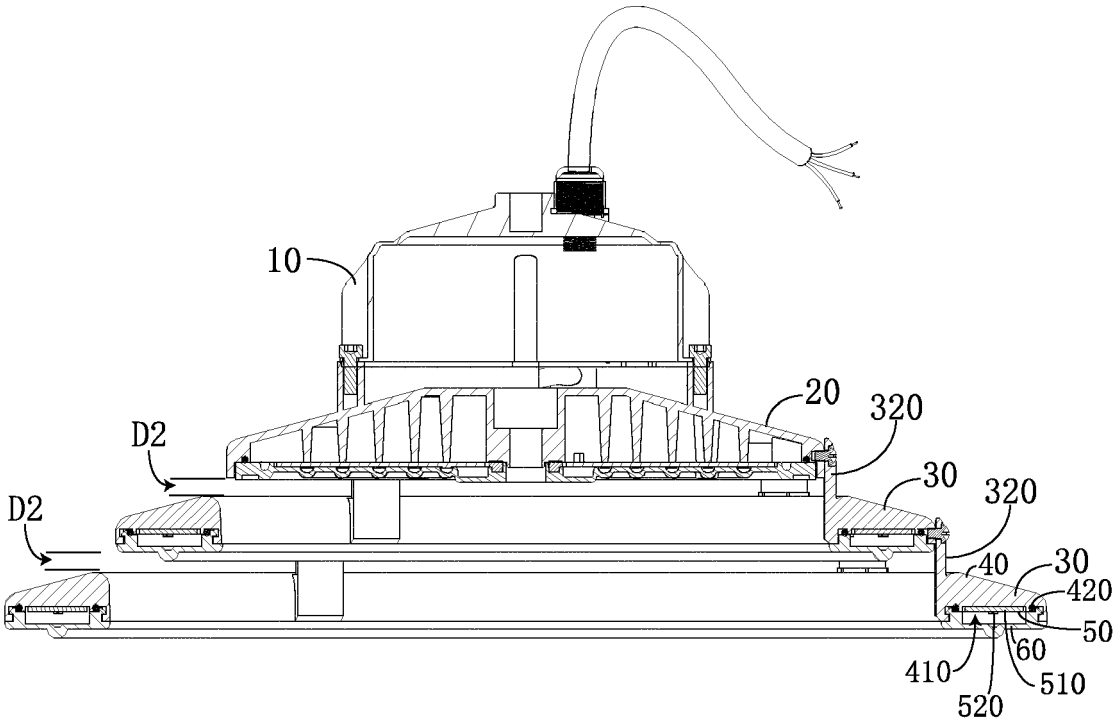
10
20
320
D2
D2
30
320
40
30
420
50
60
410
510
520

FIG. 3

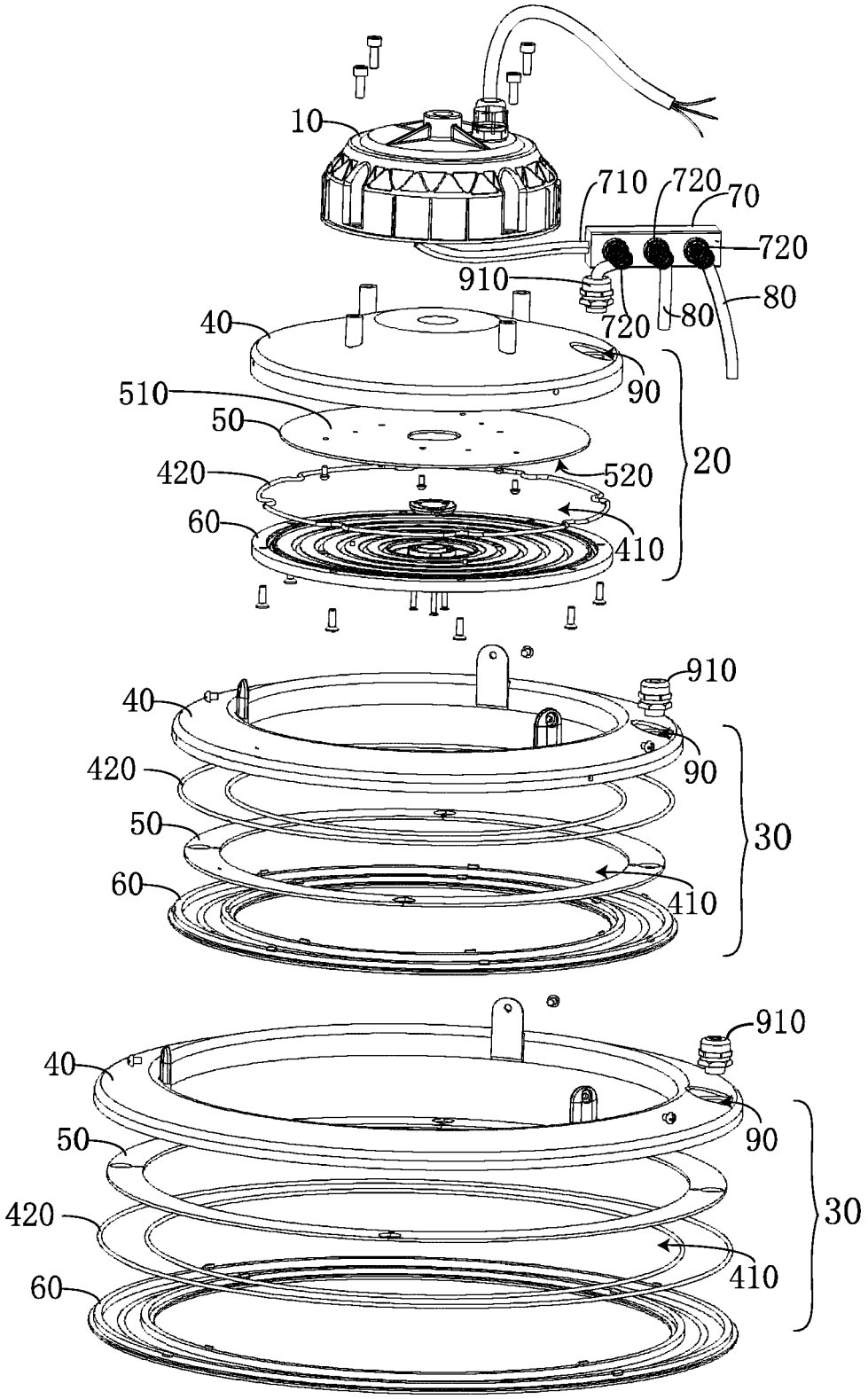
10
710
720
70
720
910
80
80
720
40
90
510
50
20
420
520
60
410
910
40
90
420
50
30
60
410
910
40
90
50
420
30
60
410

FIG. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 17 9898

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 107 345 628 A (SHENZHEN GUANKE TECHNOLOGIES CO LTD) 14 November 2017 (2017-11-14) * figures 1-5 * -& US 2019/032911 A1 (LAN QING [CN]) 31 January 2019 (2019-01-31) * paragraphs [0031], [0039] *	1-10	INV. F21S8/04 F21V23/00 F21V29/83 F21V31/00 ADD. F21Y115/10 F21Y103/33 F21Y107/60
Y	WO 2011/033411 A1 (IANIRO ALDO S R L [IT]; IANIRO FABRIZIA [IT]) 24 March 2011 (2011-03-24) * figures 1,2a,2b *	1,3-10	
Y	US 2018/209636 A1 (SOHN CHOONG-YONG [KR] ET AL) 26 July 2018 (2018-07-26) * figures 2,8a * * paragraphs [0045], [0064] *	1,3-10	
A	CN 207 921 955 U (ZOPOISE TECH ZHUZHOU CO LTD) 28 September 2018 (2018-09-28) * the whole document *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

F21S
F21V
F21Y

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 October 2019	Dinkla, Remko

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 17 9898

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

24-10-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 107345628 A	14-11-2017	CN 107345628 A	14-11-2017
		US 2019032911 A1	31-01-2019
US 2019032911 A1	31-01-2019	CN 107345628 A	14-11-2017
		US 2019032911 A1	31-01-2019
WO 2011033411 A1	24-03-2011	EP 2478287 A1	25-07-2012
		IT 1395881 B1	26-10-2012
		WO 2011033411 A1	24-03-2011
US 2018209636 A1	26-07-2018	JP 2018116922 A	26-07-2018
		US 2018209636 A1	26-07-2018
CN 207921955 U	28-09-2018	NONE	

EPO FORM P0459

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