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(54) FOCUSING MECHANISM FOR LED SPOTLIGHT

FOKUSSIERUNGSMECHANISMUS FÜR LED-SCHEINWERFER

MÉCANISME DE CONCENTRATION POUR SPOT À DEL

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Description

BACKGROUND

Technical Field

[0001] The present invention relates to a focusing mechanism for a Light Emitting Diode (LED) spotlight, and more particularly to a focusing mechanism for an LED spotlight capable of realizing stable focusing, which belongs to the field of an illumination lamp for a stage or a film and television.

Related Art

[0002] Most of conventional stage spotlights are halogen tungsten lamps of a point light source type. A focusing mechanism for a common halogen tungsten lamp is formed by a lens, a light source and a reflective bowl, and is mostly of the following structure: the light source is mounted on a lamp holder, the reflective bowl is mounted at the rear of the lamp holder, the light source is located on a central axis of the reflective bowl; the lens and a bottom case are fixed with respect to each other; the lamp holder is mounted on the bottom case, in which the lamp holder moves backward or forward with the light source and the reflective bowl by adjusting a lead screw, so as to change a distance between the light source and reflective bowl and the lens to adjust a focal length of the spotlight; the light from the light source is reflected by the reflective bowl and refracted by the lens, and then is cast on the stage, and performance requirements are met by adjusting a diameter of a cast light spot.

[0003] However, since a large gap exists between a penetration hole of the lamp holder and a focusing screw and a slide bar during movement of the light source and the lamp holder, during focusing, a slide base plate suffers uneven stress and has a great idle motion in a moving process due to the rotation of the focusing screw, so that a light source assembly inclines and vibrates in the focusing process and a center of a bulb in the light source assembly is not precisely positioned, thereby affecting accuracy of the focusing. Therefore, the method is merely applicable to the focusing of the spotlight of a point light source type.

[0004] An LED is a semiconductor capable of converting electric energy into visible light, and has advantages such as a long service life, high luminous efficacy, no radiation and low power consumption, so an illumination lamp with the LED as a light source gradually becomes a future direction. Therefore, a spotlight with the LED as a light source will necessarily become an important lamp in stage lighting. Since a single LED has low power, merely 1 W-5 W, it is generally required to integrate multiple LEDs to manufacture the lamp, so as to improve the power and increase the brightness. Since a surface light source formed by multiple LEDs integrated on one surface has a large light source area, a light source assembly

and a lens assembly must be stably moved during the focusing to maintain the focusing consistency of the luminous points and a small error, so that a focusing effect of the spotlight is not affected, thereby meeting operating requirements.

[0005] In Chinese patent No. ZL 200820233726.X of the applicant, disclosed is a zooming LED spotlight for a film and television or a stage with a focusing mechanism. A light source of the spotlight is an LED array module and is mounted on a fixed base, the fixed base is mounted on a light source support, and movement of the light source on a lead screw is adjusted by a slide base, the lead screw and an adjusting knob to implement the focusing. In the utility model, an aspheric lens and a Fresnel lens are used at the same time. Scattered light from the surface light source is focused by mounting the aspheric lens at a front side of the LED array module, and then is cast on the Fresnel lens in the front. A beam angle is changed by adjusting a relative distance between the light source assembly and the Fresnel lens, so as to implement light focusing and light scattering. In such a focusing mechanism, two lenses are used to implement the focusing consistency, so that the structure of the spotlight is complicated. In another aspect, the utility model is limited to a spotlight with the LED module as the light source and the power being below 200 W, and stable focusing still cannot be implemented for an LED spotlight with high power, so the focusing consistency of the LEDs cannot be achieved.

SUMMARY OF THE INVENTION

[0006] To solve the above technical problems, the present invention provides a focusing mechanism for an LED spotlight, which has a simple structure and can implement stable focusing of an LED spotlight with high power, so that desirable focusing consistency of luminous points and high brightness are achieved.

[0007] To achieve the above objectives of the invention, the present invention adopts the following technical solutions.

[0008] A focusing mechanism for an LED spotlight includes a light source casing, a light source assembly and a lens assembly that are located inside the light source casing, and a motor drive device located outside the light source casing and having a motor shaft.

[0009] The focusing mechanism for an LED spotlight further includes a lever connector located outside the light source casing.

[0010] The lens assembly, the light source assembly, the lever connector and the motor drive device are successively distributed in an axial direction of the motor shaft in the motor drive device. The motor drive device is connected to the lever connector. The lever connector has at least three connection portions connected to one side of the light source casing, and at least three fitting portions connected to the lens assembly. The connection portions of the lever connector are located on the same

plane perpendicular to the axial direction and are evenly distributed on the plane. The fitting portions are located on another plane perpendicular to the axial direction and are evenly distributed on the plane.

[0011] Preferably, the lever connector includes a lever connection plate and at least three levers in the same shape. The levers, with an axis as a center, are evenly distributed on and connected to the lever connection plate. The lever includes a first endpoint, a second endpoint and a fulcrum, where the first endpoint is connected to the lever connection plate, the second endpoint serves as the fitting portion and is connected to the lens assembly through a connection bar, and the fulcrum serves as the connection portion and is contacted with a surface of the light source casing.

[0012] In the focusing mechanism for an LED spotlight provided by the present invention, a guide post is used to limit rotation of a motor connection disk spirally connected to the motor shaft, so that the lever connection plate fixedly connected to the motor connection disk is driven to axially move during the focusing. The focal length of the lens is finely adjusted according to the two different distances on the lever, one distance from a stressed point to a fulcrum and the other distance from a stressing point to the same fulcrum. In the focusing mechanism for an LED spotlight, multiple levers are used to drive the lens assembly to axially move at the same time, so that the lens assembly moves more stably, thereby ensuring focusing consistency of a surface light source in the LED spotlight.

[0013] The present invention is applicable to a spotlight with multiple LEDs with low power integrated on the same plane, especially, a spotlight for a film and television or a stage with a large diameter of the surface light source and high power. The present invention has a simple structure and a low cost, solves the technical problem of inaccurate focusing for the LED spotlight with high power, implements stable focusing for the spotlight with LEDs integrated on the same plane, and ensures evenness of light spots cast by the LEDs, a low focusing error, desirable luminous efficacy and high brightness.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present invention is described in further detail in the following with reference to the accompanying drawings and the specific embodiments.

FIG. 1 is a schematic exploded view of a focusing mechanism for an LED spotlight;

FIG. 2 is a view in an A direction of the focusing mechanism shown in FIG. 1;

FIG. 3 is an A-A cutaway view of the focusing mechanism shown in FIG. 1;

FIG. 4 is a partial enlarged view of the A-A cutaway

view shown in FIG. 3;

FIG. 5 is a view in a B direction of the focusing mechanism shown in FIG. 1;

FIG. 6 is a partial enlarged view of I' shown in FIG. 1; and

FIG. 7 is a schematic enlarged view of a lever connection plate.

DETAILED DESCRIPTION OF THE INVENTION

[0015] As shown in FIG. 1, this embodiment provides a focusing mechanism for an LED spotlight, which includes a light source casing 16, a light source assembly and a lens assembly that are located inside the light source casing 16, and a motor drive device and a lever connector that are located outside the light source casing 16. The lens assembly, the light source assembly, the lever connector and the motor drive device are successively distributed in an axial direction of a motor shaft 12 in the motor drive device, that is, are successively arranged from left to right in an O-O' direction shown in FIG. 1. The motor drive device drives, through the lever connector relatively rotatably connected to the motor drive device, the lens assembly to axially move with respect to the light source assembly.

[0016] As shown in FIG. 1 and FIG. 3, the light source assembly includes multiple LEDs 4 and an aluminum-base circuit board 5 welded with the multiple LEDs 4. The aluminum-base circuit board 5 is fastened in the light source casing 16. Three evenly distributed through holes are opened on the light source casing 16. It can be understood that, the present invention is not limited to the aluminum-base circuit board, and can adopt other circuit boards according to the use environment and the function requirements. The number in the embodiment is merely for exemplification, multiple through holes may be selected according to actual conditions, and the number is not limited to three.

[0017] Three connection posts 17 are fixedly disposed on the aluminum-base circuit board 5, and are evenly distributed on the circular aluminum-base circuit board 5 at the same radian (120 degrees). One end (a left end in FIG. 1) of the connection post 17 extends from a surface of the aluminum-base circuit board 5 towards a lens support 3, and the other end (a right end in FIG. 1) extends from the other surface of the aluminum-base circuit board 5 towards a lever 9. One end of the connection post 17 has a thread fit with a lock nut 7, and the other end has a hook portion for hooking the lever 9.

[0018] As shown in FIG. 1 to FIG. 3, the lens assembly includes lenses 1 corresponding to the multiple LEDs 4 in a one-to-one manner, a lens pressing plate 2 and a lens support 3. The lens support 3 has multiple grooves corresponding to the LEDs 4 and the lenses 1 in a one-to-one manner, and is opened with a via hole for the

connection post 17 to pass through. Hole positions on the lens pressing plate 2 correspond to hole positions on the lens support, and correspond to the LEDs welded on the aluminum-base circuit board 5 in a one-to-one manner. The lenses 1 are fixed in the grooves of the lens support 3 with the lens pressing plate 2. The lens pressing plate 2 is fastened onto the lens support 3 with the lock nut 7, so that the lenses 1, the lens pressing plate 2 and the lens support 3 are integrated, so as to ensure that each LED 4 corresponds to one lens 1. In this way, a light ray emitted by the LED 4 can be cast on a center of the lens 1 in a forward direction. In addition to the above lens assembly including three parts, the lens assembly may also be a lens module including two parts, which are a lens holder (equivalent to the lens pressing plate 2 and the lens support 3) and multiple lenses 1 distributed on the lens holder. The positions of the lenses 1 in the lens module correspond to the multiple LEDs 4 in the light source assembly in a one-to-one manner.

[0019] Referring to FIG. 1, FIG. 6 and FIG. 7, the lever connector includes a lever connection plate 6 and three levers 9 in the same shape similar to a triangle. The lever connection plate 6 has a base sheet with three blades evenly distributed on the same plane, and bending portions perpendicularly connected to the blades. The base sheet is perpendicular to the motor shaft when being mounted on the motor shaft, and the three bending portions are all parallel to the axial direction of the motor shaft. Each bending portion is opened with a lever connection hole 18, where the lever connection hole 18 is a via hole and used for connecting the lever 9. Since the blades of the base sheet are evenly distributed, the levers 9 mounted on the bending portions are also evenly distributed, so that the three levers 9 suffer the same stress and have the same deformation. One blade of the base sheet of the lever connection plate 6 is further opened with a guide post connection hole 19 for being fit with a guide post 15.

[0020] The lever 9 is in a shape of a triangle plate, and includes three endpoints at three angles of the triangle plate. The first endpoint (point a) is opened with a hole for being connected to the lever connection hole 18 of the lever connection plate 6 in a screw connection manner, so that the lever 9 can be relatively rotatably connected to the lever connection plate 6. The second endpoint (point b) is hooked to the lens assembly and the light source casing 16 through the connection post 17. The fulcrum (point c) is a fulcrum protruding outward from an edge of the triangle plate, serves as a connection portion, and is held against one side of the light source casing 16 far away from the lens assembly, and can relatively slide. The second endpoint (point b) of each lever 9, that is, an end far away from a motor rotation shaft in a radial direction of the motor rotation shaft, is opened with a connection hole. A distance from the fulcrum to the light source casing 16 is less than distances from the first and the second endpoints to the light source casing 16. It can be understood that, the lever 9 may be connected to the

lever connection plate 6 with a single screw (a rotation shaft), or the first endpoint a of the lever 9 is disposed with an outward protrusion fit with the lever connection hole 18, so that the first endpoint a of the lever 9 can rotate in the lever connection hole 18.

[0021] In this embodiment, the three fulcrums serve as the connection portions and are connected to one side of the light source assembly, and are all located on the same plane. The three second endpoints serve as the fitting portions and are connected to the lens assembly through the connection post 17, and are all located on another plane.

[0022] Specifically, the fulcrums c serve as the connection portions and are held against one side (a right side in FIG. 1) of the light source casing 16, and the connection portions always maintain on the same plane in an axial moving process, so as to ensure stability of the light source assembly and the lens assembly in a moving process, that is, the light source assembly and the lens assembly move axially with respect to the motor shaft without deflection. In this way, it can be ensured that the distances from all the LEDs 4 to the lenses 1 equally change, and evenness of the emitted light rays is not affected by the moving of the light source assembly or the lens assembly.

[0023] As described above, the first endpoint of the lever 9 is relatively rotatably connected to the lever connection plate 6, and the relative rotation direction is in a plane including the motor shaft. In the case that the lever 9 at the bottom of FIG. 1 is taken as an example, a rotation direction of the first endpoint a of the lever 9 with respect to the lever connection plate 6 is in the plane including the motor shaft. In addition, the end a of the lever 9 can be relatively rotatably connected to the lever connection plate 6 in a manner of screw connection, movable rivet connection, sleeve connection or rotation shaft connection.

[0024] As shown in FIG. 4, the second endpoint b of the lever 9 is flexibly connected to the lens support 3 and the lens pressing plate 2 through the connection post 17 fixed on the aluminum-base circuit board 5. The connection post 17 passes through the via hole on the lens support 3 and a penetration hole on the lens pressing plate 2, and extends out of one side of the lens pressing plate 2 far away from the lens support 3. By being fit with the lock nut 7, the connection post 17 connects the lens support 3 with the lens pressing plate 2. Moreover, a positioning post 10 is axially disposed at a portion between the aluminum-base circuit board 5 and the lens support 3, and a periphery of the positioning post 10 is disposed with a spring 8. The positioning post 10 passes through the lens support 3 and the lens pressing plate 2, so as to be fit with the lock nut 7. The spring 8 is clamped between the aluminum-base circuit board 5 and the lens support 3 with a certain pre-pressure, so as to apply a pressure to the aluminum-base circuit board 5 and the lens support 3.

[0025] One end of the connection post 17 extends to

a hollow area in a middle of the positioning post 10 in the light source casing 16 (as shown in FIG. 4), passes through the positioning post 10 and is connected to the lock nut 7. The other end, a hook portion, of the connection post 17 passes through the through hole disposed on the light source casing 16 and is hooked into the connection hole at the second endpoint b of the lever 9. In the hooking manner, when the lens assembly axially moves along the motor shaft, the lever 9 may rotate with respect to the connection post 17 in a plane including an axial direction of the motor shaft. The second endpoint b of the lever 9 may relatively rotatably connected to the connection post 17, and the relative rotation direction is in the plane including the motor shaft. In the case that the lever 9 at the bottom of FIG. 1 is taken as an example, a rotation direction of the second endpoint b of the lever 9 with respect to the connection post 17 is in the plane including the motor shaft. It can be understood that, the hooking manner may be replaced by a manner such as movable rivet connection, as long as the lever connection plate 6 can apply a force to the connection post 17, through the rotatable connection to the connection post 17, so that the connection post 17 goes forward or backward in the axial direction of the motor shaft.

[0026] The fulcrum c of the lever 9 can be contacted with a bottom surface of the light source casing 16 in a slidable manner. The point c should protrude from the end a and the end b to an extent large enough, so that in the whole process of the lever 9 rotating in the plane including the axial direction of the motor shaft, the fulcrum c is contacted with the bottom surface of the light source casing 16, and is always closer to the bottom surface of the light source casing 16 than other portions of the lever 9.

[0027] In addition, a distance from the end a to the fulcrum c is greater than a distance from the end b to the fulcrum c. As shown in FIG. 1, on the lever 9, a distance from the end a to the fulcrum c is 6-7 times greater than a distance from the end b to the fulcrum c. When the end a of the lever 9 moves by a large distance, the end b moves by a small distance which is merely 1/6 of the moving distance of the end a, so as to finely adjust the moving of the lens assembly.

[0028] As shown in FIG. 1 and FIG. 6, the motor drive device includes a motor 13, a motor support 14 and a motor connection disk 11. The motor 13 is fixedly connected to the light source casing 16 through the motor support 14. In the motor 13, the motor shaft 12 with an outer thread is spirally connected to the motor connection disk 11 with an inner thread, so as to convert the rotation of the motor rotation shaft of the motor 13 into axial moving of the motor connection disk 11.

[0029] FIG. 6 and FIG. 7 show a structure of the lever connection plate 6 and a connection relationship between the lever connection plate 6 and the motor drive device. A protrusion on the motor connection disk 11 passes through the positioning hole 20 of the lever connection plate 6, and then is fastened to a thread hole 21

of the motor connection disk with a screw, so as to fixedly connect the motor connection disk 11 with the lever connection plate 6. When the motor 13 rotates, the motor connection disk 11 is driven by the motor rotation shaft to move forward and backward in an axial direction of the motor rotation shaft (axially move), and then push or pull the lever connection plate 6 fixed to the motor connection disk 11 to move in the same direction.

[0030] Meanwhile, the cylindrical guide post 15 is axially disposed. One end of the guide post 15 is fixed on the motor support 14, and the other end passes through the guide post connection hole 19 on the lever connection plate 6 to be fixed. When the lever connection plate 6 is driven by the motor connection disk 11 to axially move, the guide post 15 may limit rotation moving of the lever connection plate 6 along the motor rotation shaft, so as to ensure that the lever connection plate 6 reliably axially moves along the motor rotation shaft instead of rotation moving. In addition, since the motor connection disk 11 is fixedly connected to the lever connection plate 6, the guide post 15 may further limit the motor connection disk 11 to merely axially move when the motor shaft 12 rotates.

[0031] With the rotation of the motor 13, the motor shaft 12 also rotates, so that the motor connection disk 11 spirally connected to the motor shaft 12 axially moves. Correspondingly, the lever connection plate 6 fixedly connected to the motor connection disk 11 axially moves in the same way. At the same time when the first endpoint (the end a) of the lever 9 spirally connected to the lever connection plate 6 axially moves with the lever connection plate 6, the fulcrum (the end c) of the lever 9 slides in the radial direction of the motor rotation shaft along one side of the light source casing 16. The lever 9 moves with the fulcrum (the end c) as a fulcrum, and the first and the second endpoints move in opposite directions. Specifically, when the motor connection disk 11, the lever connection plate 6 and the first endpoint (the end a) of the lever 9 move forward to a left side of FIG. 1, the second endpoint (the end b) of the lever 9 moves in an opposite direction, that is, to a right side of FIG. 1. When the second endpoint (the end b) of the lever 9 moves to the right side of FIG. 1, the connection post 17 hooked to the second endpoint and connected to the lens assembly applies a pull force towards the right side of FIG. 1 to the lens assembly. At this time, the lens assembly applies a pressure on the spring 8, and the spring 8 is compressed. The lens assembly moves in a direction opposite a moving direction of the motor connection disk 11 and the lever connection plate 6.

[0032] In another aspect, when the motor connection disk 11, the lever connection plate 6 and the first endpoint (the end a) of the lever 9 move forward to the right side of FIG. 1, the second endpoint (the end b) of the lever 9 moves to the left side of FIG. 1. The connection post 17 does not apply a pressure on the lens assembly. The spring releases the lens assembly, and under the elastic force of the spring 8, a force towards the left side of FIG.

1 is applied on the lens assembly. In this way, the lens assembly can move in left and right directions, so that a distance from the lens assembly to the light source 4 changes, so as to implement the focusing function.

[0033] In the process of the motor connection disk 11 and the lever connection plate 6 axially moving, the guide post 15 prevents the motor connection disk 11 from rotating but converts the rotation to axial moving.

[0034] The connection portions (the three fulcrums) connected to the light source assembly on the lever 9 are located on the same plane, and are evenly distributed on the plane. The fitting portions (the three second endpoints) connected to the lens assembly on the lever 9 are located on another plane, and are evenly distributed on the plane. Based on the above structural characteristics, when the lever connection plate 6 axially moves, the three endpoints of the connection portions may move in the same way all the time, so as to ensure that the light source assembly is always located on the plane perpendicular to the axial direction of the motor rotation shaft, without deflection with respect to the axial direction. Similarly, when the lever connection plate 6 axially moves, the three endpoints of the fitting portions may also move in the same way all the time, so as to ensure that the lens assembly is always located on the plane perpendicular to the axial direction of the motor rotation shaft, without deflection with respect to the axial direction.

[0035] As shown in the above structure, when the focus is required, the motor 13 rotates forward or in reverse to drive the motor shaft 12 to rotate, so that the motor connection disk 11 axially moves with the lever connection plate 6 in the axial direction of the motor shaft 12. The lever connection plate 6 enables the end a of the lever 9 to move correspondingly. Due to the lever principle, the end b of the lever 9 moves in a direction opposite the moving direction of the end a, and the connection post 17 axially moves in a direction same as the moving direction of the end b, so that the lens assembly moves in the same direction. The fulcrum c of the lever 9 acts on the bottom surface of the light source casing 16, and when the end a of the lever 9 moves by a large distance, the end b outside the fulcrum c moves by a small distance which is merely about 1/6 of the moving distance of the end a, so as to finely adjust the displacement of the lens assembly.

[0036] In the focusing process, in a three-point positioning manner, the lens assembly is driven by the lever 9 and then axially moves with the three connection posts 17 together along the axial direction, without deflection or deformation, so as to achieve desirable focusing consistency and a stable focusing structure. In addition, the lever 9 drives, through the connection post 17, the lens assembly to axially move with respect to the light source assembly. A pair of forces in opposite directions is applied on the lens assembly by the connection post 17 and the spring 8, ensuring that the distances from the LEDs 4 in the light source assembly to the lenses 1 corresponding to the LEDs 4 in a one-to-one manner consistently

change in the focusing process, that is, achieving focusing consistency.

[0037] It can be seen from the above that, in this embodiment, through a principle of three points supporting a plane and by using the three levers 9, the lens assembly and the light source assembly stably move without deflection with respect to the axial direction of the motor shaft. Moreover, a pair of forces in opposite directions is applied on the lens assembly by the spring 8 and the connection post 17, so that the lens assembly more stably axially moves with respect to the light source assembly.

[0038] The focusing mechanism implements stable and fine focusing for the LED spotlight with high power, ensures evenness, desirable luminous efficiency, and high brightness of the light spots cast by the LEDs 4, and is appropriate for manufacturing of an LED lamp for a film and television with high power.

Claims

1. A focusing mechanism for a Light Emitting Diode (LED) spotlight, comprising a light source casing (16), a light source assembly and a lens assembly that are located inside the light source casing (16), a motor drive device located outside the light source casing (16) and having a motor shaft, **characterized in that** the focusing mechanism for an LED spotlight further comprises a lever connector located outside the light source casing (16), wherein the lens assembly, the light source assembly, the lever connector and the motor drive device are successively distributed in an axial direction of a motor shaft in the motor drive device; the motor drive device is connected to the lever connector; the lever connector has at least three connection portions connected to one side of the light source casing (16), and at least three fitting portions connected to the lens assembly; the connection portions of the lever connector are located on a plane perpendicular to the axial direction and are evenly distributed on the same plane; and the fitting portions are located on another plane perpendicular to the axial direction and are evenly distributed on the another plane; the lever connector comprises a lever connection plate (6) and at least three levers (9) in the same shape, and the levers are evenly distributed with an axis as a center and connected to the lever connection plate (6); the lever (9) comprises a first endpoint (a), a second endpoint (b) and a fulcrum (c), wherein the first endpoint (a) is connected to the lever connection plate (6), the second endpoint (b) serves as the fitting portion and is connected to the lens assembly, and the fulcrum (c) serves as the connection portion and is contacted with a surface of the light source casing (16);

the first endpoint (a), the second endpoint (b) and the fulcrum (c) are distributed in a triangle shape, a distance from the fulcrum (c) to the light source casing (16) is less than distances from the first (a) and the second endpoints (b) to the light source casing (10), and a distance from the first endpoint (a) to the fulcrum (c) is greater than a distance from the second endpoint (b) to the fulcrum (c);

the fulcrum (c) is connected to one side of the light source casing (16) far away from the lens assembly in a relatively slidable manner; the first endpoint (a) is relatively rotatably connected to the lever connection plate (6), and a rotation direction of the first endpoint (a) with respect to the lever connection plate (6) is perpendicular to the motor shaft; the second endpoint (b) is capable of rotating with respect to the lens assembly, and a rotation direction is perpendicular to the motor shaft;

the lever (9) is a triangle plate, the first endpoint (a), the second endpoint (b) and the fulcrum (c) are respectively located at three angles of the triangle plate, the first endpoint (a) is opened with a hole for rotatably connecting the lever (9) with the lever connection plate (6), the second endpoint (b) is opened with a hole for connecting the lever (9) with the lens assembly, and the fulcrum (c) protrudes from the angle towards the light source casing (16); and

the lever connection plate (6) has a base sheet with at least three blades evenly distributed on the same plane, and bending portions with the same number as that of the blades; each of the bending portions is perpendicularly connected to one corresponding blade and is parallel to the axial direction of the motor shaft; the bending portion is opened with a lever connection hole (16) for connecting the first endpoint (a) of the lever (9).

2. A focusing mechanism for a Light Emitting Diode (LED) spotlight, comprising a light source casing (16), a light source assembly and a lens assembly that are located inside the light source casing (16), and a motor drive device located outside the light source casing (16) and having a motor shaft, **characterized in that**

the focusing mechanism for an LED spotlight further comprises a lever connector located outside the light source casing (16), wherein the lens assembly, the light source assembly, the lever connector and the motor drive device are successively distributed in an axial direction of the motor shaft; the motor drive device is connected to the lever connector; the lever connector has at least three connection portions connected to one side of the light source casing (16), and at least three fitting portions connected to the lens assembly; the connection portions of the lever connector are located on a plane perpendicular to the axial direction and are evenly distributed on the

same plane; and the fitting portions are located on another plane perpendicular to the axial direction and are evenly distributed on the another plane.

3. The focusing mechanism for an LED spotlight according to claim 2, **characterized in that** the lever connector comprises a lever connection plate and at least three levers in the same shape, and the levers are evenly distributed with an axis as a center and connected to the lever connection plate; and the lever comprises a first endpoint, a second endpoint and a fulcrum, wherein the first endpoint is connected to the lever connection plate, the second endpoint serves as the fitting portion and is connected to the lens assembly, and the fulcrum serves as the connection portion and is contacted with a surface of the light source casing.
4. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the first endpoint, the second endpoint and the fulcrum are distributed in a triangle shape, a distance from the fulcrum to the light source casing is less than both distances from the first and the second endpoints to the light source casing.
5. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the fulcrum is connected to one side of the light source casing far away from the lens assembly in a relatively slidable manner.
6. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the first endpoint is relatively rotatably connected to the lever connection plate, and a rotation direction of the first endpoint with respect to the lever connection plate is perpendicular to the motor shaft.
7. The focusing mechanism for an LED spotlight according to claim 6, **characterized in that** the second endpoint rotates with respect to the lens assembly, and a rotation direction is perpendicular to the motor shaft.
8. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** a distance from the first endpoint to the fulcrum is greater than a distance from the second endpoint to the fulcrum.
9. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the lever is a triangle plate, the first endpoint, the second endpoint and the fulcrum are respectively located at three angles of the triangle plate, the first endpoint is opened with a hole for rotatably con-

necting the lever with the lever connection plate, the second endpoint is opened with a hole for connecting the lever with the lens assembly, and the fulcrum protrudes from the angle towards the light source casing.

10. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the lever connection plate has a base sheet with at least three blades evenly distributed on a plane, and bending portions with the same number as that of the blades; each of the bending portions is perpendicularly connected to one corresponding blade and is parallel to the axial direction of the motor shaft; the bending portion is opened with a lever connection hole for connecting the first endpoint of the lever.
11. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the focusing mechanism for an LED spotlight further comprises a connection post (17), and the connection post (17) is connected to the second endpoint (b) of the lever (9) and the lens assembly.
12. The focusing mechanism for an LED spotlight according to claim 11, **characterized in that** springs (8) and positioning posts (10) with the same number as that of the connection posts (17) are further disposed between the light source assembly and the lens assembly; the spring (8) is sleeved to a periphery of the positioning post (10), one end of the spring (8) is held against the light source assembly, and the other end is held against the lens assembly.
13. The focusing mechanism for an LED spotlight according to claim 12, **characterized in that** the focusing mechanism for an LED spotlight further comprises a lock nut (7), and the connection post (17) passes through the positioning post (10) and the lens assembly and is connected to the lock nut (7).
14. The focusing mechanism for an LED spotlight according to claim 3, **characterized in that** the motor drive device comprises a motor (13), a motor support (14), and a motor connection disk (11), the motor (3) is fixedly connected to the light source casing (16) through the motor support (14); the motor shaft (12) of the motor (3) is spirally connected to the motor connection disk (11), the motor connection disk (11) is fixedly connected to the lever connection plate (6), and the motor connection disk (11) and the lever connection plate (6) are both sleeved on the motor shaft (12),
15. The focusing mechanism for an LED spotlight according to claim 14, **characterized in that**

the focusing mechanism for an LED spotlight further comprises a guide post disposed in the axial direction of the motor shaft (12), one end of the guide post (15) is fixed on the motor support (14), and the other end is fixed on the lever connection plate (6).

16. A Light Emitting Diode (LED) spotlight, **characterized in that** the LED spotlight comprises the focusing mechanism for an LED spotlight according to any one of claims 1 to 15.

Patentansprüche

1. Fokussierungsmechanismus für einen Leuchtdioden(LED)-Scheinwerfer, umfassend ein Lichtquellengehäuse (16), eine Lichtquellengruppe und eine Linsengruppe, die innerhalb des Lichtquellengehäuses (16) angeordnet sind, eine Motorantriebsvorrichtung, die außerhalb des Lichtquellengehäuses (16) angeordnet ist und eine Motorwelle aufweist, **dadurch gekennzeichnet, dass** der Fokussierungsmechanismus für einen LED-Scheinwerfer ferner einen Hebelverbinder umfasst, der außerhalb des Lichtquellengehäuses (16) angeordnet ist, worin die Linsengruppe, die Lichtquellengruppe, der Hebelverbinder und die Motorantriebsvorrichtung nacheinander in einer axialen Richtung einer Motorwelle in der Motorantriebsvorrichtung verteilt sind; die Motorantriebsvorrichtung mit dem Hebelverbinder verbunden ist; der Hebelverbinder zumindest drei Verbindungsabschnitte, die mit einer Seite des Lichtquellengehäuses (16) verbunden sind, und zumindest drei Passabschnitte aufweist, die mit der Linsengruppe verbunden sind; die Verbindungsabschnitte des Hebelverbinders in einer Ebene angeordnet sind, die senkrecht zur axialen Richtung ist, und in derselben Ebene gleichmäßig verteilt sind; und die Passabschnitte in einer anderen Ebene angeordnet sind, die senkrecht zur axialen Richtung ist, und in der anderen Ebene gleichmäßig verteilt sind; der Hebelverbinder eine Hebelverbindungsplatte (6) und mindestens drei Hebel (9) umfasst, die die gleiche Form aufweisen, und die Hebel mit einer Achse als Zentrum gleichmäßig verteilt sind und mit der Hebelverbindungsplatte (6) verbunden sind; der Hebel (9) einen ersten Endpunkt (a), einen zweiten Endpunkt (b) und einen Drehpunkt (c) umfasst, worin der erste Endpunkt (a) mit der Hebelverbindungsplatte (6) verbunden ist, der zweite Endpunkt (b) als Passabschnitt dient und mit der Linsengruppe verbunden ist, und der Drehpunkt (c) als Verbindungsabschnitt dient und mit einer Fläche des Lichtquellengehäuses (16) in Berührung gebracht wird; der erste Endpunkt (a), der zweite Endpunkt (b) und der Drehpunkt (c) in der Form eines Dreiecks verteilt sind, wobei ein Abstand vom Drehpunkt (c) bis zum

Lichtquellengehäuse (16) geringer ist als die Abstände von dem ersten (a) und dem zweiten Endpunkt (b) bis zum Lichtquellengehäuse (16), und ein Abstand vom ersten Endpunkt (a) bis zum Drehpunkt (c) größer ist als ein Abstand vom zweiten Endpunkt (b) bis zum Drehpunkt (c);

der Drehpunkt (c) mit einer Seite, die von der Linsengruppe abgewandt ist, des Lichtquellengehäuses (16) in einer relativ verschiebbaren Weise verbunden ist; der erste Endpunkt (a) mit der Hebelverbindungsplatte (6) relativ drehbar verbunden ist, und eine Drehrichtung des ersten Endpunkts (a) in Bezug auf die Hebelverbindungsplatte (6) zur Motorwelle senkrecht ist; der zweite Endpunkt (b) imstande ist in Bezug auf die Linsengruppe zu rotieren, und eine Drehrichtung zur Motorwelle senkrecht ist;

der Hebel (9) eine Dreiecksplatte ist, der erste Endpunkt (a), der zweite Endpunkt (b) und der Drehpunkt (c) jeweils an drei Winkeln der Dreiecksplatte angeordnet sind, der erste Endpunkt (a) mit einem Loch offen ist, um den Hebel (9) mit der Hebelverbindungsplatte (6) drehbar zu verbinden, der zweite Endpunkt (b) mit einem Loch offen ist, um den Hebel (9) mit der Linsengruppe zu verbinden, und der Drehpunkt (c) vom Winkel zum Lichtquellengehäuse (16) hin hervorsteht; und

die Hebelverbindungsplatte (6) eine Grundplatte mit mindestens drei Blättern, die in derselben Ebene gleichmäßig verteilt sind, und Biegeabschnitte in der gleichen Anzahl wie diejenige der Blätter aufweist; jeder der Biegeabschnitte mit einem entsprechenden Blatt senkrecht verbunden ist und zur axialen Richtung der Motorwelle parallel ist; der Biegeabschnitt mit einem Hebelverbindungsloch (18) offen ist, um den ersten Endpunkt (a) des Hebels (9) zu verbinden.

2. Fokussierungsmechanismus für einen Leuchtdioden(LED)-Scheinwerfer, umfassend ein Lichtquellengehäuse (16), eine Lichtquellengruppe und eine Linsengruppe, die innerhalb des Lichtquellengehäuses (16) angeordnet sind, und eine Motorantriebsvorrichtung, die außerhalb des Lichtquellengehäuses (16) angeordnet ist und eine Motorwelle aufweist, **dadurch gekennzeichnet, dass** der Fokussierungsmechanismus für einen LED-Scheinwerfer ferner einen Hebelverbinder umfasst, der außerhalb des Lichtquellengehäuses (16) angeordnet ist, worin die Linsengruppe, die Lichtquellengruppe, der Hebelverbinder und die Motorantriebsvorrichtung nacheinander in einer axialen Richtung einer Motorwelle verteilt sind; die Motorantriebsvorrichtung mit dem Hebelverbinder verbunden ist; der Hebelverbinder zumindest drei Verbindungsabschnitte, die mit einer Seite des Lichtquellengehäuses (16) verbunden sind, und zumindest drei Passabschnitte aufweist, die mit der Linsengruppe verbunden sind; die Verbindungsabschnitte des Hebel-

verbinders in einer Ebene angeordnet sind, die senkrecht zur axialen Richtung ist, und in derselben Ebene gleichmäßig verteilt sind; und die Passabschnitte in einer anderen Ebene angeordnet sind, die senkrecht zur axialen Richtung ist, und in der anderen Ebene gleichmäßig verteilt sind.

3. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 2, **dadurch gekennzeichnet, dass** der Hebelverbinder eine Hebelverbindungsplatte und mindestens drei Hebel umfasst, die die gleiche Form aufweisen, und die Hebel mit einer Achse als Zentrum gleichmäßig verteilt sind und mit der Hebelverbindungsplatte verbunden sind; und der Hebel einen ersten Endpunkt, einen zweiten Endpunkt und einen Drehpunkt umfasst, worin der erste Endpunkt mit der Hebelverbindungsplatte verbunden ist, der zweite Endpunkt als Passabschnitt dient und mit der Linsengruppe verbunden ist, und der Drehpunkt als Verbindungsabschnitt dient und mit einer Fläche des Lichtquellengehäuses in Berührung gebracht wird.
4. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass** der erste Endpunkt, der zweite Endpunkt und der Drehpunkt in der Form eines Dreiecks verteilt sind, wobei ein Abstand vom Drehpunkt bis zum Lichtquellengehäuse geringer ist als die beiden Abstände von dem ersten und dem zweiten Endpunkt bis zum Lichtquellengehäuse.
5. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass** der Drehpunkt mit einer Seite, die von der Linsengruppe abgewandt ist, des Lichtquellengehäuses in einer relativ verschiebbaren Weise verbunden ist.
6. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass** der erste Endpunkt mit der Hebelverbindungsplatte relativ drehbar verbunden ist, und eine Drehrichtung des ersten Endpunkts in Bezug auf die Hebelverbindungsplatte zur Motorwelle senkrecht ist.
7. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 6, **dadurch gekennzeichnet, dass** der zweite Endpunkt in Bezug auf die Linsengruppe rotiert, und eine Drehrichtung zur Motorwelle senkrecht ist.
8. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet,**

dass

ein Abstand vom ersten Endpunkt bis zum Drehpunkt größer ist als ein Abstand vom zweiten Endpunkt bis zum Drehpunkt.

9. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass**

der Hebel eine Dreiecksplatte ist, der erste Endpunkt, der zweite Endpunkt und der Drehpunkt jeweils an drei Winkeln der Dreiecksplatte angeordnet sind, der erste Endpunkt mit einem Loch offen ist, um den Hebel mit der Hebelverbindungsplatte drehbar zu verbinden, der zweite Endpunkt mit einem Loch offen ist, um den Hebel mit der Linsengruppe zu verbinden, und der Drehpunkt vom Winkel zum Lichtquellengehäuse hin hervorsteht.

10. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass**

die Hebelverbindungsplatte eine Grundplatte mit mindestens drei Blättern, die in derselben Ebene gleichmäßig verteilt sind, und Biegeabschnitte in der gleichen Anzahl wie diejenige der Blätter aufweist; jeder der Biegeabschnitte mit einem entsprechenden Blatt senkrecht verbunden ist und zur axialen Richtung der Motorwelle parallel ist; der Biegeabschnitt mit einem Hebelverbindungsloch offen ist, um den ersten Endpunkt des Hebels zu verbinden.

11. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass**

der Fokussierungsmechanismus für einen LED-Scheinwerfer ferner einen Verbindungsstift (17) umfasst, und der Verbindungsstift (17) mit dem zweiten Endpunkt (b) des Hebels (9) und der Linsengruppe verbunden ist.

12. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 11, **dadurch gekennzeichnet, dass**

Feder (8) und Positionierstifte (10) in derselben Anzahl wie die der Verbindungsstifte (17) ferner zwischen der Lichtquellengruppe und der Linsengruppe angeordnet sind; die Feder (8) an einem Umfang des Positionierstiftes (10) umhüllt ist, ein Ende der Feder (8) gegen die Lichtquellengruppe gehalten wird, und das andere Ende gegen die Linsengruppe gehalten wird.

13. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 12, **dadurch gekennzeichnet, dass**

der Fokussierungsmechanismus für einen LED-Scheinwerfer ferner eine Feststellmutter (7) umfasst, und der Verbindungsstift (17) durch den Posi-

tionierstift (10) und die Linsengruppe fährt und mit der Feststellmutter (7) verbunden ist.

14. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 3, **dadurch gekennzeichnet, dass**

die Motorantriebsvorrichtung einen Motor (13), eine Motorabstützung (14) und eine Motorverbindungs-scheibe (11) umfasst, der Motor (3) mit dem Lichtquellengehäuse (16) durch die Motorabstützung (14) starr verbunden ist; die Motorwelle (12) des Motors (3) mit der Motorverbindungs-scheibe (11) spiralförmig verbunden ist, die Motorverbindungs-scheibe (11) mit der Hebelverbindungsplatte (6) starr verbunden ist, und die Motorverbindungs-scheibe (11) und die Hebelverbindungsplatte (6) beide auf der Motorwelle (12) umhüllt sind.

15. Fokussierungsmechanismus für einen LED-Scheinwerfer nach Anspruch 14, **dadurch gekennzeichnet, dass**

der Fokussierungsmechanismus für einen LED-Scheinwerfer ferner einen Führungsstift umfasst, der in der axialen Richtung der Motorwelle (12) angeordnet ist, ein Ende des Führungsstiftes (15) an der Motorabstützung (14) befestigt ist, und das andere Ende an der Hebelverbindungsplatte (6) befestigt ist.

16. Leuchtdioden(LED)-Scheinwerfer, **dadurch gekennzeichnet, dass** der LED-Scheinwerfer den Fokussierungsmechanismus für einen LED-Scheinwerfer nach einem der Ansprüche 1 bis 15 umfasst.

Revendications

1. Mécanisme de concentration pour un spot à diode électroluminescente (DEL), comprenant un boîtier de source de lumière (16), un ensemble de source de lumière et un ensemble de lentille qui sont situés à l'intérieur du boîtier de source de lumière (16), un dispositif d'entraînement motorisé situé à l'extérieur du boîtier de source de lumière (16) et ayant un arbre moteur, **caractérisé en ce que**

le mécanisme de concentration pour un spot à DEL comprend en outre un connecteur à levier situé à l'extérieur du boîtier de source de lumière (16), dans lequel l'ensemble de lentille, l'ensemble de source de lumière, le connecteur à levier et le dispositif d'entraînement motorisé sont distribués en succession dans une direction axiale d'un arbre moteur dans le dispositif d'entraînement motorisé ; le dispositif d'entraînement motorisé est connecté au connecteur à levier ; le connecteur à levier a au moins trois parties de connexion connectées à un côté du boîtier de source de lumière (16), et au moins trois parties de fixation connectées à l'ensemble de lentille ; les par-

ties de connexion du connecteur à levier sont situées sur un plan perpendiculaire à la direction axiale et sont distribuées uniformément sur le même plan ; et les parties de fixation sont situées sur un autre plan perpendiculaire à la direction axiale et sont distribuées uniformément sur l'un autre plan ; le connecteur à levier comprend une plaque de connexion de levier (6) et au moins trois leviers (9) de la même forme, et les leviers sont distribués uniformément avec un axe comme centre et connectés à la plaque de connexion de levier (6) ; le levier (9) comprend une première extrémité (a), une deuxième extrémité (b) et un point d'appui (c), dans lequel la première extrémité (a) est connectée à la plaque de connexion de levier (6), la deuxième extrémité (b) sert comme la partie de fixation et est connectée à l'ensemble de lentille, et le point d'appui (c) sert comme la partie de connexion et est en contact avec une surface du boîtier de source de lumière (16) ; la première extrémité (a), la deuxième extrémité (b) et le point d'appui (c) sont distribués en forme de triangle, une distance du point d'appui (c) au boîtier de source de lumière (16) est inférieure à des distances de la première (a) et la deuxième (b) extrémités au boîtier de source de lumière (16), et une distance de la première extrémité (a) au point d'appui (c) est supérieure à une distance de la deuxième extrémité (b) au point d'appui (c) ; le point d'appui (c) est connecté à un côté du boîtier de source de lumière (16) éloigné de l'ensemble de lentille d'une manière relativement coulissante ; la première extrémité (a) est connectée de manière relativement tournante à la plaque de connexion de levier (6), et une direction de rotation de la première extrémité (a) par rapport à la plaque de connexion de levier (6) est perpendiculaire à l'arbre moteur ; la deuxième extrémité (b) est capable de tourner par rapport à l'ensemble de lentille et une direction de rotation est perpendiculaire à l'arbre moteur ; le levier (9) est une plaque triangulaire, la première extrémité (a), la deuxième extrémité (b) et le point d'appui (c) sont situés respectivement au niveau de trois angles de la plaque triangulaire, la première extrémité (a) est ouverte avec un trou pour connecter de manière tournante le levier (9) avec la plaque de connexion de levier (6), la deuxième extrémité (b) est ouverte avec un trou pour connecter le levier (9) avec l'ensemble de lentille, et le point d'appui (c) fait saillie à partir d'un angle vers le boîtier de source de lumière (16) ; et la plaque de connexion de levier (6) a une tôle de base avec au moins trois lames distribuées uniformément sur le même plan et des parties de pliage avec le même nombre que celui des lames ; chacune des parties de pliage est connectée perpendiculairement à une lame respective et est parallèle à la direction axiale de l'arbre moteur ; la partie de pliage

est ouverte avec un trou de connexion de levier (18) pour connecter la première extrémité (a) du levier (9).

- 5 2. Mécanisme de concentration pour un spot à diode électroluminescente (DEL), comprenant un boîtier de source de lumière (16), un ensemble de source de lumière et un ensemble de lentille qui sont situés à l'intérieur du boîtier de source de lumière (16), et un dispositif d'entraînement motorisé situé à l'extérieur du boîtier de source de lumière (16) et ayant un arbre moteur, **caractérisé en ce que**

10 le mécanisme de concentration pour un spot à DEL comprend en outre un connecteur à levier situé à l'extérieur du boîtier de source de lumière (16), dans lequel l'ensemble de lentille, l'ensemble de source de lumière, le connecteur à levier et le dispositif d'entraînement motorisé sont distribués en succession dans une direction axiale de l'arbre moteur ; le dispositif d'entraînement motorisé est connecté au connecteur à levier ; le connecteur à levier a au moins trois parties de connexion connectées à un côté du boîtier de source de lumière (16), et au moins trois parties de fixation connectées à l'ensemble de lentille ; les parties de connexion du connecteur à levier sont situées sur un plan perpendiculaire à la direction axiale et sont distribuées uniformément sur le même plan ; et les parties de fixation sont situées sur un autre plan perpendiculaire à la direction axiale et sont distribuées uniformément sur l'un autre plan.
- 15 3. Mécanisme de concentration pour un spot à DEL selon la revendication 2, **caractérisé en ce que**

20 le connecteur à levier comprend une plaque de connexion de levier et au moins trois leviers de la même forme, et les leviers sont distribués uniformément avec un axe comme centre et connectés à la plaque de connexion de levier ; et le levier comprend une première extrémité, une deuxième extrémité et un point d'appui, dans lequel la première extrémité est connectée à la plaque de connexion de levier, la deuxième extrémité sert comme la partie de fixation et est connectée à l'ensemble de lentille, et le point d'appui sert comme la partie de connexion et est en contact avec une surface du boîtier de source de lumière.
- 25 4. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que**

30 la première extrémité, la deuxième extrémité et le point d'appui sont distribués en forme de triangle, une distance du point d'appui au boîtier de source de lumière est inférieure aux deux distances de la première et la deuxième extrémité au boîtier de source de lumière.
- 35 5. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que**

- le point d'appui est connecté à un côté du boîtier de source de lumière éloigné de l'ensemble de lentille d'une manière relativement coulissante.
6. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** la première extrémité est connectée de manière relativement tournante à la plaque de connexion de levier, et une direction de rotation de la première extrémité par rapport à la plaque de connexion de levier est perpendiculaire à l'arbre moteur.
7. Mécanisme de concentration pour un spot à DEL selon la revendication 6, **caractérisé en ce que** la deuxième extrémité tourne par rapport à l'ensemble de lentille et une direction de rotation est perpendiculaire à l'arbre moteur.
8. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** une distance de la première extrémité au point d'appui est supérieure à une distance de la deuxième extrémité au point d'appui.
9. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** le levier est une plaque triangulaire, la première extrémité, la deuxième extrémité et le point d'appui sont situés respectivement au niveau de trois angles de la plaque triangulaire, la première extrémité est ouverte avec un trou pour connecter de manière tournante le levier avec la plaque de connexion de levier, la deuxième extrémité est ouverte avec un trou pour connecter le levier avec l'ensemble de lentille, et le point d'appui fait saillie à partir d'un angle vers le boîtier de source de lumière.
10. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** la plaque de connexion de levier a une tôle de base avec au moins trois lames distribuées uniformément sur le même plan et des parties de pliage avec le même nombre que celui des lames ; chacune des parties de pliage est connectée perpendiculairement à une lame respective et est parallèle à la direction axiale de l'arbre moteur ; la partie de pliage est ouverte avec un trou de connexion de levier pour connecter la première extrémité du levier.
11. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** le mécanisme de concentration pour un spot à DEL comprend en outre un montant de connexion (17) et le montant de connexion (17) est connecté à la deuxième extrémité (b) du levier (9) et à l'ensemble de lentille.
12. Mécanisme de concentration pour un spot à DEL selon la revendication 11, **caractérisé en ce que** des ressorts (8) et des montants de positionnement (10) avec le même nombre que celui des montants de connexion (17) sont disposés en outre entre l'ensemble de source de lumière et l'ensemble de lentille ; le ressort (8) est gainé à une périphérie du montant de positionnement (10), une extrémité du ressort (8) est maintenue contre l'ensemble de source de lumière et l'autre extrémité est maintenue contre l'ensemble de lentille.
13. Mécanisme de concentration pour un spot à DEL selon la revendication 12, **caractérisé en ce que** le mécanisme de concentration pour un spot à DEL comprend en outre un écrou de blocage (7) et le montant de connexion (17) passe à travers le montant de positionnement (10) et l'ensemble de lentille et est connecté à l'écrou de blocage (7).
14. Mécanisme de concentration pour un spot à DEL selon la revendication 3, **caractérisé en ce que** le dispositif d'entraînement motorisé comprend un moteur (13), un support de moteur (14) et un disque de connexion de moteur (11), le moteur (3) est connecté de manière fixe au boîtier de source de lumière (16) à travers le support de moteur (14) ; l'arbre moteur (12) du moteur (3) est connecté en spirale au disque de connexion de moteur (11), le disque de connexion de moteur (11) est connecté de manière fixe à la plaque de connexion de levier (6), et le disque de connexion de moteur (11) et la plaque de connexion de levier (6) sont tous deux gainés sur l'arbre moteur (12).
15. Mécanisme de concentration pour un spot à DEL selon la revendication 14, **caractérisé en ce que** le mécanisme de concentration pour un spot à DEL comprend en outre un montant de guidage disposé dans la direction axiale de l'arbre moteur (12), une extrémité du montant de guidage (15) est fixée sur le support de moteur (14) et l'autre extrémité est fixée sur la plaque de connexion de levier (6).
16. Spot à diode électroluminescente (DEL), **caractérisé en ce que** le spot à DEL comprend le mécanisme de concentration pour un spot à DEL selon l'une quelconque des revendications 1 à 15.

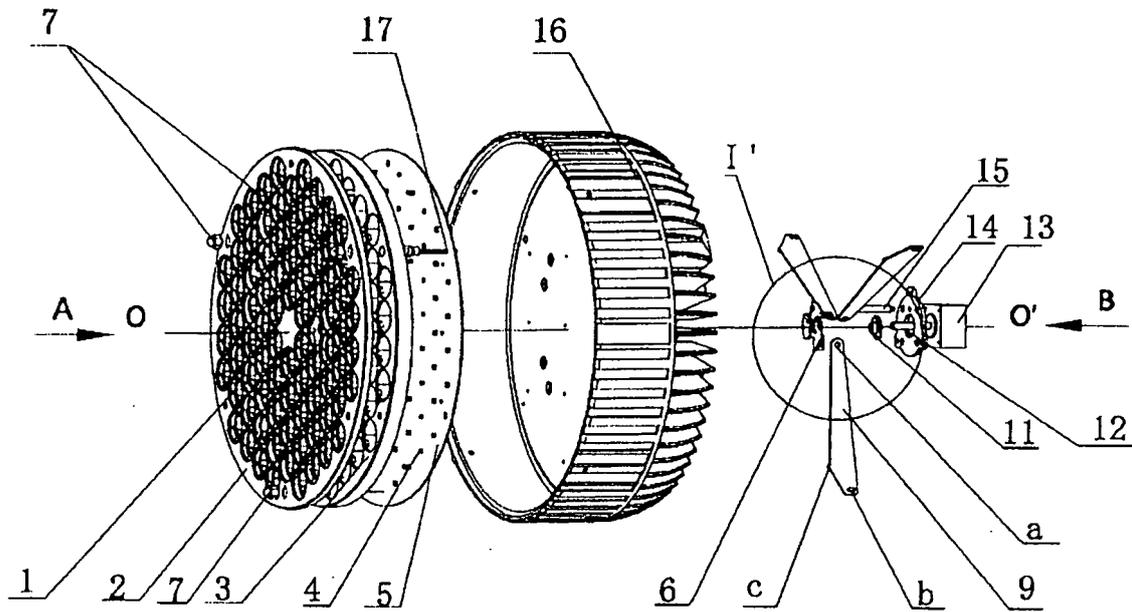


FIG. 1

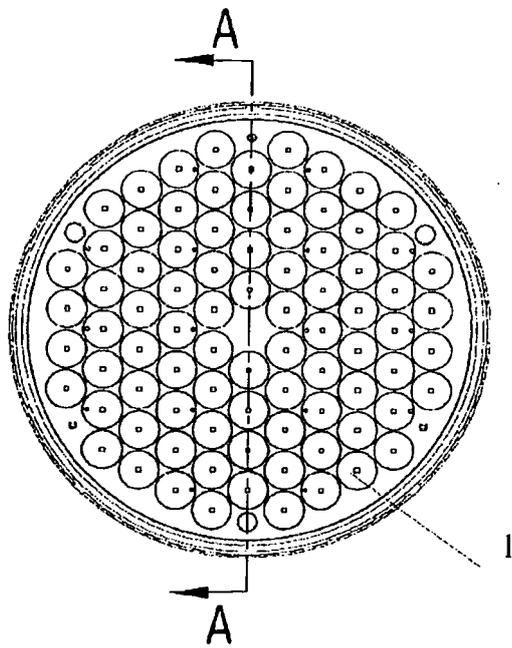


FIG. 2

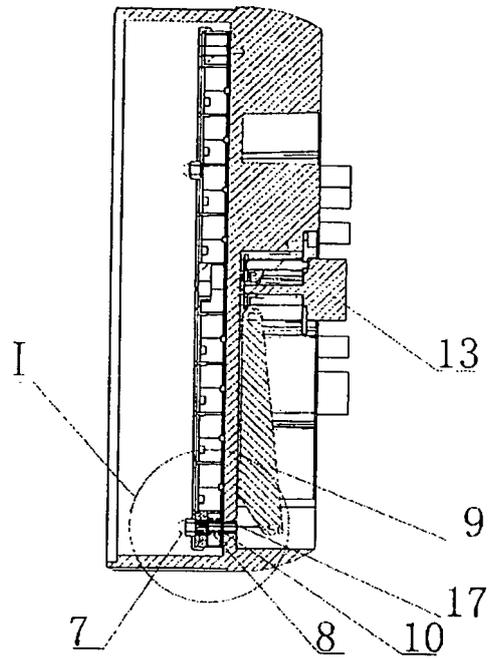


FIG. 3

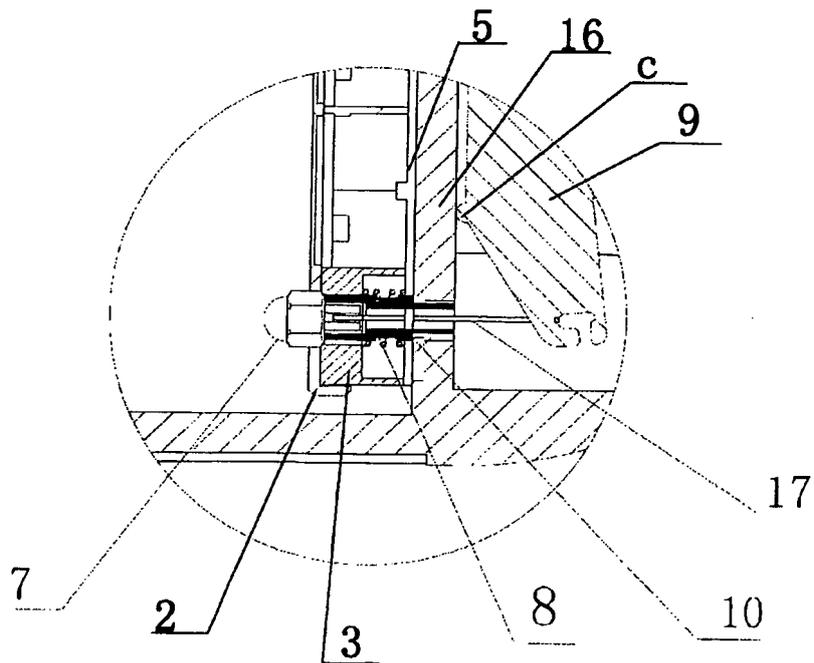


FIG. 4

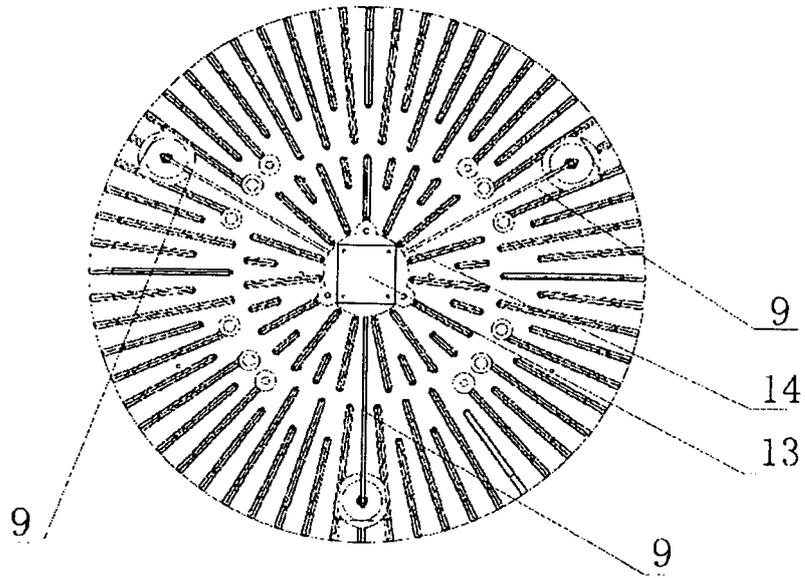


FIG. 5

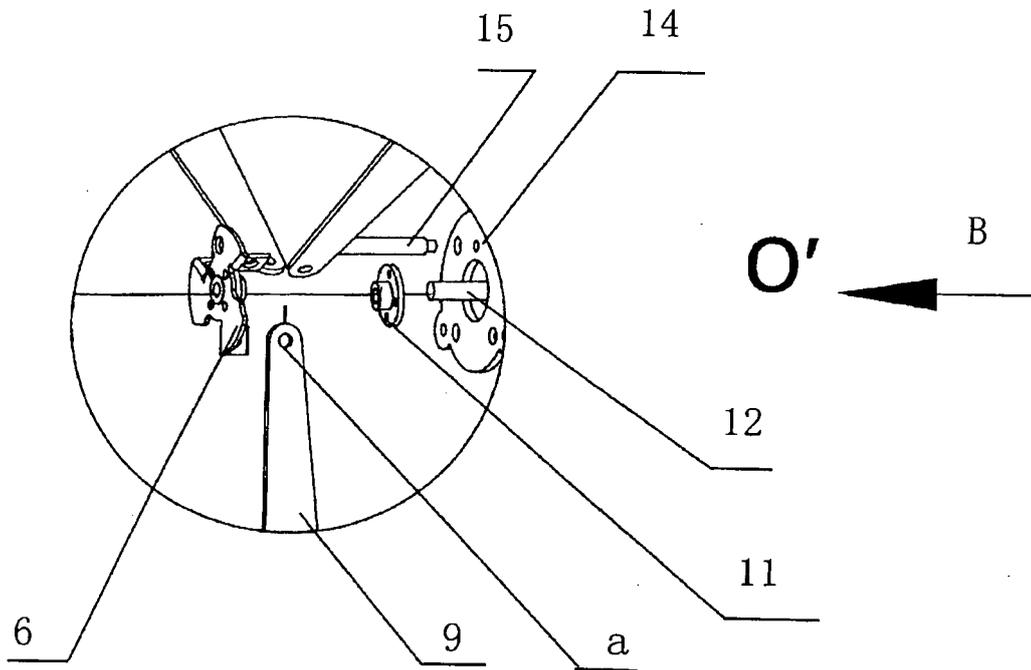


FIG. 6

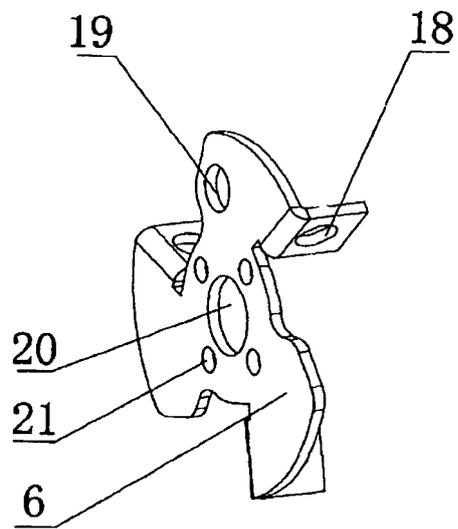


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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