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

(11) **EP 4 321 800 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
**14.02.2024 Bulletin 2024/07**

(21) Application number: **23160833.2**

(22) Date of filing: **08.03.2023**

(51) International Patent Classification (IPC):
***F21V 3/02*** *(2006.01)* ***F21V 25/12*** *(2006.01)*
***F21V 29/77*** *(2015.01)* ***F21V 29/83*** *(2015.01)*
***F21V 31/00*** *(2006.01)* *F21Y 115/10* *(2016.01)*

(52) Cooperative Patent Classification (CPC):
**F21V 31/005; F21V 3/02; F21V 25/12; F21V 29/773; F21V 29/83;** F21Y 2115/10

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
**BA**
Designated Validation States:
**KH MA MD TN**

(30) Priority: **12.08.2022 CN 202210965967**

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(54) **HIGH-RELIABILITY EXPLOSION-PROOF LAMP**

(57) A high-reliability explosion-proof lamp includes a main housing, an upper cap, a lower cap, a lamp cover and a structure strengthening ring. The light source module is disposed in the main housing. The upper cap is disposed at the top of the main housing. The lower cap has an installation hole and is disposed at the bottom of the main housing. The lamp cover is disposed at the installation hole. The structure strengthening ring is disposed between the lamp cover and the light source module. The structure strengthening ring includes a ring body and a plurality of protrusion portions disposed on the ring body. A recess is formed between any two adjacent protrusion portions.

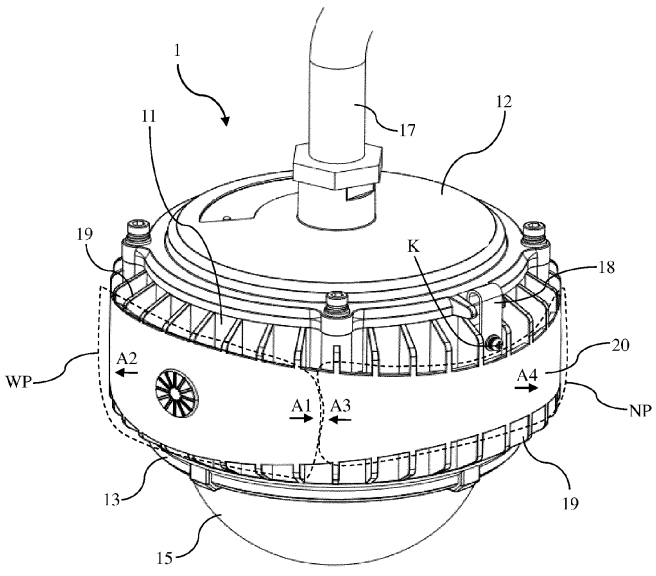


FIG. 1

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to an explosion-proof lamp, in particular to a high-reliability explosion-proof lamp.

### BACKGROUND

**[0002]** Explosion-proof lamps can be used in hazardous places with a large amount of flammable gas and dust. These lamps can prevent flammable gas and dust in the surrounding environment from being ignited by arcs or sparks generated inside these lamps.

**[0003]** Therefore, explosion-proof lamps must have high structural strength and leakproofness to avoid that arcs or sparks generated inside the lamp are leaked from these lamps to the surrounding environment. However, the structural strength of currently available explosion-proof lamps is insufficient, so the safety thereof still needs to be further improved.

**[0004]** In addition, due to the lack of a proper heat dissipation structure, the performance of the light source modules inside currently available explosion-proof lamps tends to be influenced because of high temperature. Further, the service life thereof is also reduced due to high temperature.

### SUMMARY

**[0005]** To achieve the foregoing objective, one embodiment of the present invention provides a high-reliability explosion-proof lamp, which includes a main housing, an upper cap, a lower cap, a lamp cover and a structure strengthening ring. The light source module is disposed in the main housing. The upper cap is disposed at the top of the main housing. The lower cap has an installation hole and is disposed at the bottom of the main housing. The lamp cover is disposed at the installation hole. The structure strengthening ring is disposed between the lamp cover and light source module. The structure strengthening ring includes a ring body and a plurality of protrusion portions disposed on the ring body. A recess is formed between any two adjacent protrusion portions.

**[0006]** In one embodiment of the present invention, the protrusion portions includes a plurality of first protrusion portions and a plurality of second protrusion portions. The first protrusion portions and second protrusion portions are arranged in a staggered manner.

**[0007]** In one embodiment of the present invention, the width of the first protrusion portion is greater than the width of the second protrusion portion and the width of the recess. The width of the second protrusion portion is less than or equal to the width of the recess.

**[0008]** In one embodiment of the present invention, the main housing has an inner wall, an outer wall and a plurality of connecting fins. The inner wall is connected to the outer wall via the connecting fins, such that a plurality of heat dissipation spaces are formed between the inner wall and outer wall.

**[0009]** In one embodiment of the present invention, the high-reliability explosion-proof lamp further includes a first sealing ring and a second sealing ring. The upper cap contacts the upper surface and inner surface of the top of the main housing. The first sealing ring is disposed between the upper cap and the upper surface of the top of the main housing. The second sealing ring is disposed between the upper cap and the inner surface of the top of the main housing.

**[0010]** In one embodiment of the present invention, the lower cap contacts the lower surface and the inner surface of the bottom of the main housing. The third sealing ring is disposed between the lower cap and the lower surface of the bottom of the main housing. The fourth sealing ring is disposed between the lower cap and the lower surface of the bottom of the main housing.

**[0011]** In one embodiment of the present invention, the inner surface of the bottom of the main housing is provided with a first screw thread and the outer surface of the lower cap is provided with a second screw thread. The main housing is combined with the lower cap via the first screw thread and second screw thread.

**[0012]** In one embodiment of the present invention, the high-reliability explosion-proof lamp further includes a plurality of heat dissipation fins and a heat dissipation wall. The heat dissipation wall surrounds the heat dissipation fins and partially covers the heat dissipation fins.

**[0013]** In one embodiment of the present invention, the heat dissipation wall is streamlined.

**[0014]** In one embodiment of the present invention, the lamp cover is a spherical lamp cover or a flat lamp cover.

**[0015]** The high-reliability explosion-proof lamp in accordance with the embodiments of the present invention may have the following advantages:

**[0016]** (1) In one embodiment of the present invention, the explosion-proof lamp has the structure strengthening ring disposed between the lamp cover and light source module thereof. The structure strengthening ring includes the ring body and a plurality of protrusion portions. The protrusion portions are disposed on the ring body and one recess can be formed between any two adjacent protrusion portions. The structure design of the structure strengthening ring can make the external force applied to the lamp cover be uniformly distributed over the structure strengthening ring, such that the impact force applied to the lamp cover can be dispersed in order to prevent the lamp cover from being broken due to the external force. Therefore, the structural strength of the explosion-proof lamp can be significantly enhanced, so the safety of the explosion-proof lamp can be effectively increased.

**[0017]** (2) In one embodiment of the present invention, the explosion-proof lamp has the first sealing ring and second sealing ring disposed between the upper cap and the main housing. Besides, the explosion-proof lamp further has the third sealing ring and the fourth sealing ring

disposed between the lower cap and the main housing. The above multi-layer sealing structure can effectively enhance the leakproofness of the explosion-proof lamp, so the safety of the explosion-proof lamp can be further enhanced.

**[0018]** (3) In one embodiment of the present invention, the main housing of the explosion-proof lamp has the inner wall, the outer wall and a plurality of connecting fins. The inner wall is connected to the outer wall via the connecting fins, such that a plurality of heat dissipation spaces are formed between the inner wall and the outer wall. The above structure design can greatly improve the heat dissipation performance of the explosion-proof lamp, such that the performance of the light source module thereof would not be influenced by high temperature and the service life thereof can increase.

**[0019]** (4) In one embodiment of the present invention, the explosion-proof lamp has a plurality of heat dissipation fins and the streamlined heat dissipation wall. The heat dissipation fins are disposed on the outer surface of the main housing. The heat dissipation wall surrounds the above heat dissipation fins and partially covers the heat dissipation fins. The above heat dissipation structure design can effectively generate air pressure difference around the explosion-proof lamp so as to promote air circulation, which can further improve the heat dissipation performance of the explosion-proof lamp.

**[0020]** (5) In one embodiment of the present invention, the main housing of the explosion-proof lamp has a hook structure and the user can directly hang the main housing on the upper cap via the hook structure in order to perform the installation of the explosion-proof lamp or maintain (repair) the explosion-proof lamp. Thus, the explosion-proof lamp can be more convenient in use.

**[0021]** (6) In one embodiment of the present invention, the structure strengthening ring of the explosion-proof ring can be applied to not only a spherical lamp cover, but also a flat lamp cover. In addition, as the structure strengthening ring is small, so the lighting effect of the light source module will not be influenced by the structure strengthening ring. Accordingly, the overall performance of the explosion-proof lamp can be effectively enhanced, so the explosion-proof lamp can conform to actual requirements.

**[0022]** Further scope of applicability of the present application will become more apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating exemplary embodiments of the present invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the present invention will become apparent to those skilled in the art from this detailed description.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0023]** The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention and wherein:

FIG. 1 is a perspective view of a high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 2 is a cross-sectional view of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 3 is a top view of a main housing of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 4 is a top view of a structure strengthening ring of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 5 is a schematic view for illustrating a relative position between the structure strengthening ring, lower cap and lamp cover of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 6 is a schematic view for illustrating a combination of the lower cap and the lamp cover of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 7 is a schematic view for illustrating a combination of a lower cap and a lamp cover of a high-reliability explosion-proof lamp in accordance with another embodiment of the present invention.

FIG. 8 is a perspective view of a hook structure of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 9 is a schematic view for illustrating a relative position between the hook structure, main housing and upper cap of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 10 is a first schematic view for illustrating a usage status of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 11 is a second schematic view for illustrating the usage status of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention.

FIG. 12 is a third schematic view for illustrating the usage status of the high-reliability explosion-proof

lamp in accordance with one embodiment of the present invention.

## DETAILED DESCRIPTION

**[0024]** In the following detailed description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the disclosed embodiments. It will be apparent, however, that one or more embodiments may be practiced without these specific details. In other instances, well-known structures and devices are schematically shown in order to simplify the drawing. It should be understood that, when it is described that an element is "coupled" or "connected" to another element, the element may be "directly coupled" or "directly connected" to the other element or "coupled" or "connected" to the other element through a third element. In contrast, it should be understood that, when it is described that an element is "directly coupled" or "directly connected" to another element, there are no intervening elements.

**[0025]** Please refer to FIG. 1 and FIG. 2, which are a perspective view and a cross-sectional view of a high-reliability explosion-proof lamp in accordance with one embodiment of the present invention respectively. As shown in FIG. 1 and FIG. 2, the high-reliability explosion-proof lamp 1 includes a main housing 11, an upper cap 12, a lower cap 13, a light source module 14, a lamp cover 15, a structure strengthening ring 16, a supporting post 17, a hook structure 18, a plurality of heat dissipation fins 19 and a heat dissipation wall 20.

**[0026]** The main housing 11 is a hollow cylinder, which has an upper opening and a lower opening. The inner surface of the bottom of the main housing 11 is provided with a first screw thread F1. In one embodiment, the main housing 11 is made of a metal material, such as stainless steel, iron, aluminum, etc. The hook structure 18 is fixed on the main housing 11 via a fixation member K.

**[0027]** The light source module 14 is disposed in the main housing 11. In the embodiment, the light source module 14 may be a light-emitting diode (LED) module, which may include a light source board, a driving circuit and other necessary components. In another embodiment, the light source module 14 may be any one of other currently available lighting modules.

**[0028]** The supporting post 17 can be fixed on a wall and the upper cap 12 is fixed on the supporting post 17. The upper cap 12 is disposed at the top of the main housing 11 and covers the upper opening. The explosion-proof lamp 1 may further include a first sealing ring S1 and a second sealing ring S2. The upper cap 12 contacts the upper surface and inner surface of the top of the main housing 11. The first sealing ring S1 is disposed between the upper cap 12 and the upper surface of the top of the main housing 11. The second sealing ring S2 is disposed between the upper cap 12 and the inner surface of the top of the main housing 11. The first sealing ring S1 can realize the sealing effect after being pressed by the upper cap 12 and the main housing 11. The second sealing ring S2 can realize the sealing effect by clearance fit. In one embodiment, the upper cap 12 may be made of a metal material, such as stainless steel, iron, aluminum, etc.

**[0029]** The lower cap 13 is disposed at the bottom of the main housing 11 and covers the lower opening. The outer surface of the lower cap 13 is provided with a second screw thread F2. The main housing 11 and the lower cap 13 can be combined with each other via the first screw thread F1 and the second screw thread F2. The space between the first screw thread F1 and the second screw thread F2 can be filled with sealing oil. The lower cap 13 has an installation hole H. The explosion-proof lamp 1 may further include a third sealing ring S3 and a fourth sealing ring S4. The lower cap 13 contacts the lower surface and inner surface of the bottom of the main housing 11. The third sealing ring S3 is disposed between the lower cap 13 and the inner surface of the bottom of the main housing 11 (between the first screw thread F1 and the second screw thread F2). The fourth sealing ring S4 is disposed between the lower cap 13 and the lower surface of the bottom of the main housing 11. The fourth sealing ring S4 can realize the sealing effect after being pressed by the lower cap 13 and the main housing 11. The third sealing ring S3 can realize the sealing effect by interference fit. In one embodiment, the lower cap 13 may be made of a metal material, such as stainless steel, iron, aluminum, etc.

**[0030]** A multi-layer sealing structure can be formed by the combination of the first sealing ring S1, second sealing ring S2, third sealing ring S3, fourth sealing ring S4, first screw thread F1 and second screw thread F2, which can integrate the pressing sealing effect with interference fit. The above multi-layer sealing structure can effectively improve the leakproofness of the explosion-proof lamp 1 in order to further enhance the safety thereof.

**[0031]** The lamp cover 15 is disposed at the installation hole H. In the embodiment, the lamp cover 15 is a spherical lamp cover. The lamp cover 15 can be combined with the lower cap 13 via an adhesive AG (e.g., resin adhesive) so as to increase the structural stability thereof. In another embodiment, the lamp cover 15 may be a flat lamp cover. The lamp cover 25 can be made of a transparent material or a translucent material.

**[0032]** The structure strengthening ring 16 is disposed between the lamp cover 15 and the light source module 14. The outer surface of the structure strengthening ring 16 is provided with a screw thread and the lower cap 13 has the structure corresponding thereto, such that the structure strengthening ring 16 and the lower cap 13 can be combined with each other. The external force applied to the lamp cover 15 can be uniformly distributed over the structure strengthening ring 16 in order to disperse the impact force applied to the lamp cover 15. In one embodiment, the structure strengthening ring 16 can be made of a plastic material (e.g., plastics) or a metal material (e.g., stainless steel, iron, aluminum, etc.).

**[0033]** The above heat dissipation fins 19 can be disposed on the outer surface of the main housing 11 and spaced at regular intervals. In another embodiment, these heat dissipation fins 19 can be disposed on the outer surface of the main housing 11 and unevenly spaced. The heat dissipation wall 20 surrounds these heat dissipation fins 19 and partially covers the heat dissipation fins 19. The heat dissipation fins 19 and heat dissipation wall 20 can be made of a metal material, such as stainless steel, iron, aluminum, copper, etc.

**[0034]** The heat dissipation wall 11 includes two wide portions WP and two narrow portions NP. Any one of the narrow portions NP is disposed between the two wide portions WP. Similarly, any one of the wide portions WP is disposed between the two narrow portions NP. The width of any one of the wide portions WP gradually decreases in the extending direction toward the narrow portion NP at one side thereof (as the arrow A1 shown in FIG. 1) or gradually decreases in the extending direction toward the narrow portion NP at the other side thereof (as the arrow A2 shown in FIG. 1). The width of any one of the narrow portions NP gradually increases in the extending direction toward the wide portion WP at one side thereof (as the arrow A3 shown in FIG. 1) or gradually increases in the extending direction toward the wide portion WP at the other side thereof (as the arrow A4 shown in FIG. 1). In this way, the heat dissipation wall 10 can be streamlined. The above heat dissipation structure design can effectively generate air pressure difference around the explosion-proof lamp 1 so as to promote air circulation, which can further improve the heat dissipation performance of the explosion-proof lamp 1. The structure design of the explosion-proof lamp 1 is just for illustration; the numbers of the wide portions WP and narrow portions NP can be adjusted according to actual requirements.

**[0035]** The embodiment just exemplifies the present invention and is not intended to limit the scope of the present invention; any equivalent modification and variation according to the spirit of the present invention is to be also included within the scope of the following claims and their equivalents.

**[0036]** Please refer to FIG. 3, which is a top view of a main housing of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. As shown in FIG. 3, the main housing 11 has an inner wall 111, an outer wall 112 and a plurality of connecting fins 1113. The inner wall 111 is connected to the outer wall 112 via the connecting fins 113, such that a plurality of heat dissipation spaces DS are formed between the inner wall 111 and the outer wall 112. The above connecting fins 113 are disposed between the inner wall 111 and outer wall 112, and spaced at regular intervals. In another embodiment, the connecting fins 113 can be disposed between the inner wall 111 and outer wall 112, and unevenly spaced. The above structure design greatly increases the internal heat dissipation area in the explosion-proof lamp 1, which can significantly enhance the heat dissipation performance thereof. Therefore, the light source module 14 of the explosion-proof lamp 1 will not be influenced due to high temperature and the service life thereof can also be increased.

**[0037]** The embodiment just exemplifies the present invention and is not intended to limit the scope of the present invention; any equivalent modification and variation according to the spirit of the present invention is to be also included within the scope of the following claims and their equivalents.

**[0038]** Please refer to FIG. 4 and FIG. 5. FIG. 4 is a top view of a structure strengthening ring of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. FIG. 5 is a schematic view for illustrating a relative position between the structure strengthening ring, lower cap and lamp cover of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. The structure strengthening ring 16 is disposed in the main housing 11, and between the lamp cover 15 and the light source module 14.

**[0039]** The structure strengthening ring 16 includes a ring body 161 and a plurality of protrusion portions. The ring body 161 has a plurality of slots G, so the user can rotate the ring body 161 via a fixture with the structure corresponding to the slots G so as to fix the structure strengthening ring 16 and lower cap 13 with each other. The protrusion portions includes a plurality of first protrusion portions 162A and a plurality of protrusion portions 162B. The first protrusion portions 162A and the second protrusion portions 162B are arranged in a staggered manner. That is to say, any one of the first protrusion portions 162A is disposed between two second protrusion portions 162B adjacent to each other; similarly, any one of the second protrusion portions 162B is disposed between two first protrusion portions 162A adjacent to each other. A recess R is formed between the first protrusion portion 162A and second protrusion portion 162B adjacent to each other. The width of the first protrusion portion 162A is greater than the width of the second protrusion portion 162B and the width of the recess R. The width of the second protrusion portion 62B is less than or equal to the width of the recess R.

**[0040]** As set forth above, the width of the first protrusion portion 162A is greater than the width of the second protrusion portion 162B and the width of the recess R, which can enhance the structural strength of the structure strengthening ring 16. In addition, the structure design of the structure strengthening ring 16 can avoid that the structural strength thereof is influenced due to the volume change (caused by heat expansion and cold contraction) of the adhesive AG between the lamp cover 15 and lower cap 13 with a view to enhance the structural stability of the structure strengthening ring 16.

**[0041]** As previously stated, the explosion-proof lamp 1 has the structure strengthening ring 16 disposed between the lamp cover 15 and light source module 14, which includes the ring body 161 and the protrusion portions (the first protrusion portions 162A and second pro-

trusion portions 162B). The above protrusion portions are disposed on the ring body 161 and one recess R can be formed between any two adjacent protrusion portions. The structure design of the structure strengthening ring 16 can make the external force applied to the lamp cover 15 be uniformly distributed over the structure strengthening ring 16, such that the impact force applied to the lamp cover 15 can be dispersed in order to prevent the lamp cover 15 from being broken due to the external force. Therefore, the structural strength of the explosion-proof lamp 1 can be significantly enhanced, so the safety thereof can be effectively increased.

**[0042]** The embodiment just exemplifies the present invention and is not intended to limit the scope of the present invention; any equivalent modification and variation according to the spirit of the present invention is to be also included within the scope of the following claims and their equivalents.

**[0043]** Please refer to FIG. 6 and FIG. 7. FIG. 6 is a schematic view for illustrating a combination of the lower cap and the lamp cover of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. FIG. 7 is a schematic view for illustrating a combination of a lower cap and a lamp cover of a high-reliability explosion-proof lamp in accordance with another embodiment of the present invention. As shown in FIG. 6, the lamp cover 15 may be a spherical lamp cover. The lamp cover 15 can be combined with the lower cap 13 via the adhesive AG (e.g., resin adhesive) so as to enhance the structural stability thereof.

**[0044]** As shown in FIG. 7, the lamp cover 15 may be a flat lamp cover. The lamp cover 15 can be combined with the lower cap 13 via the adhesive AG (e.g., resin adhesive) in order to enhance the structural stability thereof.

**[0045]** The structure strengthening ring 16 is applicable to the spherical lamp cover shown in FIG. 6 or the flat lamp cover shown in FIG. 7. The size, material and thickness of the lamp cover 15 can be changed according to actual requirements. The structure strengthening ring 16 can evenly disperse the impact force applied to the lamp cover 15 with an aim of enhancing the structural strength of the explosion-proof lamp 1.

**[0046]** The embodiment just exemplifies the present invention and is not intended to limit the scope of the present invention; any equivalent modification and variation according to the spirit of the present invention is to be also included within the scope of the following claims and their equivalents.

**[0047]** It is worthy to point out that the structural strength of currently available explosion-proof lamps is insufficient, so the safety thereof still needs to be further improved. In addition, due to the lack of a proper heat dissipation structure, the performance of the light source modules inside currently available explosion-proof lamps tends to be influenced because of high temperature and the service life thereof is also reduced because of high temperature. On the contrary, according to one embodiment of the present invention, the explosion-proof lamp has the structure strengthening ring disposed between the lamp cover and the light source module thereof. The structure strengthening ring includes the ring body and a plurality of protrusion portions. The protrusion portions are disposed on the ring body and one recess can be formed between any two adjacent protrusion portions. The structure design of the structure strengthening ring can make the external force applied to the lamp cover be uniformly distributed over the structure strengthening ring, such that the impact force applied to the lamp cover can be dispersed in order to prevent the lamp cover from being broken due to the external force. Therefore, the structural strength of the explosion-proof lamp can be significantly enhanced, so the safety of the explosion-proof lamp can be effectively increased.

**[0048]** According to one embodiment of the present invention, the explosion-proof lamp has the first sealing ring and the second sealing ring disposed between the upper cap and the main housing. Besides, the explosion-proof lamp further has the third sealing ring and the fourth sealing ring disposed between the lower cap and the main housing. The above multi-layer sealing structure can effectively enhance the leakproofness of the explosion-proof lamp, so the safety of the explosion-proof lamp can be further enhanced.

**[0049]** Also, according to one embodiment of the present invention, the main housing of the explosion-proof lamp has the inner wall, the outer wall and a plurality of connecting fins. The inner wall is connected to the outer wall via the connecting fins, such that a plurality of heat dissipation spaces are formed between the inner wall and the outer wall. The above structure design can greatly improve the heat dissipation performance of the explosion-proof lamp, such that the performance of the light source module thereof would not be influenced by high temperature and the service life thereof can increase.

**[0050]** Further, according to one embodiment of the present invention, the explosion-proof lamp has a plurality of heat dissipation fins and the streamlined heat dissipation wall. The heat dissipation fins are disposed on the outer surface of the main housing. The heat dissipation wall surrounds the above heat dissipation fins and partially covers the heat dissipation fins. The above heat dissipation structure design can effectively generate air pressure difference around the explosion-proof lamp so as to promote air circulation, which can further improve the heat dissipation performance of the explosion-proof lamp.

**[0051]** Moreover, according to one embodiment of the present invention, the main housing of the explosion-proof lamp has a hook structure and the user can directly hang the main housing on the upper cap via the hook structure in order to perform the installation of the explosion-proof lamp or maintain (repair) the explosion-proof lamp. Thus, the explosion-proof lamp can be more convenient in use.

**[0052]** Furthermore, according to one embodiment of the present invention, the structure strengthening ring of the explosion-proof ring can be applied to not only a spherical lamp cover, but also a flat lamp cover. In addition, as the structure strengthening ring is small, so the lighting effect of the light source module will not be influenced by the structure strengthening ring. Accordingly, the overall performance of the explosion-proof lamp can be effectively enhanced, so the explosion-proof lamp can conform to actual requirements. As described above, the explosion-proof lamp 1 according to the embodiments of the present invention can definitely achieve great technical effects.

**[0053]** Please refer to FIG. 8 and FIG. 9. FIG. 8 is a perspective view of a hook structure of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. FIG. 9 is a schematic view for illustrating a relative position between the hook structure, main housing and upper cap of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention. As shown in FIG. 8 and FIG. 9, the hook structure 18 can be fixed on the main housing 11 via a fixation member K and the upper cap 12 has a fixation portion 121.

**[0054]** Please refer to FIG. 10, FIG. 11 and FIG. 12, which are a first schematic view, a second schematic view and a third schematic view for illustrating a usage status of the high-reliability explosion-proof lamp in accordance with one embodiment of the present invention respectively. As shown in FIG. 10, when the user performs the installation of the explosion-proof lamp 1, the user can fix the supporting post 17 on the wall and fix the upper cap 12 at the supporting post 17.

**[0055]** As shown in FIG. 11, the user can directly hang the main housing 11 on the fixation portion 121 of the upper cap 12 via the hook structure 18.

**[0056]** As shown in FIG. 12, when the user hangs the main housing 11 on the fixation portion 121 of the upper cap 12 via the hook structure 18, the user can execute the installation of the light source module 14.

**[0057]** Similarly, when the user wants to maintain or repair the explosion-proof lamp 1, the user can open the upper cap 12 and separate the main housing 11 from the upper cap 12. Then, the user can directly hang the main housing 11 on the upper cap 12. In this way, the user can begin to maintain or repair the explosion-proof lamp 1, which is more convenient in use.

**[0058]** The embodiment just exemplifies the present invention and is not intended to limit the scope of the present invention; any equivalent modification and variation according to the spirit of the present invention is to be also included within the scope of the following claims and their equivalents.

**[0059]** To sum up, according to one embodiment of the present invention, the explosion-proof lamp has the structure strengthening ring disposed between the lamp cover and the light source module thereof. The structure strengthening ring includes the ring body and a plurality of protrusion portions. The protrusion portions are disposed on the ring body and one recess can be formed between any two adjacent protrusion portions. The structure design of the structure strengthening ring can make the external force applied to the lamp cover be uniformly distributed over the structure strengthening ring, such that the impact force applied to the lamp cover can be dispersed in order to prevent the lamp cover from being broken due to the external force. Therefore, the structural strength of the explosion-proof lamp can be significantly enhanced, so the safety of the explosion-proof lamp can be effectively increased.

**[0060]** According to one embodiment of the present invention, the explosion-proof lamp has the first sealing ring and the second sealing ring disposed between the upper cap and the main housing. Besides, the explosion-proof lamp further has the third sealing ring and the fourth sealing ring disposed between the lower cap and the main housing. The above multi-layer sealing structure can effectively enhance the leakproofness of the explosion-proof lamp, so the safety of the explosion-proof lamp can be further enhanced.

**[0061]** Also, according to one embodiment of the present invention, the main housing of the explosion-proof lamp has the inner wall, the outer wall and a plurality of connecting fins. The inner wall is connected to the outer wall via the connecting fins, such that a plurality of heat dissipation spaces are formed between the inner wall and the outer wall. The above structure design can greatly improve the heat dissipation performance of the explosion-proof lamp, such that the performance of the light source module thereof would not be influenced by high temperature and the service life thereof can increase.

**[0062]** Further, according to one embodiment of the present invention, the explosion-proof lamp has a plurality of heat dissipation fins and the streamlined heat dissipation wall. The heat dissipation fins are disposed on the outer surface of the main housing. The heat dissipation wall surrounds the above heat dissipation fins and partially covers the heat dissipation fins. The above heat dissipation structure design can effectively generate air pressure difference around the explosion-proof lamp so as to promote air circulation, which can further improve the heat dissipation performance of the explosion-proof lamp.

**[0063]** Moreover, according to one embodiment of the present invention, the main housing of the explosion-proof lamp has a hook structure and the user can directly hang the main housing on the upper cap via the hook structure in order to perform the installation of the explosion-proof lamp or maintain (repair) the explosion-proof lamp. Thus, the explosion-proof lamp can be more convenient in use.

**[0064]** Furthermore, according to one embodiment of the present invention, the structure strengthening ring of the explosion-proof ring can be applied to not only a spherical lamp cover, but also a flat lamp cover. In addi-

tion, as the structure strengthening ring is small, so the lighting effect of the light source module will not be influenced by the structure strengthening ring. Accordingly, the overall performance of the explosion-proof lamp can be effectively enhanced, so the explosion-proof lamp can meet actual requirements.

**[0065]** It will be apparent to those skilled in the art that various modifications and variations can be made to the disclosed embodiments. It is intended that the specification and examples be considered as exemplary only, with a true scope of the present invention being indicated by the following claims and their equivalents.

## Claims

**1.** A high-reliability explosion-proof lamp, comprising:

a main housing;
a light source module disposed in the main housing;
an upper cap disposed at a top of the main housing;
a lower cap having an installation hole and disposed at a bottom of the main housing;
a lamp cover disposed at the installation hole; and
a structure strengthening ring disposed between the lamp cover and the light source module, wherein the structure strengthening ring comprises a ring body and a plurality of protrusion portions disposed on the ring body, and a recess is formed between any two of the protrusion portions adjacent to each other.

**2.** The high-reliability explosion-proof lamp as claimed in claim 1, wherein the protrusion portions comprises a plurality of first protrusion portions and a plurality of second protrusion portions, and the first protrusion portions and the second protrusion portions are arranged in a staggered manner.

**3.** The high-reliability explosion-proof lamp as claimed in claim 2, wherein a width of the first protrusion portion is greater than a width of the second protrusion portion and a width of the recess, and the width of the second protrusion portion is less than or equal to the width of the recess.

**4.** The high-reliability explosion-proof lamp as claimed in claim 1, wherein the main housing has an inner wall, an outer wall and a plurality of connecting fins, and the inner wall is connected to the outer wall via the connecting fins, whereby a plurality of heat dissipation spaces are formed between the inner wall and the outer wall.

**5.** The high-reliability explosion-proof lamp as claimed in claim 1, further comprising a first sealing ring and a second sealing ring, wherein the upper cap contacts an upper surface and an inner surface of the top of the main housing, the first sealing ring is disposed between the upper cap and the upper surface of the top of the main housing, and the second sealing ring is disposed between the upper cap and the inner surface of the top of the main housing.

**6.** The high-reliability explosion-proof lamp as claimed in claim 1, further comprising a third sealing ring and a fourth sealing ring, wherein the lower cap contacts a lower surface and an inner surface of the bottom of the main housing, the third sealing ring is disposed between the lower cap and the lower surface of the bottom of the main housing, and the fourth sealing ring is disposed between the lower cap and the lower surface of the bottom of the main housing.

**7.** The high-reliability explosion-proof lamp as claimed in claim 6, wherein the inner surface of the bottom of the main housing is provided with a first screw thread and an outer surface of the lower cap is provided with a second screw thread, wherein the main housing is combined with the lower cap via the first screw thread and the second screw thread.

**8.** The high-reliability explosion-proof lamp as claimed in claim 1, further comprising a plurality of heat dissipation fins and a heat dissipation wall, wherein the heat dissipation wall surrounds the heat dissipation fins and partially covers the heat dissipation fins.

**9.** The high-reliability explosion-proof lamp as claimed in claim 1, wherein the heat dissipation wall is streamlined.

**10.** The high-reliability explosion-proof lamp as claimed in claim 1, wherein the lamp cover is a spherical lamp cover or a flat lamp cover.

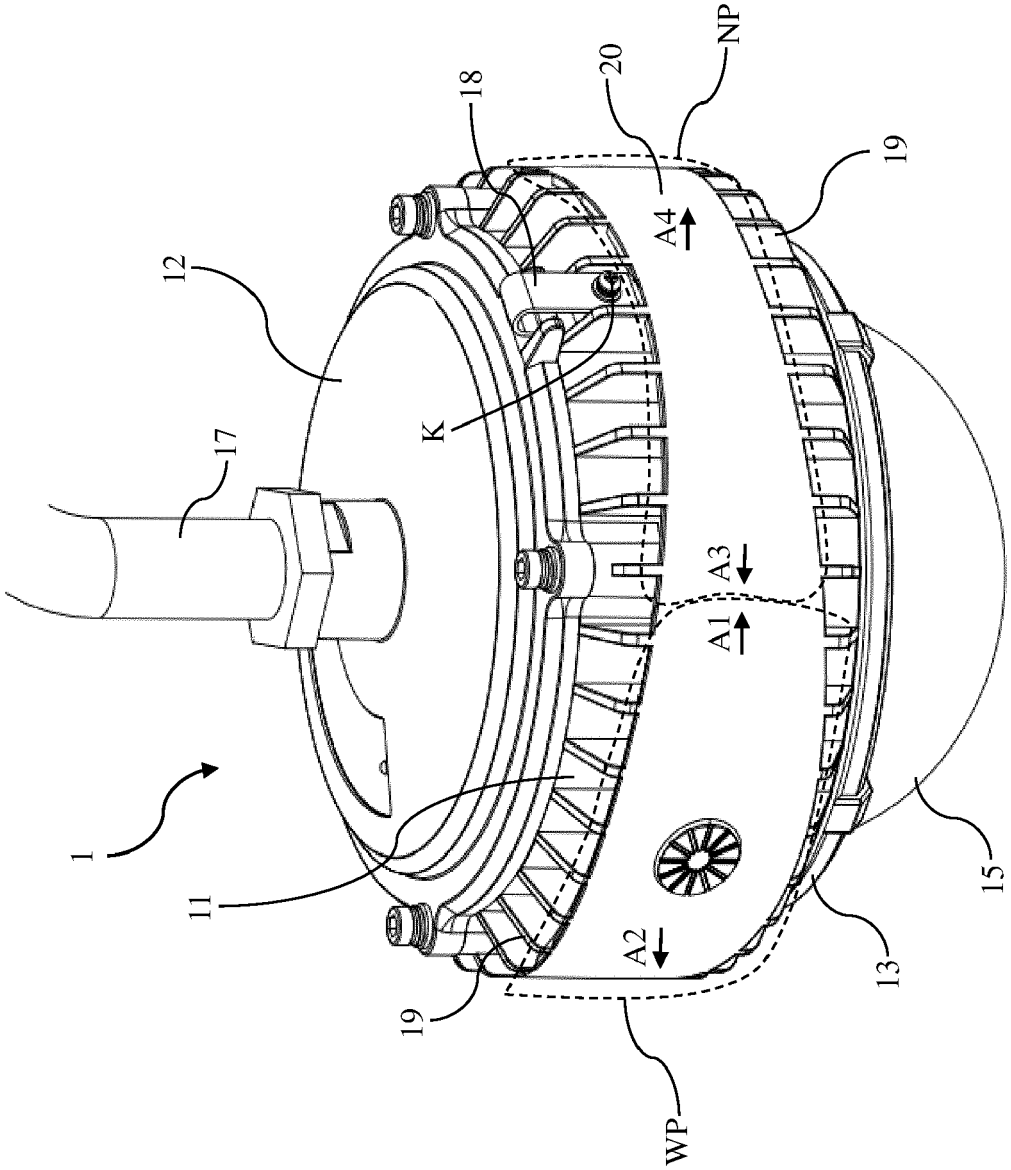


FIG. 1

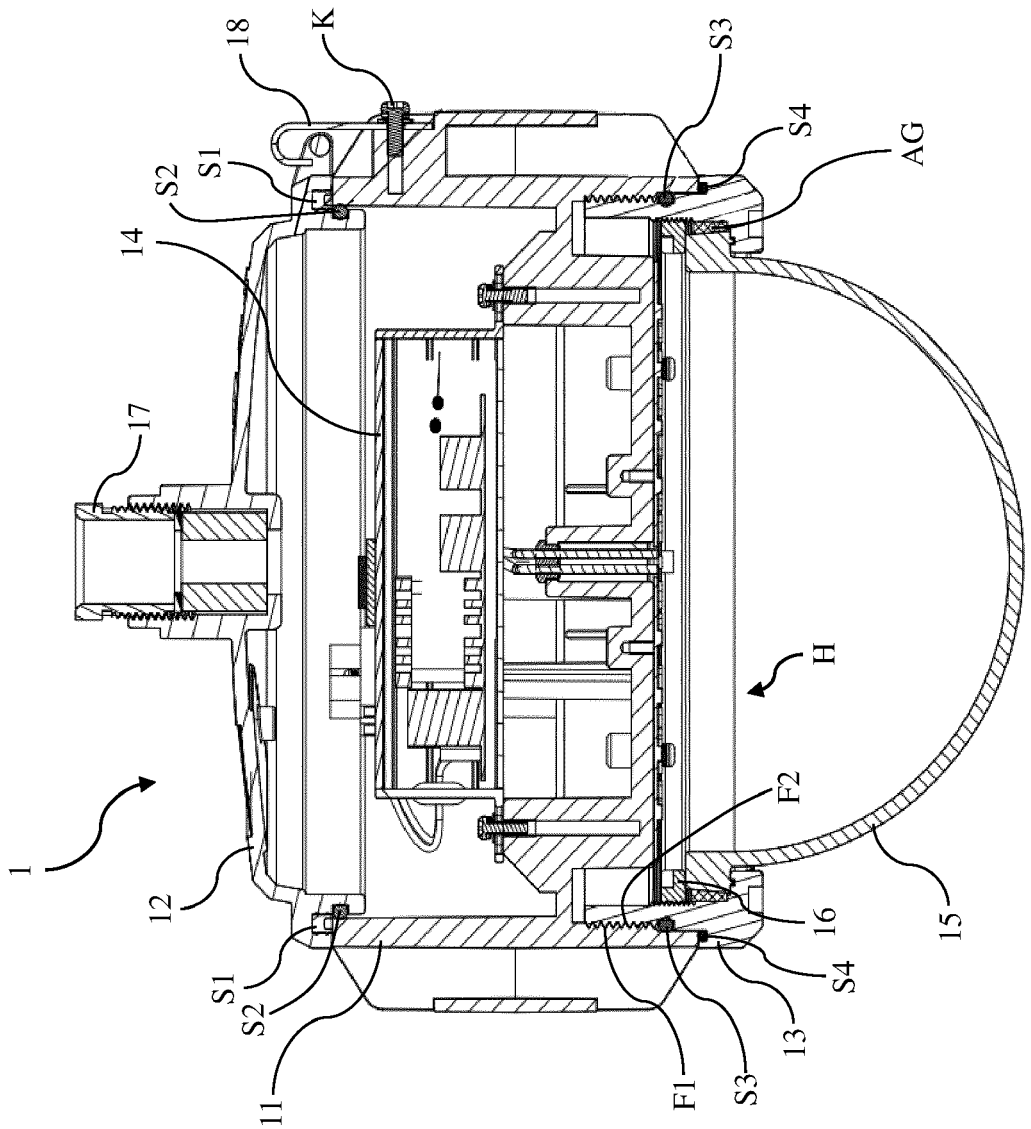


FIG. 2

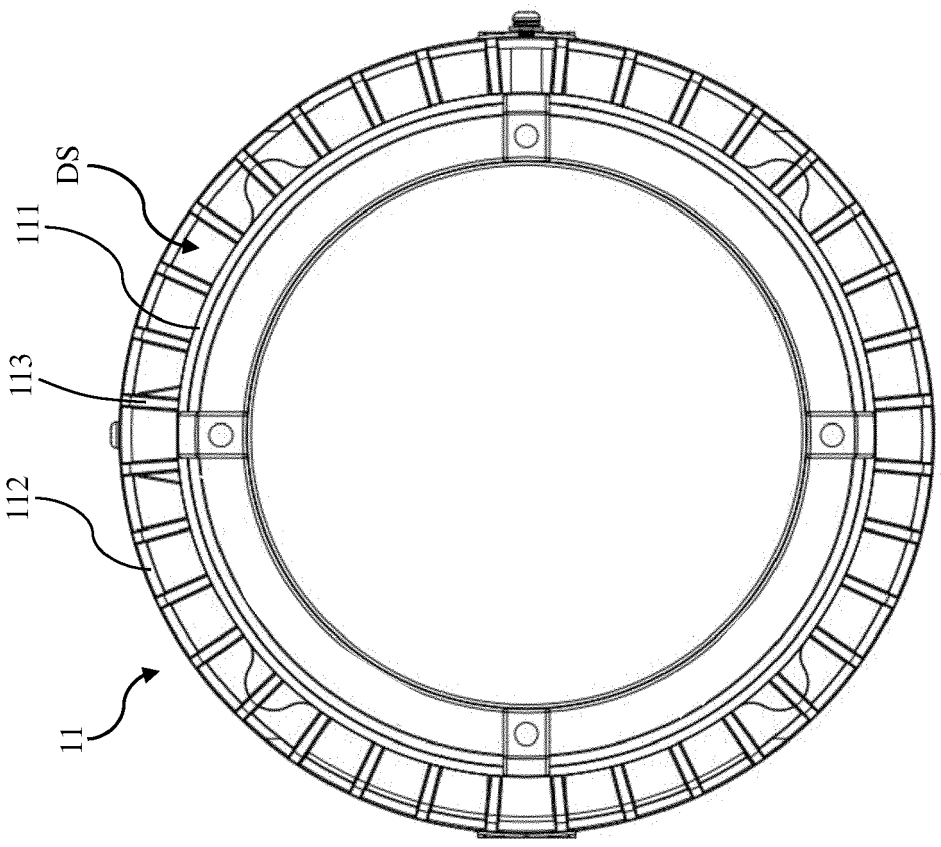


FIG. 3

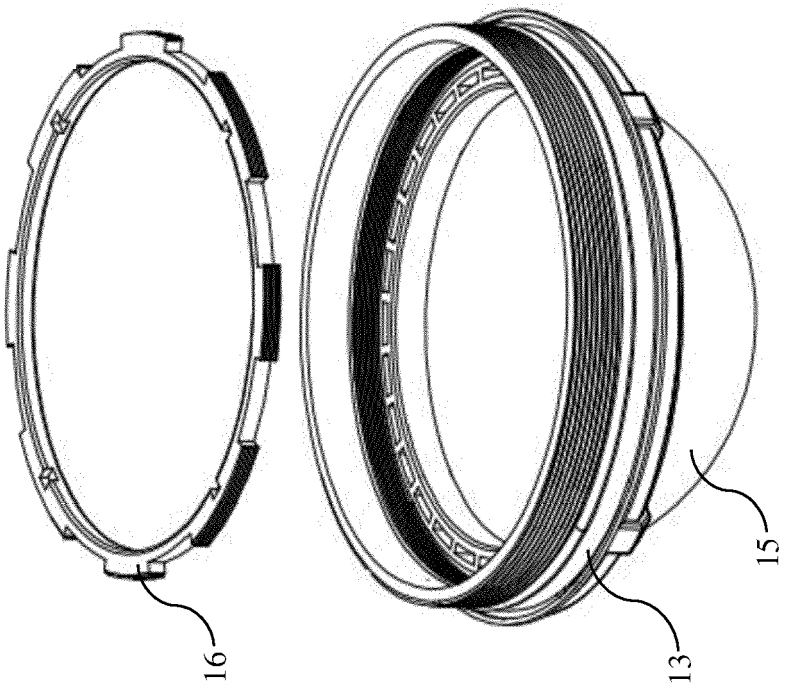


FIG. 5

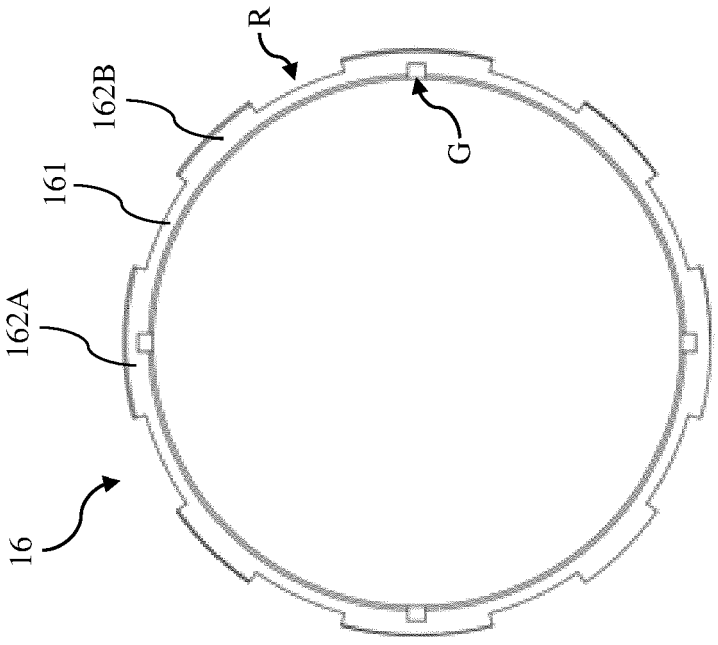


FIG. 4

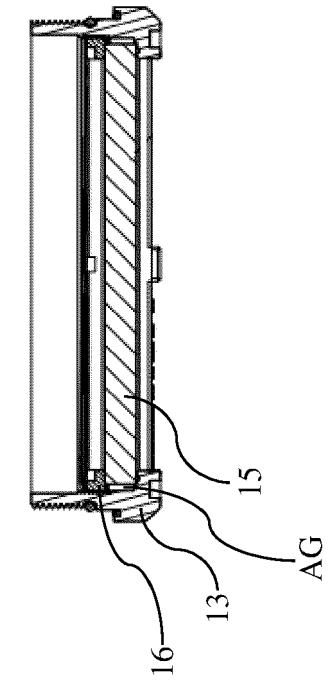


FIG. 7

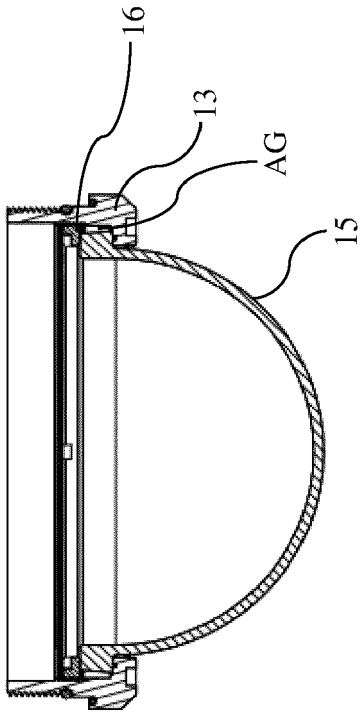


FIG. 6

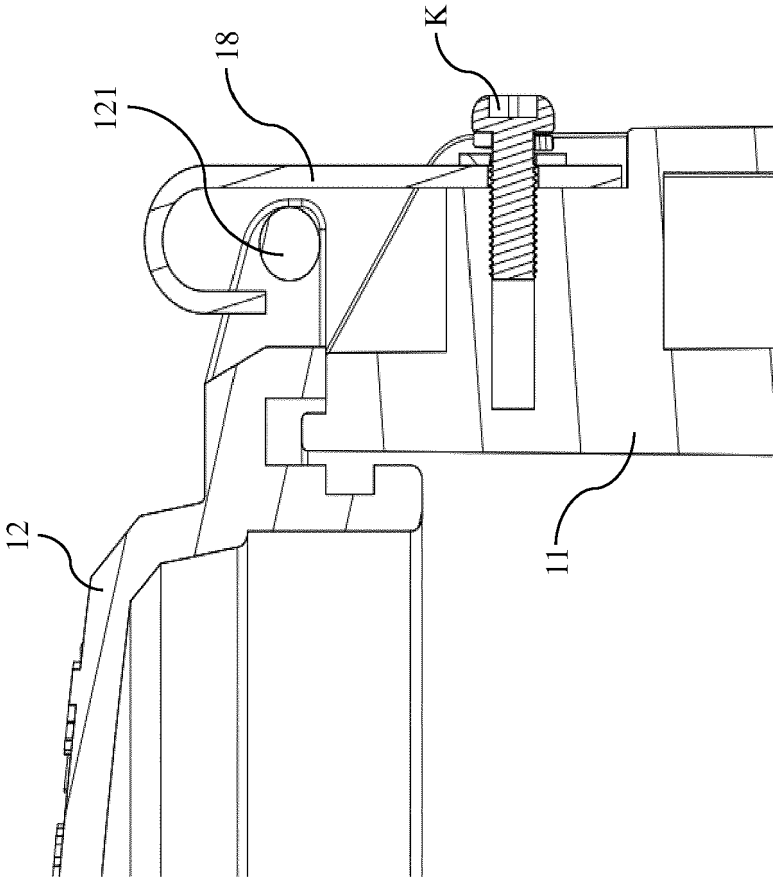


FIG. 9

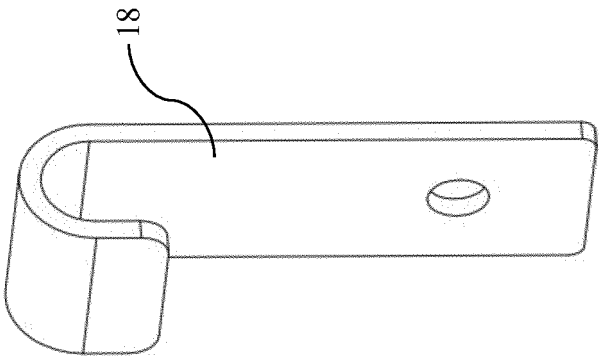


FIG. 8

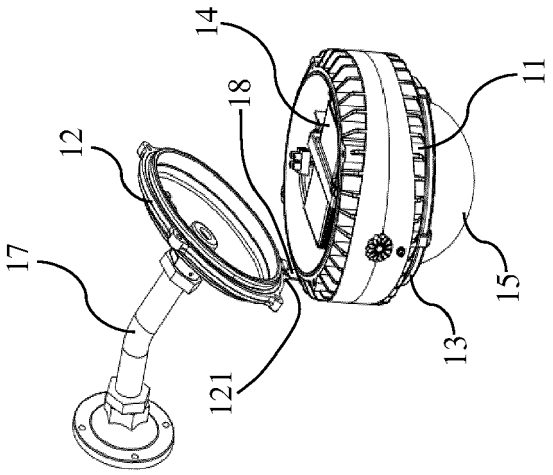


FIG. 12

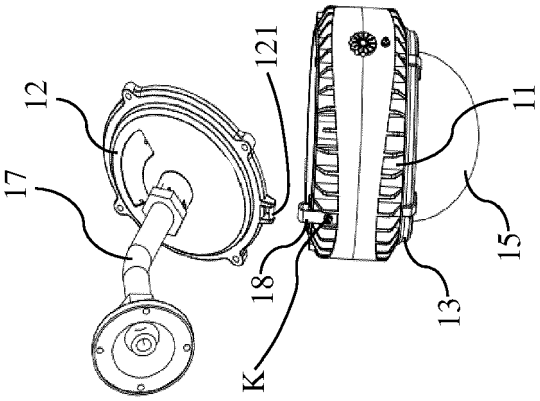


FIG. 11

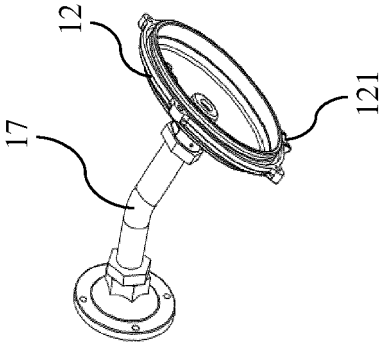


FIG. 10

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# EUROPEAN SEARCH REPORT

Application Number
EP 23 16 0833

## 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<br>Y | CN 208 504 274 U (JIANGSU OUHUI LIGHTING FIXTURES CO LTD)<br>15 February 2019 (2019-02-15)<br>* paragraphs [0022] - [0036] *<br>* figures 1-7 *<br>----- | 1,2,5-7,<br>10<br>4,8,9 | INV.<br>F21V3/02<br>F21V25/12<br>F21V29/77<br>F21V29/83<br>F21V31/00 |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 14 November 2023 | Demirel, Mehmet |

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