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(54) **LIGHT-DIRECTION ADJUSTMENT DEVICE**

VORRICHTUNG ZUR ANPASSUNG DER LICHTRICHTUNG

DISPOSITIF D'AJUSTEMENT DE DIRECTION DE LUMIÈRE

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Description

BACKGROUND OF THE PRESENT INVENTION

FIELD OF INVENTION

[0001] The present invention relates to a light-direction adjustment device, and more particularly to a light-direction adjustment device comprising an adjustment unit and a light source mounted on the adjustment unit, enabling a direction of light irradiation from the light source to be changed along with an angle adjustment of the adjustment unit, so that users can easily use the light-direction adjustment device for illumination.

DESCRIPTION OF RELATED ARTS

[0002] Spotlight is a typical modern lighting equipment without fixed dimensions. Due to its free angle changing feature, a predetermined number of spotlights can be arranged according to a desired pattern to create an atmosphere and to heighten the environment. Therefore, the spotlights have brought great convenience to people's lives.

[0003] Conventionally, a spotlight includes a base for fixing the spotlight, a supporting component and a lamp body. One end portion of the supporting component is affixed to the base. The lamp body is moveably mounted to the other end portion of the supporting component. The lamp body is able to perform a rotating movement relative to the supporting component so as to change the direction of light emitted from the light source.

[0004] Based on the conventional spotlights disclosed above, it is understood that when the base is mounted on a ceiling or a similar position, the supporting component is extended downwardly. In other words, the supporting component occupies a certain space in the lower portion of the ceiling or the like thereof, and when the lamp body performs a rotating movement relative to the supporting component, the lamp body would occupy other spaces besides the space of the spotlight itself. In other words, when the lamp body rotatably moves with respect to the supporting component, the outer space of the spotlight to be occupied should be in a constantly changing condition so as to meet the needs of users.

[0005] CN 201 434 243Y discloses a rotating lamp capable of adjusting an irradiation angle of light rays. Herein, a luminous tube is arranged on a lamp seat and the luminous tube is positioned by a positioning ring. A flat mirror is arranged in a groove of the positioning ring and is then screwed into a rotating inner head. A spring is sheathed on the lamp seat and a rotating head is clamped on the spring. A rivet, a clamping spring and a rotating shell are connected and assembled into a piece which is sheathed on the rotating head and is clamped into a rotating outer head, so as to form the rotating lamp capable of adjusting the irradiation angle of the light rays.

[0006] Therefore, an arrangement which occupies a relatively smaller space after assembly and during the light adjustment procedure process is demanded to meet the needs of users.

SUMMARY OF THE PRESENT INVENTION

[0007] The present invention is advantageous in providing a light-direction adjustment device, wherein the light-direction adjustment device comprises an adjustment unit and a light source mounted on the adjustment unit, wherein a direction of light emitted from the light source is able to be changed along with an angle adjustment of the adjustment unit, so that users can easily use the light-direction adjustment device for illumination.

[0008] Another advantage of the invention is to provide a light-direction adjustment device, wherein the adjustment unit is able to be adjusted in multiple angles and that, during the angle adjustment process of the adjustment unit, when the direction of light emitted from the light source meets the desired need of the user, the adjustment unit is easily to be fixed in that position.

[0009] Another advantage of the invention is to provide a light-direction adjustment device, wherein a curved structure of the adjustment unit is well coordinated with the lamp body and a curved structure of a housing during the angle adjustment process of the adjustment unit, so that the angle of the adjustment unit can be conveniently adjusted.

[0010] Another advantage of the invention is to provide a light-direction adjustment device, during the angle adjustment process of the adjustment unit, the adjustment unit is always positioned inside a first receiving chamber formed in the lamp body and the housing. In other words, during the angle adjustment process of the adjustment unit, the adjustment unit does not occupy any additional space besides the space of the light-direction adjustment device, enabling the light-direction adjustment device to be utilized within a narrow space.

[0011] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device provides a plurality of sealing members, wherein when the light-direction adjustment device is used outdoor or in an environment that is easy to be polluted by dust, water or the like, the sealing members can ensure a relatively stable environment for the light source and the light-direction adjustment device.

[0012] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device provides a plurality of fixing members to secure conductive leads and to prevent conductive leads from twining inside the light-direction adjustment device, under the premise of not influencing a normal use of the light-direction adjustment device, when the adjustment unit is faulty operated.

[0013] Another advantage of the invention is to provide a light-direction adjustment device, wherein the housing of the light-direction adjustment device is able to be adjusted according to various requirements so as to im-

prove a heat dissipation efficiency of the light-direction adjustment device.

[0014] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device comprises a holding unit, that the light-direction adjustment device can be installed to a predetermined position and be conveniently disassembled from the predetermined position by mean of the holding unit, equipped with a stopper portion, by the users.

[0015] Another advantage of the invention is to provide a light-direction adjustment device, wherein a light emitting unit comprises a spotlighting element provided in the direction of light emitted from the light source in such a manner that the light generated by the light source perform a spotlighting effect through the spotlighting element, so that lights generated by the light source has a well directionality.

[0016] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device has ingeniously designed components, a reasonable structure and a scientific layout in such a manner that the durability of the light-direction adjustment device is improved and, moreover, the reliability and safety of the light-direction adjustment device during using process are well assured.

[0017] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device is simple to operate and can effectively meet the demands of the market.

[0018] Another advantage of the invention is to provide a light-direction adjustment device, wherein the light-direction adjustment device has a complex architecture and a sophisticated construction, and the raw materials of the light-direction adjustment device have wide sources, and thus, it is beneficial to control the manufacturing cost of the light-direction adjustment such that the light-direction adjustment has a good market prospect.

[0019] Additional advantages and features of the invention will become apparent from the description which follows, and may be realized by means of the instrumentalities and combinations particular point out in the appended claims.

[0020] According to the present invention, the foregoing and other objects and advantages are attained by a light-direction adjustment device, which comprises:

a housing,

a lamp body unit,

a light emitting unit comprising a light source, and

an adjustment unit comprising a first driving member and a second driving member, the light source being mounted on the adjustment unit, the first driving member and the second driving member being respectively provided at one end portion of the adjustment unit, a movement of the first driving member and the second driving member being synchronously such that a direction of light emitted from the light source is able to be changed,

wherein the housing comprises a first housing, a second housing and at least two heat dissipating elements, wherein two ends of each heat dissipating element are respectively extended to the first housing and the second housing and a heat exchanging space is formed between each two adjacent heat dissipating elements,

wherein the lamp body unit comprises a first positioning element, wherein the housing has at least one first mounting hole and the lamp body unit has at least one second mounting hole, wherein the lamp body unit further comprises a first mounting member, wherein when the lamp body unit is assembled with the housing, the first mounting member is provided to enclose the housing and each of the first mounting members mounts the lamp body unit to the housing through each of the second mounting holes and each of the first mounting holes, wherein the housing and the lamp body unit form a first receiving chamber and the adjustment unit is positioned in the first receiving chamber,

wherein the lamp body unit comprises a second positioning member, wherein the first positioning element and the second positioning member form a positioning groove, wherein when the lamp body unit is assembled with the housing, one end portion of the first housing is mounted in the positioning groove,

wherein said second housing comprises a first connecting body and a second connecting body, wherein one end portion of said first connecting body is integrally extended to said second housing and the other end portion of said first connecting body has a connecting chamber, wherein one end portion of said second connecting body forms a first driving surface and the other end portion of said second connecting body forms a second connecting member, wherein said second connecting member is mounted in said connecting chamber, wherein said first driving surface is a lower curved surface, wherein said second positioning member forms a second driving surface which is an upper curved surface, and said first driving member and said second driving member are able to be moved synchronously along a trajectory defined by said first driving surface and said second driving surface so as to change said direction of light emitted from said light source.

[0021] According to one embodiment of the present invention, the connecting chamber has a thread structure and the second connecting member has a thread structure, wherein when the second connecting member is

mounted in the connecting chamber, the thread structure of the second connecting member is matched with the thread structure of the connecting chamber so as to connect the second connecting body to the first connecting body.

[0022] According to one embodiment of the present invention, the light emitting unit further comprises a heat dissipating member, wherein the heat dissipating member further comprises a mounting substrate having a mounting position, wherein the light source is mounted at the mounting position so as to mount the light source on the mounting substrate.

[0023] According to one embodiment of the present invention, one side portion of the mounting substrate is extended in a perpendicular direction to form a first heat dissipating piece and at least two second heat dissipating pieces arranged spacedly and intervally, wherein a first heat dissipating cavity is defined between each two adjacent second heat dissipating pieces and a second heat dissipating cavity is defmed between the first heat dissipating piece and the mounting substrate, wherein two adjacent portions of each of the second heat dissipating pieces are respectively extended to the first heat dissipating piece and the mounting substrate.

[0024] According to one embodiment of the present invention, the mounting substrate has at least one third mounting hole and at least one second mounting member and the second driving member has at least one fourth mounting hole, wherein each of the second mounting members mounts the second driving member on the mounting substrate through each of the third mounting holes and each of the fourth mounting holes, wherein the heat dissipating member and the second driving member form a second receiving chamber and the light source is positioned in the second receiving chamber.

[0025] According to one embodiment of the present invention, one side portion of the mounting substrate is extended in a perpendicular direction to form a first mounting shaft and a second mounting shaft, wherein a diameter of the second mounting shaft is smaller than a diameter of the first mounting shaft, wherein the first driving member has a first mounting cavity and a second mounting cavity, wherein a diameter of the second mounting cavity is smaller than a diameter of the first mounting cavity, wherein the second mounting shaft is capable of moving along a path defined by the second mounting cavity when the first driving member and the second driving member are moving along a trajectory defined between the first driving surface and the second driving surface.

[0026] According to one embodiment of the present invention, the adjustment unit further comprises a resilient element, wherein two end portions of the resilient element are faced toward the first mounting shaft and the first mounting cavity respectively, wherein the resilient element enables the first mounting shaft to be able to move and displace to return to a predetermined position.

[0027] According to one embodiment of the present invention, the light emitting unit further comprises a reflecting element installed at the mounting substrate, wherein the reflecting element has a third light channel to enable the light generated by the light source radiating to outside of the light-direction adjustment device through the third light channel.

[0028] According to one embodiment of the present invention, the light emitting unit further comprises a spotlighting element comprising a fixing portion and a spotlighting portion integrally formed with the fixing portion, wherein the second driving member has a retaining portion, wherein the fixing portion is fixed to the retaining portion and the light generated by the light source is emitted to outside of the light-direction adjustment device by the spotlighting portion.

[0029] According to one embodiment of the present invention, the light emitting unit further comprises a second sealing member mounted on the retaining portion.

[0030] According to one embodiment of the present invention, two side portions of the first positioning element are extended towards the housing to form a holding portion, wherein the light-direction adjustment device further comprises two holding units and one end portion of each of the holding units is mounted on the holding portion, wherein the lamp body unit further comprises a stopper portion provided on an outer side of the first positioning element, wherein a catching and holding chamber is formed between each of the holding units and the stopper portion.

[0031] According to one embodiment of the present invention, the first housing, the second housing and each of the heat dissipating element are integrally formed.

[0032] According to one embodiment of the present invention, the second driving surface further has a positioning channel and a first sealing member, wherein the first sealing member is positioned in the positioning channel, and the first sealing member is positioned between the adjustment unit and the second driving surface.

[0033] According to one embodiment of the present invention, the first sealing member is made of elastic material.

[0034] According to one embodiment of the present invention, the lamp body unit further comprises a first fixing member and a second fixing member, wherein the first fixing member is mounted on the second heat dissipating pieces and a first fixing chamber is defined between the first fixing member and the second heat dissipating pieces, wherein the second fixing member is mounted on the housing and the second fixing member has a second fixing chamber, wherein conductive leads are extended inside the light-direction adjustment device through the second fixing chamber and the first fixing chamber.

[0035] According to an unclaimed aspect of the invention, the foregoing and other objects and advantages are also attained by a light-direction adjustment device, which comprises:

a light source for generating lights,

a housing forming a first driving surface,

a lamp body unit forming a second driving surface, wherein a first receiving chamber is defined between the housing and the lamp body unit, and

an adjustment unit mounted on the light source and positioned in the first receiving chamber, wherein the adjustment unit comprises:

a first driving member; and

a second driving member, wherein the first driving member and the second driving member are able to move synchronously along a trajectory defined by the first driving surface and the second driving surface.

[0036] According to one embodiment of the present invention, the adjustment unit further comprises a resilient element, wherein two end portions of the resilient element are faced toward the first driving member and the second driving member respectively, wherein when the second driving member moves toward the first driving member, the resilient element has a tendency of returning to a predetermined condition.

[0037] According to one embodiment of the present invention, the housing comprises a first housing, a second housing and at least two heat dissipating elements, wherein two ends of each of the heat dissipating elements are respectively extended to the first housing and the second housing and a heat exchanging space is formed between each two adjacent heat dissipating elements.

[0038] According to one embodiment of the present invention, the lamp body unit comprises a first positioning element and a second positioning member, wherein the first positioning element and the second positioning member are spacedly provided to form a positioning groove, when the lamp body unit is assembled with the housing, one end portion of the first housing is mounted in the positioning groove.

[0039] According to one embodiment of the present invention, the second housing forms the first driving surface which is a lower curved surface and the second positioning member forms the second driving surface which is an upper curved surface, wherein the first driving member and the second driving member are able to move synchronously along a trajectory defined by the first driving surface and the second driving surface so as to change the direction of light emitted from the light source.

[0040] According to one embodiment of the present invention, the second housing comprises a first connecting body and a second connecting body, wherein one end portion of the first connecting body is integrally extended to the second housing and the other end portion of the first connecting body forms a connecting chamber, wherein one end portion of the second connecting body forms a first driving surface and the other end portion of the second connecting body forms a second connecting member, wherein the second connecting member is mounted in the connecting chamber, wherein the first driving surface is a lower curved surface, wherein the second positioning member forms a second driving surface which is an upper curved surface, and the first driving surface and the second driving surface are able to move synchronously along a path defined by the first driving surface and the second driving surface so as to change the direction of light emitted from the light source.

[0041] According to one embodiment of the present invention, the connecting chamber has a thread structure and the second connecting member has a thread structure, wherein when the second connecting member is mounted in the connecting chamber, the thread structure of the second connecting member is matched with the thread structure of the connecting chamber so as to connect the second connecting body with the first connecting body.

[0042] According to one embodiment of the present invention, the second driving surface further has a positioning channel and a first sealing member, wherein the first sealing member is positioned in the positioning channel, and the first sealing member is positioned between the adjustment unit and the second driving surface.

[0043] According to one embodiment of the present invention, the first sealing member is made of elastic material.

[0044] According to an unclaimed aspect of the invention, the foregoing and other objects and advantages are also attained by a method of adjusting a light emitting direction by means of a light-direction adjustment device, wherein the light-direction adjustment device comprises a light source, an adjustment unit mounted to the light source, a housing, and a lamp body unit, wherein the method comprises the steps of:

(a) generating lights by the light source; and

(b) changing the light emitting direction of the light source when the adjustment unit is moved relative to the lamp body unit and the housing by an external force applied on the adjustment unit.

[0045] According to the embodiments of the present invention, the step (a) further comprises the steps of:

(a.1) reflecting the lights generated by the light source by a reflecting element reflecting element such that the lights generated by the light source have a good directivity; and

(a.2) providing a spotlighting element to gather the lights therethrough such that the lights generated by the light source have a good consistency.

[0046] According to one embodiment of the present invention, the step (b) further comprises the steps of:

(b.1.) forming a first driving surface by a second housing of the housing;

(b.2) forming a second driving surface by a second positioning member of the lamp body unit; and

(b.3) changing the light emitting direction of the light source by moving the a first driving member of the adjustment unit and a second driving member of the adjustment unit respectively along a trajectory defined by the first driving surface and the second driving surface.

[0047] According to an unclaimed aspect of the invention, the foregoing and other objects and advantages are also attained by a method of manufacturing a light-direction adjustment device, which comprises the steps of:

(A) providing a light source for generating lights;

(B) molding a housing having a first driving surface and a lamp body unit having a second driving surface respectively by means of moulds; and

(C) forming an adjustment unit which comprises a first driving member and a second driving member, wherein the first driving member and the second driving member are capable of respectively and synchronously moving along a trajectory defined by the first driving surface and the second driving surface, so as to change the light emitting direction of the light source.

[0048] Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

[0049] These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0050]

FIG. 1 is a perspective view of a light-direction adjustment device according to a preferred embodiment of the present invention.

FIG. 2 is an assembly view of the light-direction adjustment device according to above preferred embodiment of the present invention.

FIG. 3 is a perspective view of a housing of the light-direction adjustment device according to above preferred embodiment of the present invention.

FIG. 4 to FIG. 7 are sectional views of the light-direction adjustment device according to an unclaimed aspect of the present invention.

FIG. 8 is a perspective view of a light-direction adjustment device according to an alternative mode of the above unclaimed aspect of the present invention.

FIG. 9 is a perspective view of the light-direction adjustment device according to above alternative mode of the above preferred embodiment of the present invention.

FIG. 10 is a sectional view of a first driving surface of the light-direction adjustment device according to above alternative mode of the above preferred embodiment of the present invention.

FIG. 11 is a sectional view of another first driving surface of the light-direction adjustment device according to above alternative mode of above preferred embodiment of the present invention.

FIG. 12 is a perspective view illustrating an alternative mode of the light-direction adjustment device according to above preferred embodiment of the present invention.

FIG. 13 is a perspective view illustrating another alternative mode of the light-direction adjustment device according to above preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0051] The following description is disclosed to enable any person skilled in the art to make and use the present invention. Preferred embodiments are provided in the following description only as examples and modifications will be apparent to those skilled in the art.

[0052] Referring to FIG. 1 to FIG. 7 of the drawings, a light-direction adjustment device according to a preferred embodiment of the invention is illustrated, wherein the light-direction adjustment device does not need to occupy additional spaces besides the space receiving the light-direction adjustment device while adjusting the light emitting directions of the light-direction adjustment device. Accordingly, the light-direction adjustment device can be utilized within a narrow space.

[0053] According to the preferred embodiment of the invention described above, the light-direction adjustment device comprises a housing 10, a lamp body unit 20, a light emitting unit 30, and an adjustment unit 40.

[0054] The housing 10 comprises a first housing 11, a second housing 12 and at least two heat dissipating el-

ements 13, wherein two ends of each heat dissipating elements 13 are respectively extended to the first housing 11 and the second housing 12, and a heat exchanging space 131 is formed between each of the two adjacent heat dissipating elements 13. When a temperature inside the housing 10 is higher than a temperature outside the housing 10, the air inside the housing 10 exchanges with the air outside the housing 10 via the heat exchanging space 131, so that a pressure balance of the interior and the exterior of the housing 10 is ensured.

[0055] It is worth mentioning that the first housing 11, the second housing 12 and each of the heat dissipating elements 13 are integrally formed.

[0056] The housing 10 further forms a first receiving chamber 14 providing a mounting space for the adjustment unit 40, wherein each of the heat exchanging spaces 131 is communicated with the first receiving chamber 14 such that the air inside the housing 10 exchanges with the air outside the housing 10 via the heat exchanging space 131. It is understandable that when the light-direction adjustment device is in an assembling status, the housing 10 is provided to enclose the outer portion of the adjustment unit 40 so as to protect the adjustment unit 40.

[0057] Specifically, the first housing 11 is provided to enclose the adjustment unit 40 and the second housing 12 is positioned at an end portion of the adjustment unit 40, wherein the second housing 12 faces toward one side portion of the first receiving chamber 14 to form a first driving surface 15, so that the adjustment unit 40 is able to be moved with respect to the housing 10 along a trajectory defined by the first driving surface 15.

[0058] The lamp body unit 20 comprises a first positioning element 21 and a second positioning member 22, wherein the first positioning element 21 and the second positioning member 22 are spacedly provided to form a positioning groove 23. The lamp body unit 20 is assembled with the housing 10, wherein the housing 10 has at least one first mounting hole 101. The lamp body unit 20 has at least one second mounting hole 201, wherein each of the first mounting holes 101 is matched with each of the second mounting holes 201. The lamp body unit 20 further comprises a first mounting member 24. When the lamp body unit 20 is assembled with the housing 10, one end portion of the first housing 11 is mounted in the positioning groove 23. The first positioning element 21 is positioned on an outer side of the first housing 11. The second positioning member 22 is positioned on an inner side of the first housing 11. The first mounting member 24 affixes the housing 10 to the lamp body unit 20 through the first mounting hole 101 and the second mounting hole 201.

[0059] Furthermore, when the lamp body unit 20 is assembled with the housing 10, the lamp body unit 20 and the housing 10 form the first receiving chamber 14. The adjustment unit 40 is positioned inside the first receiving chamber 14, wherein the second positioning member 22 forms a second driving surface 25, so that the adjustment unit 40 is able to be moved with respect to the lamp body unit 20 along a trajectory defined by the second driving surface 25.

[0060] The second driving surface 25 is in a ring shape forming a first light channel 251, wherein the first light channel 251 is communicated with the first receiving chamber 14, so that the lights generating by the light emitting unit 30 are radiated to the outside of the light-direction adjustment device through the first light channel 251.

[0061] According to this preferred embodiment of the invention as shown in FIG. 5 and FIG. 6, the second driving surface 25 further has a positioning channel 252 and a first sealing member 253, wherein the first sealing member 253 is positioned in the positioning channel 252, and the first sealing member 253 is positioned between the adjustment unit 40 and the second driving surface 25. When the light-direction adjustment device is utilized in a high humidity environment, the first sealing member 253 can ensure that the moisture outside the light-direction adjustment device cannot enter the inside of the light-direction adjustment device, so that the first sealing member 253 can ensure that the light-direction adjustment device has a stable working environment.

[0062] It is worth mentioning that the first sealing member 253 is made of elastic materials, wherein when the adjustment unit 40 is moved along a trajectory defined by the second driving surface 25, the first sealing member 253 can always ensure that the adjustment unit 40 and the second driving surface 25 have no gap therebetween.

[0063] Furthermore, an end portion of the first housing 11 also comprises one or more blocking elements 111 spacedly and internally arranged, wherein each of the blocking elements 111 has a good flexibility, so that when the first housing 11 is provided in the positioning groove 23 formed by the first positioning element 21 and the second positioning member 22, each of the blocking elements 111 is facing toward the first positioning element 21 such that the first housing 11 is able to be affixed in the positioning groove 23..

[0064] The light emitting unit 30 comprises a light source 31, which is mounted on the adjustment unit 40, so that an emitting direction of the lights generated by the light source 31 can be changed with the angle adjustment of the adjustment unit 40. Furthermore, users can easily use the light-direction adjustment device for illumination. It is understandable that the light generated by the light source 31 can be radiated to the outside of the light-direction adjustment device through the first light channel 251.

[0065] It is worth mentioning that the light source 31 is preferably a LED light source in order to improve the life span of the light-direction adjustment device based on reducing a production cost of the light-direction adjustment device, and the light generated by the light source 31 can have a good lighting effect on the light-direction adjustment device.

[0066] The light emitting unit 30 further comprises a heat dissipating member 32, wherein the heat dissipating

member 32 further comprises a mounting substrate 321. The mounting substrate 321 has a mounting position 3211, wherein the light source 31 is mounted at the mounting position 3211, so that the light source 31 is mounted on the mounting substrate 321 to further ensure the light source 31 and the mounting substrate 321 having a stable positional relationship.

[0067] Furthermore, one side portion of the mounting substrate 321 is extended in a perpendicular direction to form a first heat dissipating piece 322 and at least two second heat dissipating pieces 323, wherein the second heat dissipating pieces 323 are spaced with each other, and a first heat dissipating cavity 324 is formed between each of the two adjacent second heat dissipating pieces 323. One side portion of the each of the second heat dissipating pieces 323 is extended to the first heat dissipating piece 322 and the other side portion of each of the second heat dissipating pieces 323 is extended to the mounting substrate 321. The first heat dissipating piece 322 forms a second heat dissipating cavity 325.

[0068] It is understandable that, during assembling the light-direction adjustment device, the first heat dissipating cavity 324 and the second heat dissipating cavity 325 are communicated with the heat exchanging space 131 through the first receiving chamber 14.

[0069] It is worth mentioning that the mounting substrate 321, the first heat dissipating piece 322 and each of the second heat dissipating pieces 323 are integrally made of aluminum material, so that the heat dissipating member 32 has a good heat dissipating effect and, during the operation of the light-direction adjustment device, the working environment temperature of the light source 31 will be ensured being not too high, and thus a life span of the light-direction adjustment device is prolonged.

[0070] Specifically, during the lighting emission of the light source 31 mounted on the mounting substrate 321, the light source 31 will also generate a large amount of heat, so that the temperature of the working environment of the light source 31 is rapidly raised and then the working environment of the light source 31 has a rapid deterioration. Since the heat dissipating member 32 is made of aluminum material, the large amount of heat generated by the light source 31 is transmitted to the first heat dissipating piece 322 and each of the second heat dissipating pieces 323 through the mounting substrate 321. Consequently, the heat is radiated to the outside of the light-direction adjustment device via the heat exchanging space 131 through the first heat dissipating cavity 324 and the second heat dissipating cavity 325 so as to ensure an atmospheric pressure balance of the interior and the exterior of the light-direction adjustment device, and thus ensuring that the temperature of the working environment of the light source 31 of the light-direction adjustment device will not be too high and the life span of the light-direction adjustment device is prolonged.

[0071] The adjustment unit adjustment unit 40 comprises a first driving member 41 and a second driving member 42, wherein the first driving member 41 and the second driving member 42 are respectively positioned at one end portion of the adjustment unit 40, wherein the first driving member 41 and the second driving member 42 have stable spatial positions. In other words, when the adjustment unit 40 is moved with respect to the housing 10 and the lamp body unit 20, the first driving member 41 and the second driving member 42 is able to move synchronously. In other words, the first driving member 41 and the second driving member 42 are able to move along a trajectory defined by the first driving surface 15 and the second driving surface 25.

[0072] Specifically, when assembling the light-direction adjustment device, the first driving member 41 is contacted with the first driving surface 15 and the first driving member 41 is capable of moving along a trajectory defined by the first driving surface 15. Preferably, the first driving surface 15 is a lower curved surface. The second driving member 42 is contacted with the second driving surface 25 and the second driving member 42 is capable of moving along a trajectory defined by the second driving surface 25. Preferably, the second driving surface 25 is an upper curved surface.

[0073] It is worth mentioning that the direction of the lamp body unit 20 is defined as the lower direction and the direction of the housing 10 is defined as the upper direction. It is understandable that the lower curved surface formed by the first driving surface 15 is facing toward the lamp body unit 20 and the upper curved surface formed by the second driving surface 25 is facing toward the housing 10.

[0074] The mounting substrate 321 has at least a third mounting hole 3212 and at least a second mounting member 3213. The second driving member 42 has at least a fourth mounting hole 421, wherein each of the second mounting member 3213 is mounted on the second driving member 42 by each of the third mounting holes 3212 and each of the fourth mounting holes 421, wherein the heat dissipating member 32 and the second driving member 42 form a second receiving chamber 422 and the light source 31 is positioned in the second receiving chamber 422.

[0075] Furthermore, the second driving member 42 has a second light channel 423, wherein the second light channel 423 is communicated with the second receiving chamber 422, so that the light generated by the light source 31 is radiated to the outside of the light-direction adjustment device through the second light channel 423.

[0076] One side portion of the mounting substrate 321 is extended in a perpendicular direction to form a first mounting shaft 326 and a second mounting shaft 327, wherein a diameter of the second mounting shaft 327 is smaller than a diameter of the first mounting shaft 326. The first driving member 41 has a first mounting cavity 411 and a second mounting cavity 412, wherein a diameter of the second mounting cavity 412 is smaller than a diameter of the first mounting cavity 411, and the second mounting shaft 327 is able to be moved along a path formed by the second mounting cavity 412.

[0077] Furthermore, the adjustment unit 40 further comprises a resilient element 43, wherein two end portions of the resilient element 43 are facing toward the first mounting shaft 326 and the first mounting cavity 411 respectively. The first mounting shaft 326 is able to be moved and displaced to return to its predetermined condition by the resilient element 43.

[0078] Specifically, when the first driving member 41 and the second driving member 42 are simultaneously and respectively moved with respect to the first driving surface 15 and the second driving surface 25, the second mounting shaft 327 is able to be moved along a path formed by the second mounting cavity 412 so as to change a distance between the first driving member 41 and the second driving member 42. In addition, the resilient element 43 ensures a frictional force generated between the first driving member 41 and the first driving surface 15 and a frictional force generated between the second driving member 42 and the second driving surface 25, such that the adjustment unit 40 can be fixed in any position.

[0079] More specifically, during the changing of the lighting direction of the light source 31 of the light-direction adjustment device, the relationships between each of the components are as follows:

[0080] In which, when the light-direction adjustment device is fixed to a certain position, the adjustment unit 40 is preinstalled such that the lamp body unit 20 and the housing 10 are in a vertical condition. At this condition, the resilient element 43 relies on an elastic force generated by the first mounting shaft 326 and the first mounting cavity 411 to ensure the adjustment unit 40 being located on this position stably.

[0081] In which, when one side portion of the second driving member 42 applies an external force to the housing 10, the first driving member 41 and the second driving member 42 are synchronously and respectively moved along the trajectory defined by the first driving surface 15 and the second driving surface 25, and the second mounting shaft 327 is moved along a path formed by the second mounting cavity 412. It is understandable that the external force overcomes the frictional force generated between the first driving member 41 and the first driving surface 15 and the friction forced generated between the second driving member 42 and the second driving surface 25. Therefore, this process fixes the change of the lighting direction of the light source 31 of the adjustment unit 40.

[0082] It is worth mentioning that when the external force applied on the second driving member 42 is released, the first driving member 41 may perform a movement and a displacement toward the first driving surface 15 under the action of the resilient element 43, so that the frictional force is generated between the first driving member 41 and the first driving surface 15. Correspondingly, the second driving member 42 may perform a movement and a displacement toward the second driving surface 25, so that the frictional force is generated between the second driving member 42 and the second driving surface 25. Accordingly, the frictional forces generated between each above components ensure that the adjustment unit 40 is fixed on the adjusted position. In other words, when there is no external force applying on the second driving member 42 again, the light emitting direction of the light source 31 will no longer be changed so as to meet the ultimate need of the light-direction adjustment device.

[0083] In view of the above description, it is understandable that when there is an external force reapplying on the second driving member 42, the lighting direction of the light source 31 is adjusted with the angle adjustment of the adjustment unit 40 to achieve a multiple angle adjustment.

[0084] It is understandable that since the adjustment unit 40 is positioned in the first receiving chamber 14 formed by the housing 10 and the lamp body unit 20, during a process of the adjustment unit 40 changing the emitting direction of the light source 31, there is no need to occupy additional spaces beside the occupied space of the light-direction adjustment device, so that the light-direction adjustment device can be utilized in a narrow and small space.

[0085] Preferably, the light emitting unit 30 comprises a reflecting element 33 mounted on the mounting substrate 321, wherein the reflecting element 33 has a third light channel 331 such that the light generated by the light source 31 is emitted through the third light channel 331. The advantages of the reflecting element 33 include that when the light source 31 emits lights, the lights emit to surroundings with the light source 31 as a base point, and that the reflecting element 33 reflects the lights emitted toward the mounting substrate 321, so that the light emitting direction of the light source 31 has a good directivity and thus an optical effect of the light-direction adjustment device is enhanced.

[0086] Based on the above disclosure of the invention, the light emitting unit 30 further comprises a spotlighting element 34. The spotlighting element 34 comprises a fixing portion 341 and a spotlighting portion 342 integrally formed with the fixing portion 341. The second driving member 42 has a retaining portion 424, wherein the fixing portion 341 is fixed to the retaining portion 424. The lights generated by the light source 31 is emitted from the spotlighting portion 342, so that the spotlighting element 34 enables the lights generated by the light source 31 to have a good consistency and thus to improve the utilization of the lights generated by the light source 31.

[0087] It is worth mentioning that, as the conventional spotlights are array light sources, the lights generated by the conventional spotlights have a poor consistency. Compared with the conventional spotlights, the spotlighting element 34 of the present invention is preferably an optical lens. In particular, when the lights generated by the light source 31 is emitted by the spotlighting element 34, the spotlighting portion 342 of the spotlighting element 34 gathers the lights to enhance the consistency

of the lights, so that the light-direction adjustment device has a better using effect.

[0088] It is also worth mentioning that the light-direction adjustment device can be applied on various locations, such as outdoor, closet, indoor, and so on. In order to ensure the light-direction adjustment device having a good stability and to ensure that the pollution of dust, water or the like on the light-direction adjustment device is minimized, the light emitting unit 30 further comprises a second sealing member 35 mounted on the retaining portion 424 so as to ensure a better sealing performance between the spotlighting element 34 and the second driving member 42. It is understandable that the second sealing member 35 is positioned between the spotlighting element 34 and the second driving member 42 so as to seal a gap between the spotlighting element 34 and the second driving member 42, so that a life span of the light-direction adjustment device is prolonged and the security of the light-direction adjustment device is effectively guaranteed.

[0089] It is also worth mentioning that the positional relationship between the light emitting unit 30 and the adjustment unit 40 is stable, so that the light emitting direction of the light source 31 can be changed with the angle adjustment of the adjustment unit 40.

[0090] According to this preferred embodiment of the invention, two side portions of the first positioning element 21 are extended towards the housing 10 to form a holding portion 26. Accordingly, the first housing 11 has two blocking cavities 112 disposed symmetrically, wherein the blocking cavities 112 are communicated with the first receiving chamber 14 of the housing 10 and the external environment of the housing 10 and each of the blocking cavities 112 is provided adjacent to the holding portion 26. The light-direction adjustment device further comprises two holding units 50. One end portion of each of the holding units 50 is mounted on the holding portion 26, wherein when each of the holding units 50 rotates around each of the second driving surface 25, each of the blocking cavities 112 provides a rotating space for each of the holding units 50. In other words, during each of the holding units 50 rotating around each of the holding portion 26, each of the holding units 50 will not touch the first housing 11, so that there is a stable positional relationship between the housing 10 and the lamp body unit 20.

[0091] It is worth mentioning that each of the holding units 50 is made of an elastic material.

[0092] It is also worth mentioning that, when the light-direction adjustment device is in a non-assembling status, each of the holding units 50 is preinstalled closely to the first housing 11 of the housing 10, wherein when there is an external force applying on the holding units 50 to drive a free end portion of each of the holding units 50 away from the first housing 11, each of the holding units 50 has an ability of returning to its preinstalled position.

[0093] The lamp body unit 20 further comprises a stopper portion 27 provided on an outer side of the first positioning element 21. It is understandable that a diameter of the stopper portion 27 is greater than a diameter of the first positioning element 21. Preferably, the first positioning element 21, the second positioning member 22 and the stopper portion 27 are integrally formed.

[0094] It is worth mentioning that a catching and holding chamber 51 is formed between the holding units 50 and the stopper portion 27, wherein a size of the catching and holding chamber 51 can be changed with the distance adjustment between the free end portion of the holding units 50 and the first housing 11, so that the holding units 50 and the stopper portion 27 fix the light-direction adjustment device to its preinstalled position.

[0095] Referring to FIG. 3 to FIG. 8 of the drawings, according to the preferred embodiment of the present invention, the lamp body unit 20 further comprises a first fixing member 28 and a second fixing member 29, wherein the first fixing member 28 is mounted on the second heat dissipating pieces 323 and a first fixing chamber 281 is formed between the first fixing member 28 and the second heat dissipating pieces 323. Correspondingly, the first housing 11 further has a positioning hole 113, wherein the second fixing member 29 is mounted in the positioning hole 113 of the first housing 11 and the second fixing member 29 and the first housing 11 has a stable structural relationship. The second fixing member 29 further has a second fixing chamber 291. Input leads are extended to the interior of the light-direction adjustment device through the second fixing chamber 291 and the first fixing chamber 281 to provide power supply for the light source 31.

[0096] In other words, the transmission conductors extended to the interior of the light-direction adjustment device are fixed to the first fixing member 28 and the second fixing member 29 so as to prevent damages resulting from the output leads entangled in the internal of the light-direction adjustment device, under the precondition of not influencing a normal use of the light-direction adjustment device, when the adjustment unit 40 is faulty operated.

[0097] Referring to FIG. 9 to FIG. 10 of the drawings, an implementation form according to an alternative mode of the preferred embodiment of the present invention is illustrated.

[0098] The second housing 12 comprises a first connecting body 121 and a second connecting body 122, wherein one end portion of the first connecting body 121 is integrally extended to the second housing 12 and the other end portion of the first connecting body 121 is formed to connect with a connecting chamber 1211 having a thread structure. One end portion of the second connecting body 122 forms the first driving surface 15 and the other end portion forms a second connecting member 1221 having a thread structure. The thread structure of the second connecting member 1221 is matched with the thread structure of the connecting chamber 1211 so as to securely connect the second connecting body 122 with the first connecting body 121.

[0099] It is worth mentioning that since the first connecting body 121 and the second connecting body 122 are connected by thread structures, a distance between the first driving surface 15 and the second housing 12 is adjusted according to actual needs, so that the reliability of the light-direction adjustment device is improved.

[0100] Referring to FIG. 11 of the drawings, another implementation form according to an alternative mode of the preferred embodiment of the present invention is illustrated.

[0101] The second housing 12 comprises a first connecting body 121A and a second connecting body 122A, wherein one end portion of the first connecting body 121A is integrally extended to the second housing 12 and the other end portion of the first connecting body 121A is formed to connect with a connecting chamber 1211A. One end portion of the second connecting body 122A forms the first driving surface 15 and the other end portion of the second connecting body 122A forms a second connecting member 1221A. The second connecting member 1221A is mounted in the connecting chamber 1211A of the first connecting body 121A and the second connecting body 122A is mounted to the first connecting body 121A.

[0102] Referring to FIG. 12 and FIG. 13 of the drawings, one embodiment according to the above preferred embodiment of the present invention is illustrated, wherein the light-direction adjustment device is installed in a relatively narrow wardrobe. Compared with the conventional spotlights, the advantages of the light-direction adjustment device will also be further elaborated and revealed in the following description.

[0103] As shown in FIG. 12 of the drawings, the light-direction adjustment device is mounted on a top portion, a side portion or a rear portion of a wardrobe 60, wherein the light-direction adjustment device is mounted on the top potion of the wardrobe 60 as an example.

[0104] The wardrobe 60 has a top plate 61, wherein the top plate 61 has a pre-installed site 62. In which, a diameter of the pre-installed site 62 is larger than a diameter of the first positioning element 21 and a diameter of the pre-installed site 62 is smaller than a diameter of the stopper portion 27, so that the light-direction adjustment device is extended from a bottom portion of the top plate 61 through the pre-installed site 62 to an upper portion of the top plate 61 and the stopper portion 27 prevents the light-direction adjustment device throughout the pre-installed site 62.

[0105] External forces are applied on each of the holding units 50 to drive the free end portion of each of the holding units 50 away from the first housing 11, so that the catching and holding chamber 51 is formed between the stopper portion 27 and each of the holding units 50, wherein the top plate 61 is located in the catching and holding chamber 51. When the external forces applied on each of the holding units 50 are released, each of the holding units 50 has a tendency and a movement back to the preinstalled position due to the characteristics of the materials of each of the holding units 50, so that the top plate 61 is firmly clamped by the stopper portion 27 and each of the holding units 50. In other words, the stopper portion 27 and each of the holding units 50 are respectively contacted to a bottom portion and an upper portion of the top plate 61, so that the light-direction adjustment device is mounted on the pre-installed site 62 of the top plate 61.

[0106] As shown in FIG. 13, when the light-direction adjustment device is mounted on the ceiling, since the upper portions of some ceilings are covered with a layer of insulation cottons to maintain the temperature in the room, as a result, the layer of insulation cottons has a negative effect on the heat emission efficiency of the light-direction adjustment device. In order to solve the problem, according to the disclosed structure in the above alternative mode of the present invention, the first receiving chamber 14 formed by the housing 10 and the lamp body unit 20 is adjusted to an appropriate size. In other words, increasing the air for exchanging around the light-direction adjustment device enhances the heat emission efficiency of the light-direction adjustment device. Thus, the light-direction adjustment device in this environment is ensured to be normally used.

[0107] It is worth mentioning that the above disclosed specific embodiments of the light-direction adjustment device are exemplary only to further illustrated and disclose the advantages of the light-direction adjustment device during installation or removal process. Thus, one skilled in the art will understand that the above embodiments of the present invention are not intended to be limiting. During a process of using the light-direction adjustment device, users can select installation sites of the light-direction adjustment device and achieve different using effects of the light-direction adjustment device depending on their own needs.

[0108] Accordingly, the present invention further provides a method of adjusting a light emitting direction of the light source 31 by means of the light-direction adjustment device, wherein the light-direction adjustment device comprises the light source 31, the adjustment unit 40 mounted to the light source 31, the housing 10, and the lamp body unit 20, wherein the method comprises the following steps.

(a) Generate lights by the light source 31. It will be understandable that after the light source 31 is supplied with power, the lights are generated and are radiated from the light source 31 as a center. The step (a) further comprises the following steps:

(a.1) Reflect the lights generated by the light source 31 by the reflecting element reflecting element 33 such that the lights generated by the light source 31 have a good directivity.

(a.2) Provide the spotlighting element 34 to gather the lights through the spotlighting element 34

such that the lights generated by the light source 31 have a good consistency.

(b) Change the light emitting direction of the light source 31 when the adjustment unit is moved with respect to the lamp body unit 20 by applying an external force on the adjustment unit 40.

[0109] The step (b) further comprises the following steps.

(b.1.) Form the first driving surface 15 by the second housing 12 of the housing 10.

(b.2) Form the second driving surface 25 by the second positioning member 22 of the lamp body unit 20.

(b.3) Change the light emitting direction of the light source 31 by moving the first driving member 41 and the second driving member 42 along a trajectory defined by first driving surface 15 of the first driving member 41 and the second driving surface 25 of the second driving member 42.

[0110] On the other hand, the present invention also provides a method of manufacturing the light-direction adjustment device, wherein the method comprises the following steps.

(A) Provide the light source 31 to generate lights. It is understandable that after the light source 31 is provided with a power supply, the lights are generated and are radiated from the light source 31 as a center.

(B) Mold the housing 10 having the first driving surface 15 and the lamp body unit 20 having the second driving surface 25 respectively by moulds.

(C) Form the adjustment unit 40 comprising the first driving member 41 and the second driving member 42, wherein the first driving member 41 and the second driving member 42 are respectively and synchronously moved along a trajectory defined by the first driving surface 15 and the second driving surface 25, so as to change the light emitting direction of the light source 31.

[0111] It is worth mentioning that the light source 31 is mounted on the adjustment unit 40 such that the light source 31 and the adjustment unit 40 have relative stable positions. Thus, it is understandable that, the light emitting direction of the light source 31 can be changed with the angle adjustment of the adjustment unit 40. Furthermore, users can adjust the light emitting direction of the light source 31 through the above method to meet the needs of the users.

[0112] Preferably, the step (C) further comprises the steps of: providing the resilient element 43 which has two end portions respectively facing toward the first driving member 41 and the second driving member 42, wherein when the second driving member 42 faces toward the first driving member 41 to move, the resilient element 43 ensures the second driving member 42 having a tendency of returning to its preinstalled condition.

[0113] Based on the effects of the resilient element 43 in the light-direction adjustment device, it is understandable that during the changing of the angle of the adjustment unit 40, a frictional force between the first driving member 41 and the first driving surface 15 and a frictional force between the second driving member 42 and the second driving surface 25 are produced through the resilient element 43, so that the adjustment unit 40 can be fixed to any positions in the trajectory defined by the first driving surface 15 and the second driving surface 25. Thus, it is convenient for users to use the light-direction adjustment device to change the light emitting direction of the light source 31 and to further achieve the purpose of certain particular using states.

[0114] One skilled in the art will understand that the embodiment of the present invention as shown in the drawings and described above is exemplary only and not intended to be limiting.

[0115] It will thus be seen that the objects of the present invention have been fully and effectively accomplished. The embodiments have been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from such principles. Therefore, this invention includes all modifications encompassed within the scope of the following claims.

Claims

1. A light-direction adjustment device, comprising:

a housing (10);
a lamp body unit (20);
a light emitting unit (30) comprising a light source (31); and
an adjustment unit (40) comprising a first driving member (41) and a second driving member (42),
wherein said light source (31) is mounted on said adjustment unit (40) and said first driving member (41) and said second driving member (42) are respectively provided at one end portion of said adjustment unit (40), wherein said first driving member (41) and said second driving member (42) are able to be moved synchronously to change a direction of light emitted from said light source (31),
wherein said housing (10) comprises a first housing (11), a second housing (12) and two or more heat dissipating elements (13), wherein two ends of each of said heat dissipating ele-

ments (13) are respectively extended to said first housing (11) and said second housing (12) and a heat exchanging space (131) is formed between each of said two adjacent heat dissipating elements (13),

wherein said lamp body unit (20) comprises a first positioning element (21), wherein said housing (10) has at least a first mounting hole (101) and said lamp body unit (20) has at least a second mounting hole (201), wherein said lamp body unit (20) further comprises a first mounting member (24), wherein when said lamp body unit (20) is assembled with said housing (10), said first mounting member (24) is provided to enclose said housing (10), and said lamp body unit (20) is installed in said housing (10) by each of said first mounting members (24) through said second mounting holes (201) and each of said first mounting holes (101), wherein said housing (10) and said lamp body unit (20) form a first receiving chamber (14) and said adjustment unit (40) is positioned in said first receiving chamber (14),

wherein said lamp body unit (20) comprises a second positioning member (22), wherein said first positioning element (21) and said second positioning member (22) form a positioning groove (23), wherein when said lamp body unit (20) is assembled with said housing (10), one end portion of said first housing (11) is mounted in said positioning groove (23),

characterized in that said second housing (12) comprises a first connecting body (121) and a second connecting body (122), wherein one end portion of said first connecting body (121) is integrally extended to said second housing (12) and the other end portion of said first connecting body (121) has a connecting chamber (1211A), wherein one end portion of said second connecting body (122) forms a first driving surface (15) and the other end portion of said second connecting body (122) forms a second connecting member (1211), wherein said second connecting member (1211) is mounted in said connecting chamber (1211A), wherein said first driving surface (15) is a lower curved surface, wherein said second positioning member (22) forms a second driving surface (25) which is an upper curved surface, and said first driving member (41) and said second driving member (42) are able to be moved synchronously along a trajectory defined by said first driving surface (15) and said second driving surface (25) so as to change said direction of light emitted from said light source (31).

2. The light-direction adjustment device, as recited in claim 1, wherein said connecting chamber (1211A) has a first thread structure and said second connecting member (1211) has a second thread structure, wherein when said second connecting member (1211) is mounted in said connecting chamber (1211A), said second thread structure of said second connecting member (1211) is matched with said first thread structure of said connecting chamber (1211A) so as to connect said second connecting body (122) with said first connecting body (121).

3. The light-direction adjustment device, as recited in claim 1, wherein said light emitting unit (30) further comprises a heat dissipating member (32), wherein said heat dissipating member (32) further comprises a mounting substrate (321) having a mounting position, wherein said light source (31) is mounted on said mounting position such that said light source (31) is mounted on said mounting substrate (321).

4. The light-direction adjustment device, as recited in claim 3, wherein one side portion of said mounting substrate (321) is extended in a perpendicular direction to form a first heat dissipating piece (322) and at least two second heat dissipating pieces (323), wherein said second heat dissipating pieces (323) are spacedly and intervally arranged, wherein a first heat dissipating cavity (324) is formed between each of said two adjacent second heat dissipating pieces (323) and a second heat dissipating cavity (325) is formed between said first heat dissipating piece (322) and said mounting substrate (321), wherein two adjacent portions of each of said second heat dissipating pieces (323) are respectively extended to said first heat dissipating piece (322) and said mounting substrate (321).

5. The light-direction adjustment device, as recited in claim 4, wherein said mounting substrate (321) has at least a third mounting hole (3212) and at least a second mounting member (3213) and said second driving member (42) has at least a fourth mounting hole (421), wherein said second driving member (42) is mounted on said mounting substrate (321) by each of said second mounting members (3213) through each of said third mounting holes (3212) and each of said fourth mounting holes (421), wherein said heat dissipating member (32) and said second driving member (42) form a second receiving chamber (422) and said light source (31) is positioned in said second receiving chamber (422).

6. The light-direction adjustment device, as recited in claim 5, wherein one side portion of said mounting substrate (321) is extended in a perpendicular direction to form a first mounting shaft (326) and a second mounting shaft (327), wherein a diameter of said second mounting shaft (327) is smaller than a diameter of said first mounting shaft (326), wherein said first

driving member (41) has a first mounting cavity (411) and a second mounting cavity (412), wherein a diameter of said second mounting cavity (412) is smaller than a diameter of said first mounting cavity (411), wherein said second mounting shaft (327) is able to be moved along a path formed by said second mounting cavity (412) when said first driving member (41) and said second driving member (42) respectively are moved along said trajectory defined by said first driving surface (15) and said second driving surface (25).

7. The light-direction adjustment device, as recited in claim 6, wherein said adjustment unit (40) further comprises a resilient element (43), wherein two end portions of said resilient element (43) are respectively facing toward said first mounting shaft (326) and said first mounting cavity (411), wherein said first mounting shaft (326) is able to perform a movement and displacement returning to a predetermined condition thereof by said resilient element (43).

8. The light-direction adjustment device, as recited in claim 7, wherein said light emitting unit (30) further comprises a reflecting element (33) mounted on said mounting substrate (321), wherein said reflecting element (33) has a third light channel (331) such that said light generated by said light source (31) is emitted to outside of said light-direction adjustment device through said third light channel (331).

9. The light-direction adjustment device, as recited in claim 8, wherein said light emitting unit (30) further comprises a spotlighting element (34) comprising a fixing portion (341) and a spotlighting portion (342) integrally formed with said fixing portion (341), wherein said second driving member (42) has a retaining portion (424), wherein said fixing portion (341) is fixed to said retaining portion (424) and said light generated by said light source (31) is emitted to outside of said light-direction adjustment device by said spotlighting portion (342).

10. The light-direction adjustment device, as recited in claim 1, wherein two side portions of said first positioning element (21) are extended towards said housing (10) to form a holding portion (26), wherein said light-direction adjustment device further comprises two holding units (50) and one end portion of each of said holding units (50) is mounted on said holding portion (26), wherein said lamp body unit (20) further comprises a stopper portion (27) provided on an outer side of said first positioning element (21), wherein a catching and holding chamber (51) is formed between each of said holding units (50) and said stopper portion (27).

Patentansprüche

1. Lichtrichtungs-Anpassvorrichtung, umfassend:

ein Gehäuse (10);
eine Lampenkörpereinheit (20);
eine Lichtemissionseinheit (30) mit einer Lichtquelle (31); und
eine Anpasseinheit (40), umfassend ein erstes Antriebselement (41) und ein zweites Antriebselement (42), wobei die Lichtquelle (31) an der Anpasseinheit (40) angebracht ist, und das erste Antriebselement (41) und das zweite Antriebselement (42) an jeweils einem Endbereich der Anpasseinheit (40) vorgesehen sind, wobei das erste Antriebselement (41) und das zweite Antriebselement (42) in der Lage sind, synchron bewegt zu werden, um eine Richtung von seitens der Lichtquelle (31) emittiertem Licht zu ändern,
wobei das Gehäuse (10) ein erstes Gehäuse (11), ein zweites Gehäuse (12) und zwei oder mehr Wärmeableitelemente (13) aufweist, wobei zwei Enden jedes der Wärmeableitelemente (13) zu dem ersten Gehäuse (11) bzw. zu dem zweiten Gehäuse (12) erstreckt sind und zwischen jedem von den zwei benachbarten Wärmeableitelementen (13) ein Wärmeaustauschraum (131) ausgebildet ist,
wobei die Lampenkörpereinheit (20) ein erstes Positionierelement (21) aufweist, das Gehäuse (10) ein erstes Montageloch (101) und die Lampenkörpereinheit (20) mindestens ein zweites Montageloch (201) besitzt, wobei die Lampenkörpereinheit (20) weiterhin ein erstes Anbringelement (24) aufweist, so dass, wenn die Lampenkörpereinheit (20) mit dem Gehäuse (10) zusammengebaut wird, das erste Anbringelement so vorgesehen ist, dass es das Gehäuse (10) einschließt, die Lampenkörpereinheit (20) in dem Gehäuse (10) durch jedes der ersten Anbringelemente (24) durch die zweiten Montagelöcher (202) und jedes der ersten Montagelöcher (101) installiert ist, wobei das Gehäuse (10) und die Lampenkörpereinheit (20) eine erste Aufnahmekammer (14) bilden und die Anpasseinheit (40) in der ersten Aufnahmekammer (14) angeordnet ist,
wobei die Lampenkörpereinheit (20) ein zweites Positionierelement (22) aufweist, das erste Positionierelement (21) und das zweite Positionierelement (22) eine Positioniernut (23) bilden, so dass, wenn die Lampenkörpereinheit (20) mit dem Gehäuse (10) zusammengebaut wird, ein Endbereich des ersten Gehäuses (11) in der Positioniernut (23) aufgenommen ist,
dadurch gekennzeichnet, dass das zweite Gehäuse (12) einen ersten Verbinderkörper

(121) und einen zweiten Verbinderkörper (122) aufweist, wobei ein Endbereich des ersten Verbinderkörpers (121) sich integral zu dem zweiten Gehäuse (12) erstreckt, und der andere Endbereich des ersten Verbinderkörpers (121) eine Verbindungskammer (1211A) besitzt, wobei ein Endbereich des zweiten Verbinderkörpers (122) eine erste Antriebsfläche (15) bildet, und der andere Endbereich des zweiten Verbinderkörpers (122) ein zweites Verbinderelement (1211) bildet, wobei das zweite Verbinderelement (1211) in der Verbindungskammer (1211A) untergebracht ist, die erste Antriebsfläche (15) eine untere gekrümmte Fläche ist, das zweite Positionierelement (22) eine zweite Antriebsfläche (25) als obere gekrümmte Fläche bildet, und das erste Antriebselement (41) und das zweite Antriebselement (42) in der Lage sind, synchron entlang einer Bahn bewegt zu werden, die definiert ist durch die erste Antriebsfläche (15) und die zweite Antriebsfläche (25), um die Richtung des von der Lichtquelle (31) emittierten Lichts zu ändern.

2. Vorrichtung nach Anspruch 1, bei der die Verbindungskammer (1211A) eine erste Gewindestruktur aufweist und das zweite Verbinderelement (1211) eine zweite Gewindestruktur besitzt, wobei, wenn das zweite Verbinderelement (1211) in der Verbindungskammer (1211A) aufgenommen ist, die zweite Gewindestruktur des zweiten Verbinderelements (1211) zu der ersten Gewindestruktur der Verbindungskammer (1211A) passt, um den zweiten Verbinderkörper (122) mit dem ersten Verbinderkörper (121) zu verbinden.

3. Vorrichtung nach Anspruch 1, bei der die Lichtemissionseinheit (30) weiterhin ein Wärmeableitelement (32) aufweist, welches seinerseits ein Trägersubstrat (321) mit einer Trägerposition aufweist, wobei die Lichtquelle (31) an der Trägerposition derart angebracht ist, dass die Lichtquelle (31) an dem Trägersubstrat (321) angebracht ist.

4. Vorrichtung nach Anspruch 3, bei der ein Seitenbereich des Trägersubstrats (321) in einer rechtwinkligen Richtung erstreckt ist, um ein erstes Wärmeableitstück (322) und mindestens zwei zweite Wärmeableitstücke (323) zu bilden, wobei die zweiten Wärmeableitstücke (323) räumlich und mit Abstand angeordnet sind, wobei ein erster Wärmeableithohlraum (324) zwischen jeweils den beiden benachbarten zweiten Wärmeableitstücken (323) gebildet ist und zwischen dem ersten Wärmeableitstück (322) und dem Trägersubstrat (321) ein zweiter Wärmeableithohlraum (325) gebildet ist, wobei zwei benachbarte Bereiche jedes der zweiten Wärmeableitstücke (323) jeweils zu dem ersten Wärmeableitstück (322) und dem Trägersubstrat (321) erstreckt sind.

5. Vorrichtung nach Anspruch 4, bei der das Trägersubstrat (321) mindestens ein drittes Montageloch (3212) und mindestens ein zweites Trägerelement (3213) aufweist, und das zweite Antriebselement (42) mindestens ein viertes Montageloch (421) besitzt, wobei das zweite Antriebselement (42) an dem Trägersubstrat (321) durch jedes der zweiten Montageelemente (3213) angebracht ist, durch die jeweils die dritten Montagelöcher (3212) und jedes der vierten Montagelöcher (421) verlaufen, wobei das Wärmeableitelement (32) und das zweite Antriebselement (42) eine zweite Aufnahmekammer (422) bilden und die Lichtquelle (31) in der zweiten Aufnahmekammer (422) aufgenommen ist.

6. Vorrichtung nach Anspruch 5, bei der ein Seitenbereich des Trägersubstrats (321) in einer rechtwinkligen Richtung erstreckt ist, um eine erste Montagewelle (326) und eine zweite Montagewelle (327) zu bilden, wobei der Durchmesser der zweiten Montagewelle (327) kleiner ist als der Durchmesser der ersten Montagewelle (326), wobei das erste Antriebselement (41) einen ersten Aufnahmehohlraum (411) und einen zweiten Aufnahmehohlraum (412) aufweist, wobei ein Durchmesser des zweiten Aufnahmehohlraums (412) kleiner ist als ein Durchmesser des ersten Aufnahmehohlraums (411), wobei die zweite Montagewelle (327) entlang einem Weg bewegbar ist, der gebildet wird durch den zweiten Aufnahmehohlraum (412), wenn das erste Antriebselement (41) und das zweite Antriebselement (42) entlang der durch die erste Antriebsfläche (15) und die zweite Antriebsfläche (25) definierte Bahn bewegt werden.

7. Vorrichtung nach Anspruch 6, bei der die Anpasseinheit (40) weiterhin ein elastisches Element (43) enthält, wobei zwei Endbereiche des elastischen Elements (43) der ersten Montagewelle (326) bzw. dem ersten Aufnahmehohlraum (411) zugewandt sind, wobei die erste Montagewelle (326) in der Lage ist, eine Bewegung und eine Versetzung in einen vorbestimmten Zustand durch das elastische Element (43) zu vollziehen.

8. Vorrichtung nach Anspruch 7, bei der die Lichtemissionseinheit (30) weiterhin ein reflektierendes Element (33) aufweist, angebracht an dem Trägersubstrat (321), wobei das reflektierende Element (33) einen dritten Lichtkanal (331) aufweist, so dass das von der Lichtquelle (31) emittierte Licht durch den dritten Lichtkanal (331) zur Außenseite der Lichtrichtungs-Anpassvorrichtung emittiert wird.

9. Vorrichtung nach Anspruch 8, bei der die Lichtemis-

sionseinheit (30) weiterhin ein Spotlight-Element (34) aufweist, umfassend einen Fixierabschnitt (341) und einen Spotlight-Abschnitt (342), der integral mit dem Fixierabschnitt (341) ausgebildet ist, wobei das zweite Antriebselement (42) einen Halteabschnitt (424) aufweist, wobei der Fixierabschnitt (341) an dem Halteabschnitt (424) fixiert ist und das von der Lichtquelle (31) erzeugte Licht durch den Spotlight-Abschnitt (342) aus der Lichtrichtungs-Anpassvorrichtung heraus emittiert wird.

10. Vorrichtung nach Anspruch 1, bei der zwei Seitenabschnitte des ersten Positionierelements (21) zu dem Gehäuse (10) unter Bildung eines Halteabschnitts (26) erstreckt sind, wobei die Lichtrichtungs-Anpassvorrichtung weiterhin zwei Halteeinheiten (50) aufweist und ein Endbereich jeder der Halteeinheiten (50) an dem Halteabschnitt (26) angebracht ist, wobei die Lampenkörpereinheit (20) weiterhin einen Anschlagabschnitt (27) an der Außenseite des ersten Positionierelements (41) aufweist, und zwischen jeder der Halteeinheiten (50) und dem Anschlagabschnitt (27) eine Auffang- und Haltekammer (51) gebildet ist.

Revendications

1. Dispositif d'ajustement de direction de lumière comprenant :

un boîtier (10) ;
une unité de corps de lampe (20) ;
une unité d'émission de lumière (30) comprenant une source de lumière (31) ; et
une unité d'ajustement (40) comprenant un premier élément d'entraînement (41) et un second élément d'entraînement (42), dans lequel ladite source de lumière (31) est montée sur ladite unité d'ajustement (40) et ledit premier élément d'entraînement (41) et ledit second élément d'entraînement (42) sont respectivement prévus au niveau d'une partie d'extrémité de ladite unité d'ajustement (40), dans lequel ledit premier élément d'entraînement (41) et ledit second élément d'entraînement (42) peuvent être déplacés de manière synchrone pour changer une direction de lumière émise à partir de ladite source de lumière (31),
dans lequel ledit boîtier (10) comprend un premier boîtier (11), un second boîtier (12) et deux éléments de dissipation de chaleur (13) ou plus, dans lequel deux extrémités de chacun desdits éléments de dissipation de chaleur (13) sont respectivement étendus vers ledit premier boîtier (11) et ledit second boîtier (12) et un espace d'échange de chaleur (131) est formé entre chacun desdits deux éléments de dissipation de chaleur (13) adjacents,
dans lequel ladite unité de corps de lampe (20) comprend un premier élément de positionnement (21), dans lequel ledit boîtier (10) a au moins un premier trou de montage (101) et ladite unité de corps de lampe (20) a au moins un deuxième trou de montage (201), dans lequel ladite unité de corps de lampe (20) comprend en outre un premier élément de montage (24), dans lequel lorsque ladite unité de corps de lampe (20) est assemblée avec ledit boîtier (10), ledit premier élément de montage (24) est prévu pour enfermer ledit boîtier (10), et ladite unité de corps de lampe (20) est installée dans ledit boîtier (10) par chacun desdits premiers éléments de montage (24) à travers lesdits deuxièmes trous de montage (201) et chacun desdits premiers trous de montage (101), dans lequel ledit boîtier (10) et ladite unité de corps de lampe (20) forment une première chambre de réception (14) et ladite unité d'ajustement (40) est positionnée dans ladite première chambre de réception (14),
dans lequel ladite unité de corps de lampe (20) comprend un second élément de positionnement (22), dans lequel ledit premier élément de positionnement (21) et ledit second élément de positionnement (22) forment une rainure de positionnement (23), dans lequel lorsque ladite unité de corps de lampe (20) est assemblée avec ledit boîtier (10), une partie d'extrémité dudit premier boîtier (11) est montée dans ladite rainure de positionnement (23),
caractérisé en ce que ledit second boîtier (12) comprend un premier corps de raccordement (121) et un second corps de raccordement (122), dans lequel une partie d'extrémité dudit premier corps de raccordement (121) est étendue de manière solidaire vers ledit second boîtier (12) et l'autre partie d'extrémité dudit premier corps de raccordement (121) a une chambre de raccordement (1211A), dans lequel une partie d'extrémité dudit second corps de raccordement (122) forme une première surface d'entraînement (15) et l'autre partie d'extrémité dudit second corps de raccordement (122) forme un second élément de raccordement (1211), dans lequel ledit second élément de raccordement (1211) est monté dans ladite chambre de raccordement (1211A), dans lequel ladite première surface d'entraînement (15) est une surface incurvée inférieure, dans lequel ledit second élément de positionnement (22) forme une seconde surface d'entraînement (25) qui est une surface incurvée supérieure, et ledit premier élément d'entraînement (41) et ledit second élément d'entraînement (42) peuvent être déplacés de manière synchrone le long d'une trajectoire

définie par ladite première surface d'entraînement (15) et ladite seconde surface d'entraînement (25) afin de changer ladite direction de lumière émise à partir de ladite source de lumière (31).

2. Dispositif d'ajustement de direction de lumière selon la revendication 1, dans lequel ladite chambre de raccordement (1211A) a une première structure de filetage et ledit second élément de raccordement (1211) a une seconde structure de filetage, dans lequel lorsque ledit second élément de raccordement (1211) est monté dans ladite chambre de raccordement (1211A), ladite seconde structure de filetage dudit second élément de raccordement (1211) correspond à ladite première structure de filetage de ladite chambre de raccordement (1211A) afin de raccorder ledit second corps de raccordement (122) avec ledit premier corps de raccordement (121).

3. Dispositif d'ajustement de direction de lumière selon la revendication 1, dans lequel ladite unité d'émission de lumière (30) comprend en outre un élément de dissipation de chaleur (32), dans lequel ledit élément de dissipation de chaleur (32) comprend en outre un substrat de montage (321) ayant une position de montage, dans lequel ladite source de lumière (31) est montée sur ladite position de montage de sorte que ladite source de lumière (31) est montée sur ledit substrat de montage (321).

4. Dispositif d'ajustement de direction de lumière selon la revendication 3, dans lequel une partie latérale dudit substrat de montage (321) est étendue dans une direction perpendiculaire afin de former une première pièce de dissipation de chaleur (322) et au moins deux secondes pièces de dissipation de chaleur (323), dans lequel lesdites secondes pièces de dissipation de chaleur (323) sont agencées de manière espacée et à intervalle, dans lequel une première cavité de dissipation de chaleur (324) est formée entre chacune desdites deux secondes pièces de dissipation de chaleur (323) adjacentes et une seconde cavité de dissipation de chaleur (325) est formée entre ladite première pièce de dissipation de chaleur (322) et ledit substrat de montage (321), dans lequel deux parties adjacentes de chacune desdites secondes pièces de dissipation de chaleur (323) sont respectivement étendues vers ladite première pièce de dissipation de chaleur (322) et ledit substrat de montage (321).

5. Dispositif d'ajustement de direction de lumière selon la revendication 4, dans lequel ledit substrat de montage (321) a au moins un troisième trou de montage (3212) et au moins un second élément de montage (3213) et ledit second élément d'entraînement (42) a au moins un quatrième trou de montage (421), dans lequel ledit second élément d'entraînement (42) est monté sur ledit substrat de montage (321) par chacun desdits seconds éléments de montage (3213) à travers chacun desdits troisièmes trous de montage (3212) et chacun desdits quatrièmes trous de montage (421), dans lequel ledit élément de dissipation de chaleur (32) et ledit second élément d'entraînement (42) forment une seconde chambre de réception (422) et ladite source de lumière (31) est positionnée dans ladite seconde chambre de réception (422).

6. Dispositif d'ajustement de direction de lumière selon la revendication 5, dans lequel une partie latérale dudit substrat de montage (321) est étendue dans une direction perpendiculaire pour former un premier arbre de montage (326) et un second arbre de montage (327), dans lequel un diamètre dudit second arbre de montage (327) est inférieur à un diamètre dudit premier arbre de montage (326), dans lequel ledit premier élément d'entraînement (41) a une première cavité de montage (411) et une seconde cavité de montage (412), dans lequel un diamètre de ladite seconde cavité de montage (412) est inférieur à un diamètre de ladite première cavité de montage (411), dans lequel ledit second arbre de montage (327) peut être déplacé le long d'une trajectoire formée par ladite seconde cavité de montage (412) lorsque ledit premier élément d'entraînement (41) et ledit second élément d'entraînement (42) sont respectivement déplacés le long de ladite trajectoire définie par ladite première surface d'entraînement (15) et ladite seconde surface d'entraînement (25).

7. Dispositif d'ajustement de direction de lumière selon la revendication 6, dans lequel ladite unité d'ajustement (40) comprend en outre un élément résilient (43), dans lequel deux parties d'extrémité dudit élément résilient (43) sont respectivement orientées vers ledit premier arbre de montage (326) et ladite première cavité de montage (411), dans lequel ledit premier arbre de montage (326) peut réaliser un mouvement et un déplacement revenant à sa condition prédéterminée par ledit élément résilient (43).

8. Dispositif d'ajustement de direction de lumière selon la revendication 7, dans lequel ladite unité d'émission de lumière (30) comprend en outre un élément réfléchissant (33) monté sur ledit substrat de montage (321), dans lequel ledit élément réfléchissant (33) a un troisième canal de lumière (331) de sorte que ladite lumière générée par ladite source de lumière (31) est émise vers l'extérieur dudit dispositif d'ajustement de direction de lumière par le biais dudit troisième canal de lumière (331).

9. Dispositif d'ajustement de direction de lumière selon la revendication 8, dans lequel ladite unité d'émis-

sion de lumière (30) comprend en outre un élément d'éclairage par réflecteur (34) comprenant une partie de fixation (341) et une partie d'éclairage par réflecteur (342) formée de manière solidaire avec ladite partie de fixation (341), dans lequel ledit second élément d'entraînement (42) a une partie de retenue (424), dans lequel ladite partie de fixation (341) est fixée sur ladite partie de retenue (424) et ladite lumière générée par ladite source de lumière (31) est émise vers l'extérieur dudit dispositif d'ajustement de direction de lumière par ladite partie d'éclairage par réflecteur (342).

10. Dispositif d'ajustement de direction de lumière selon la revendication 1, dans lequel deux parties latérales dudit premier élément de positionnement (21) sont étendues vers ledit boîtier (10) afin de former une partie de maintien (26), dans lequel ledit dispositif d'ajustement de direction de lumière comprend en outre deux unités de maintien, (50) et une partie d'extrémité de chacune desdites unités de maintien (50) est montée sur ladite partie de maintien (26), dans lequel ladite unité de corps de lampe (20) comprend en outre une partie de butée (27) prévue sur un côté externe dudit premier élément de positionnement (21), dans lequel une chambre de prise et de maintien (51) est formée entre chacune desdites unités de maintien (50) et ladite partie de butée (27).

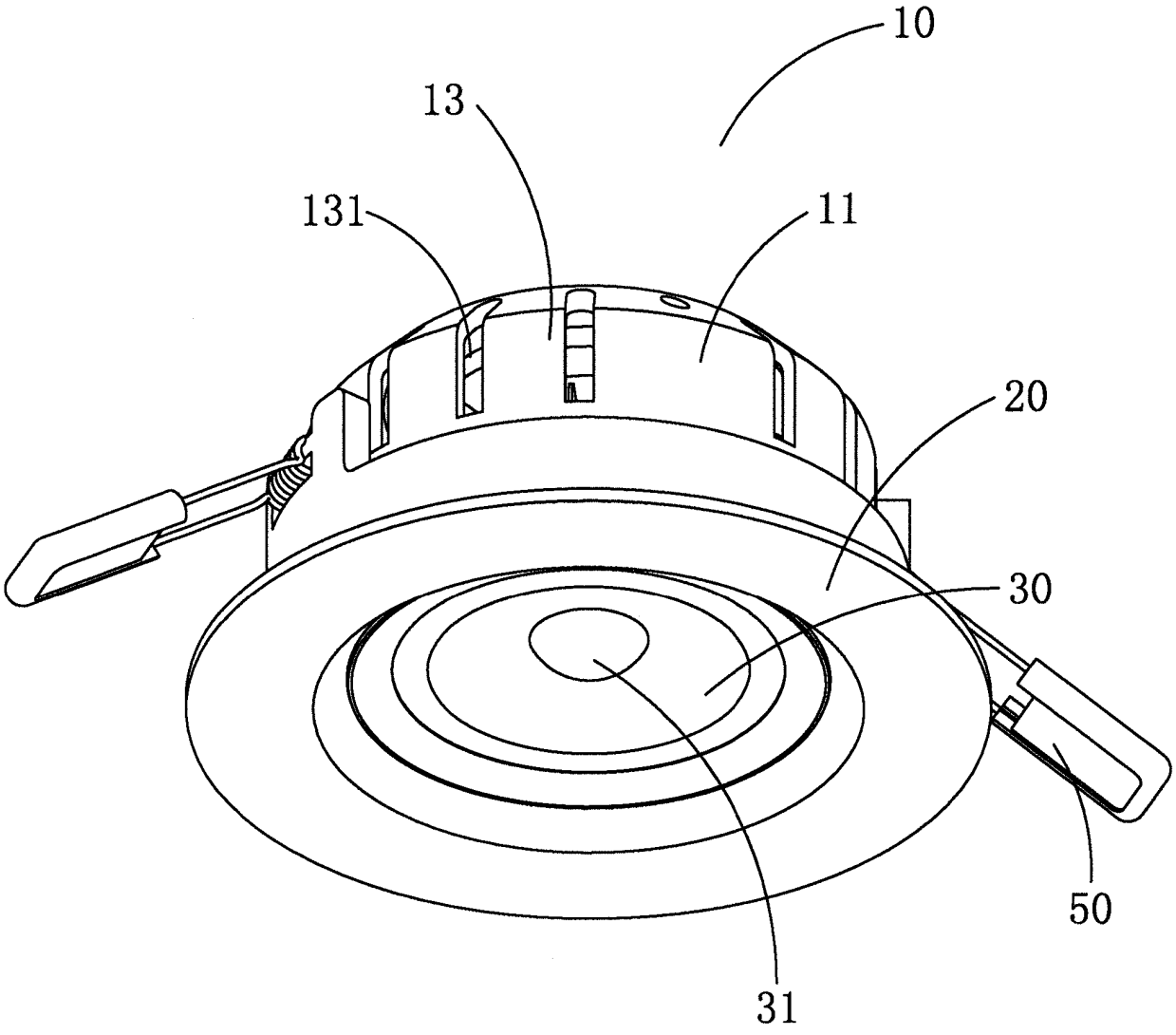

FIG.1

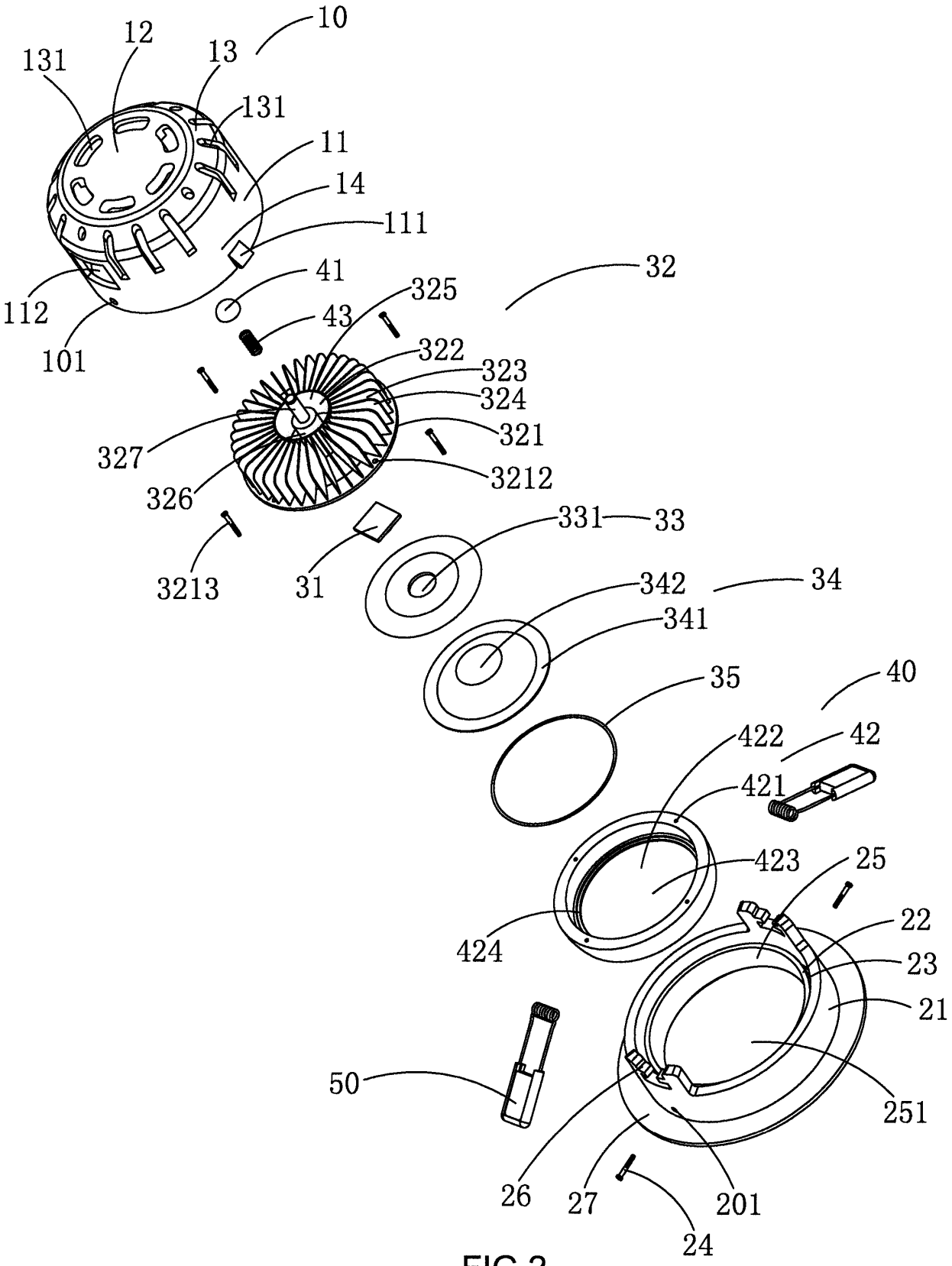
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FIG.2

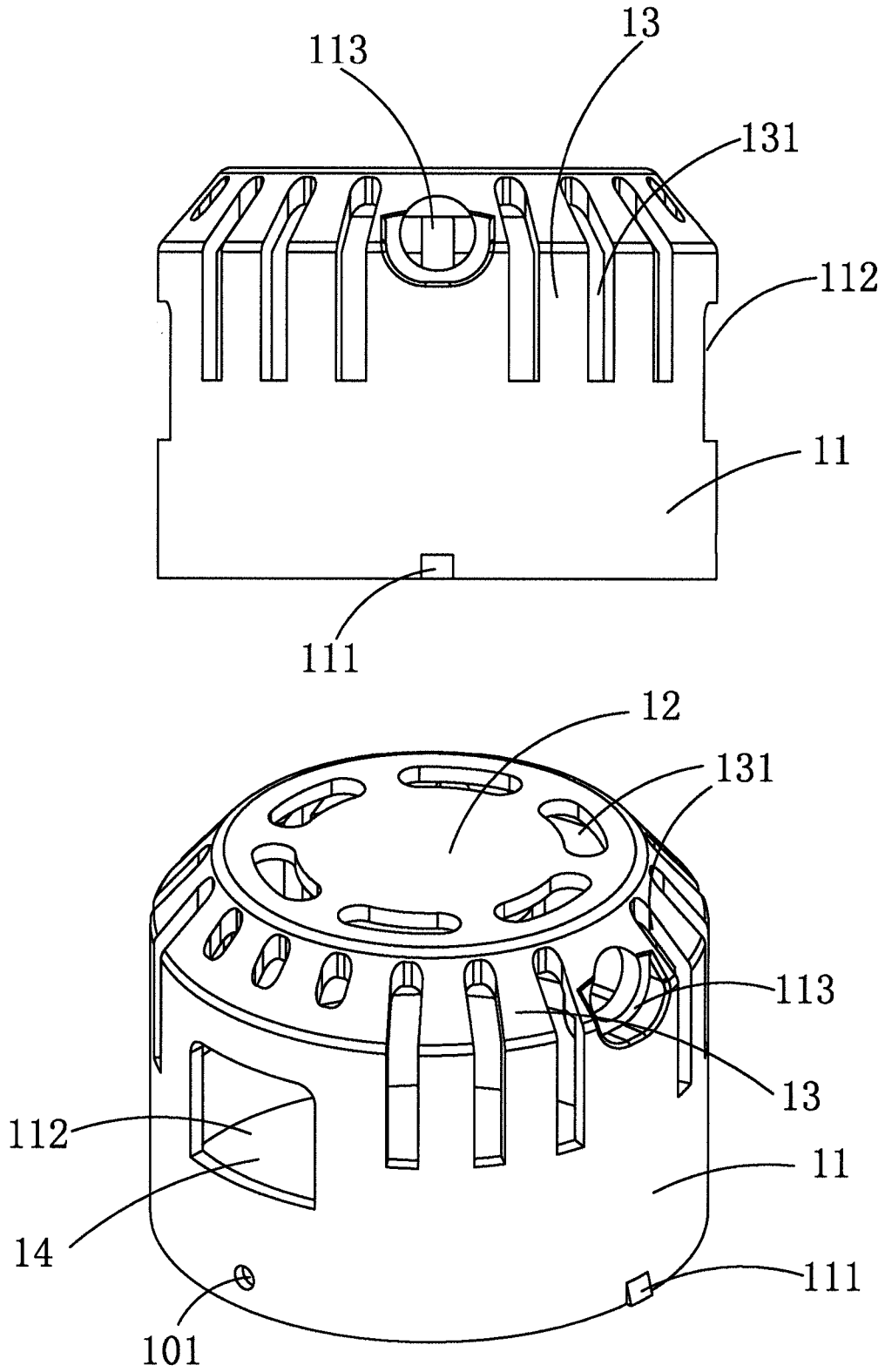

FIG.3

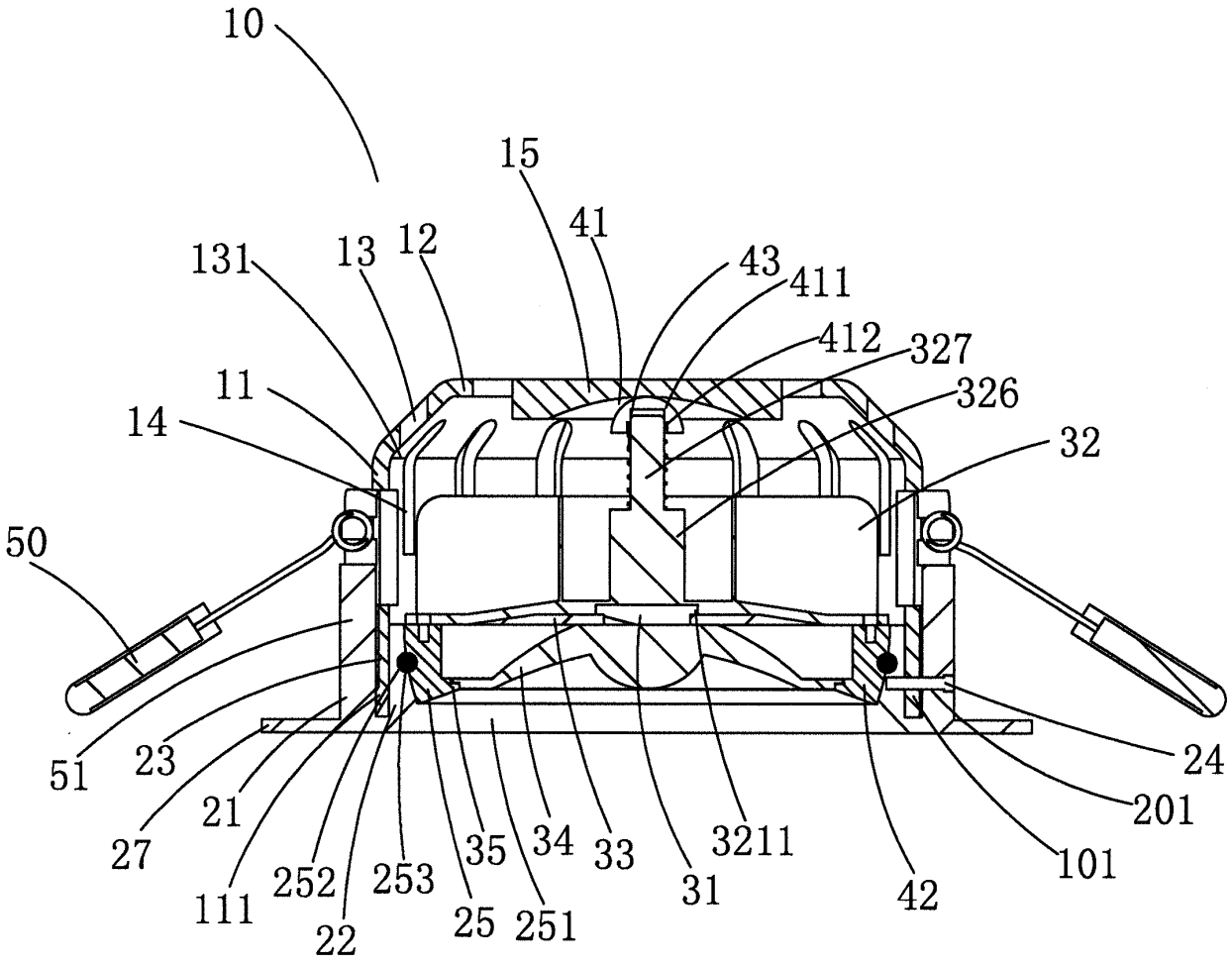
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FIG.4

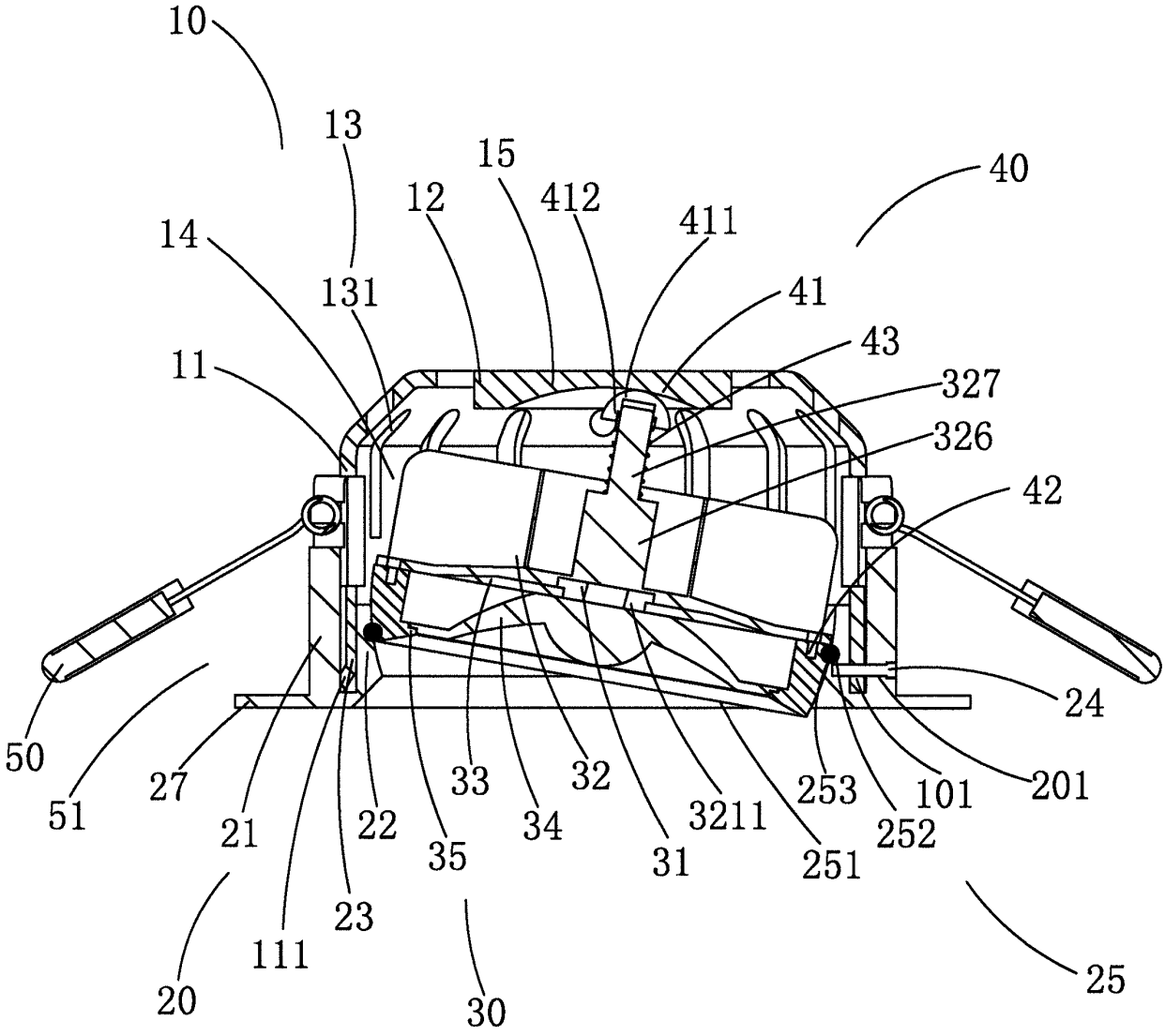
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FIG.5

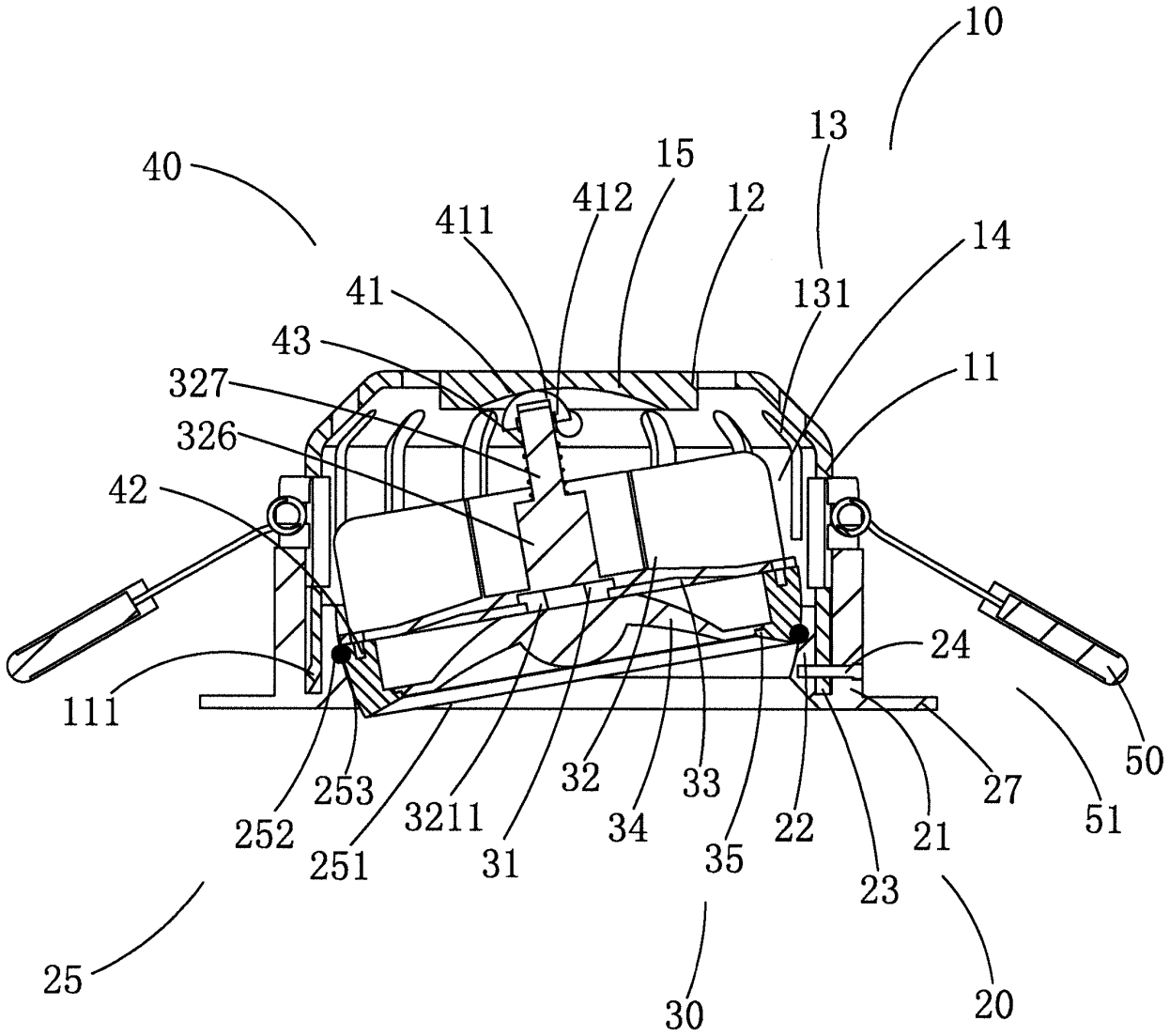
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FIG.6

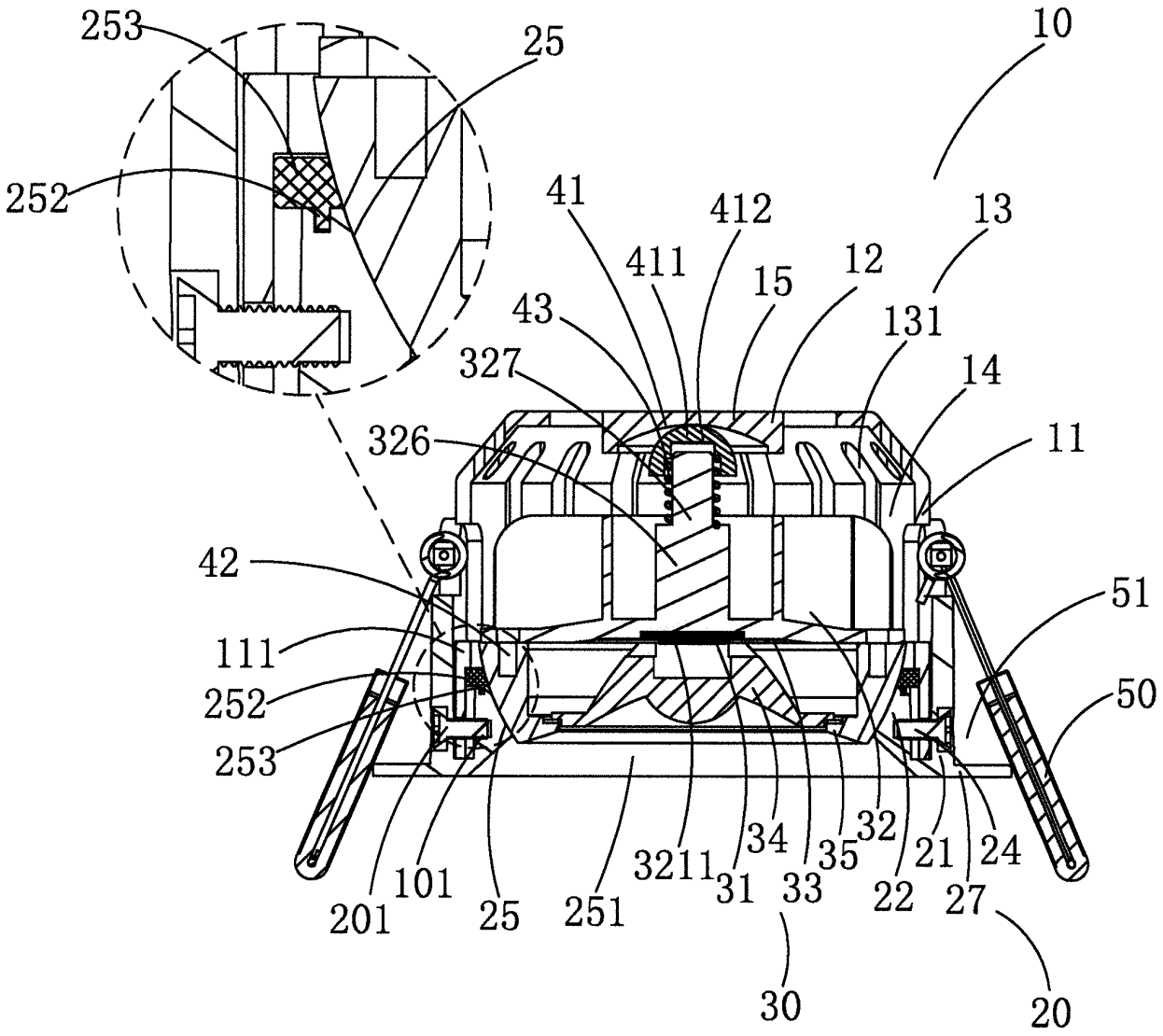
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FIG.7

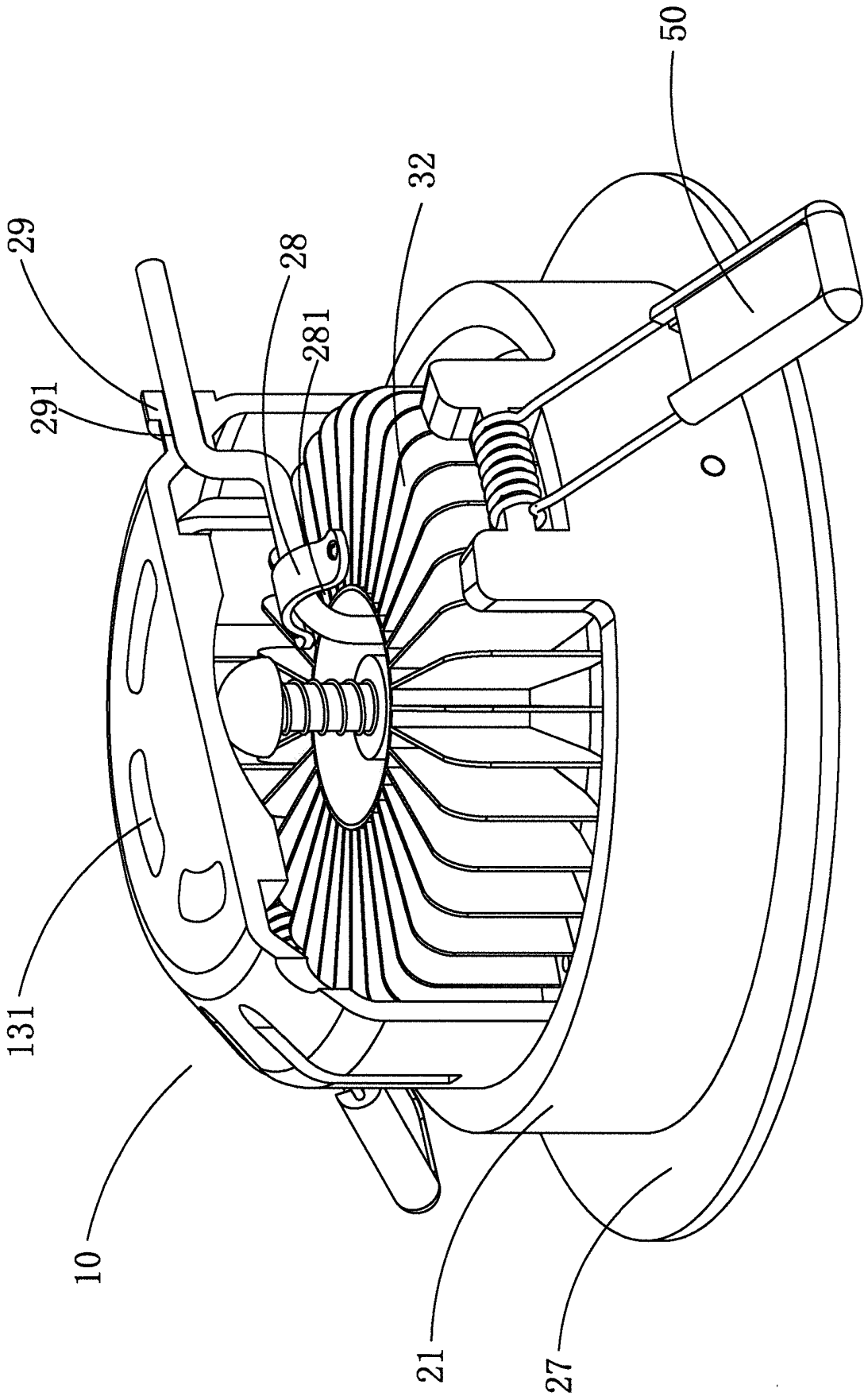

FIG.8

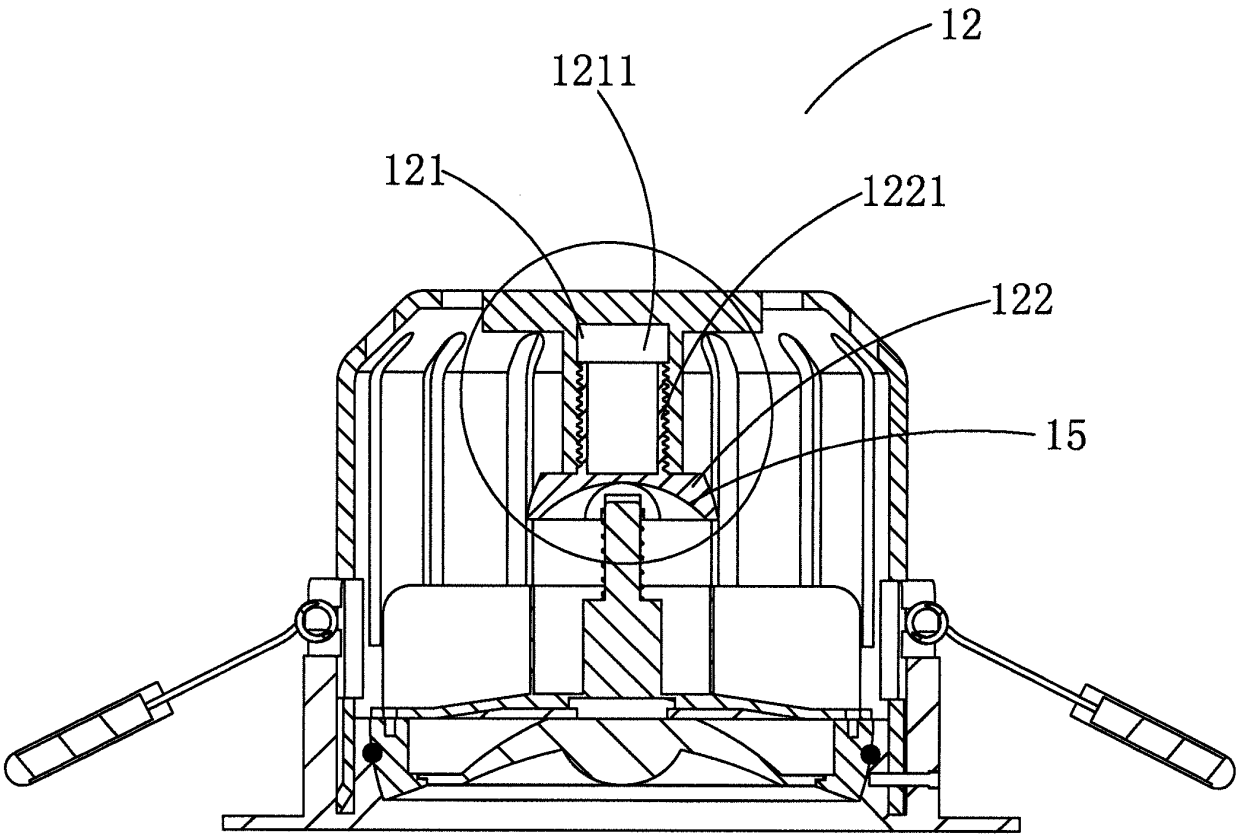

FIG.9

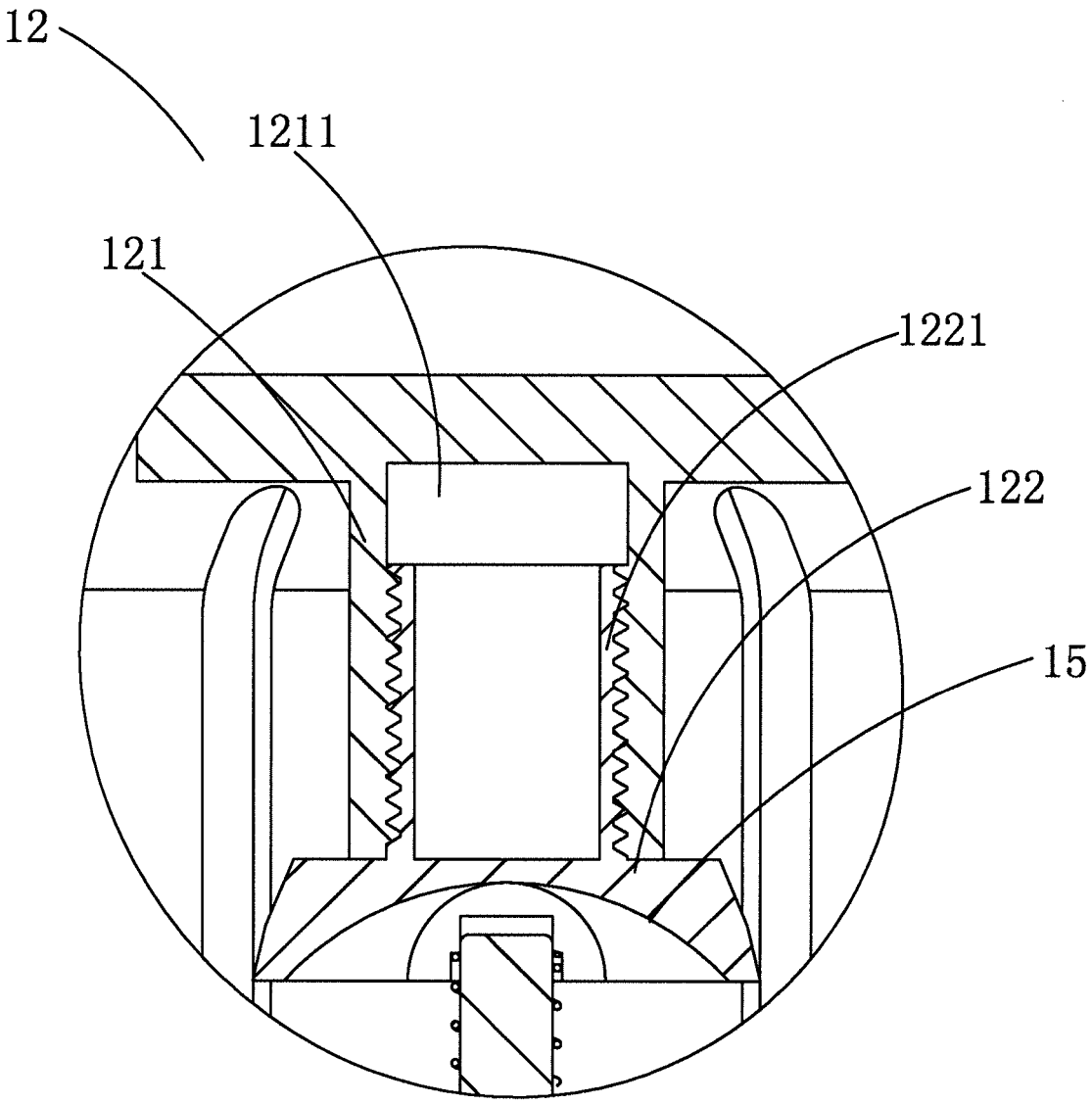

FIG.10

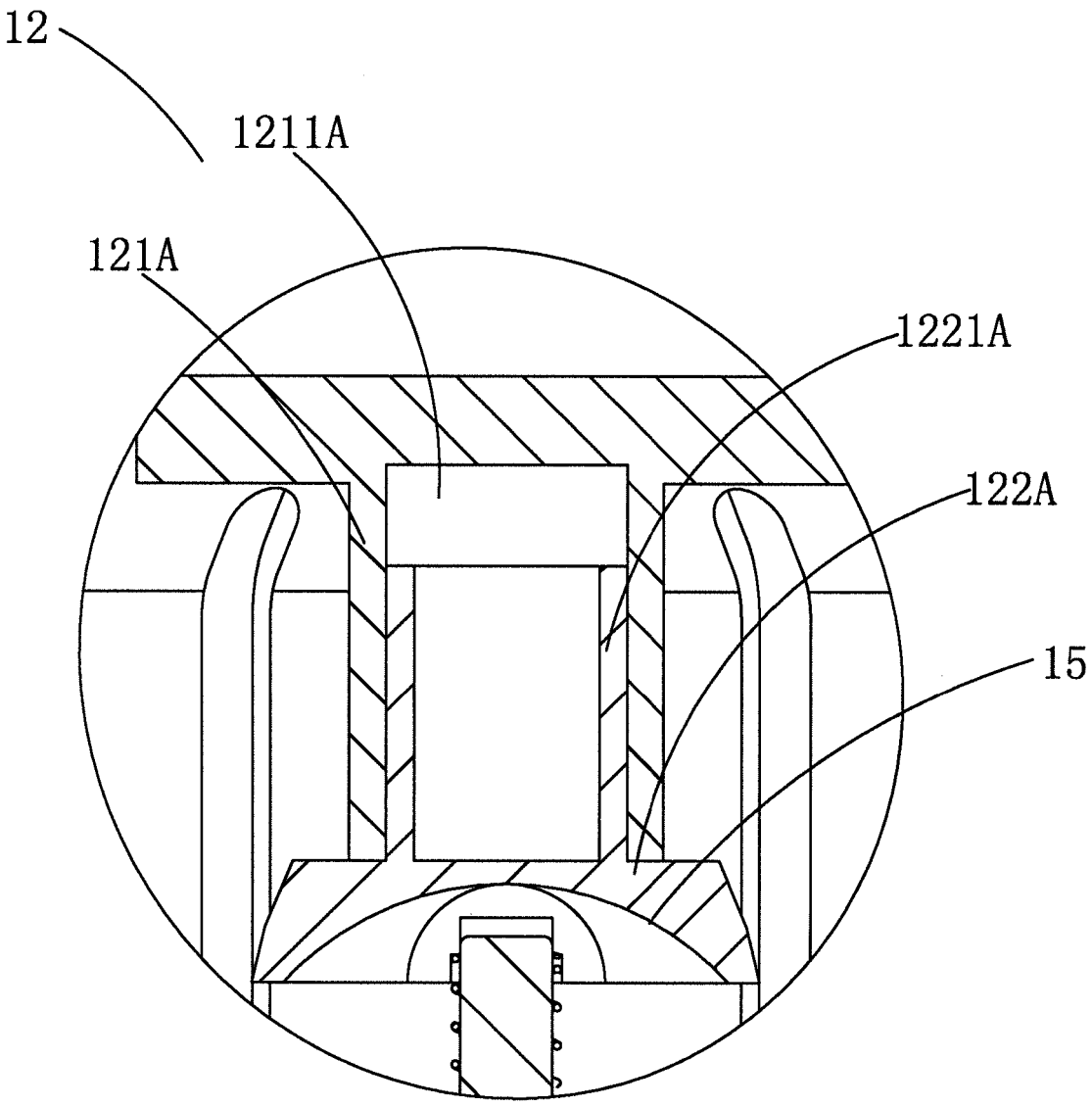

FIG.11

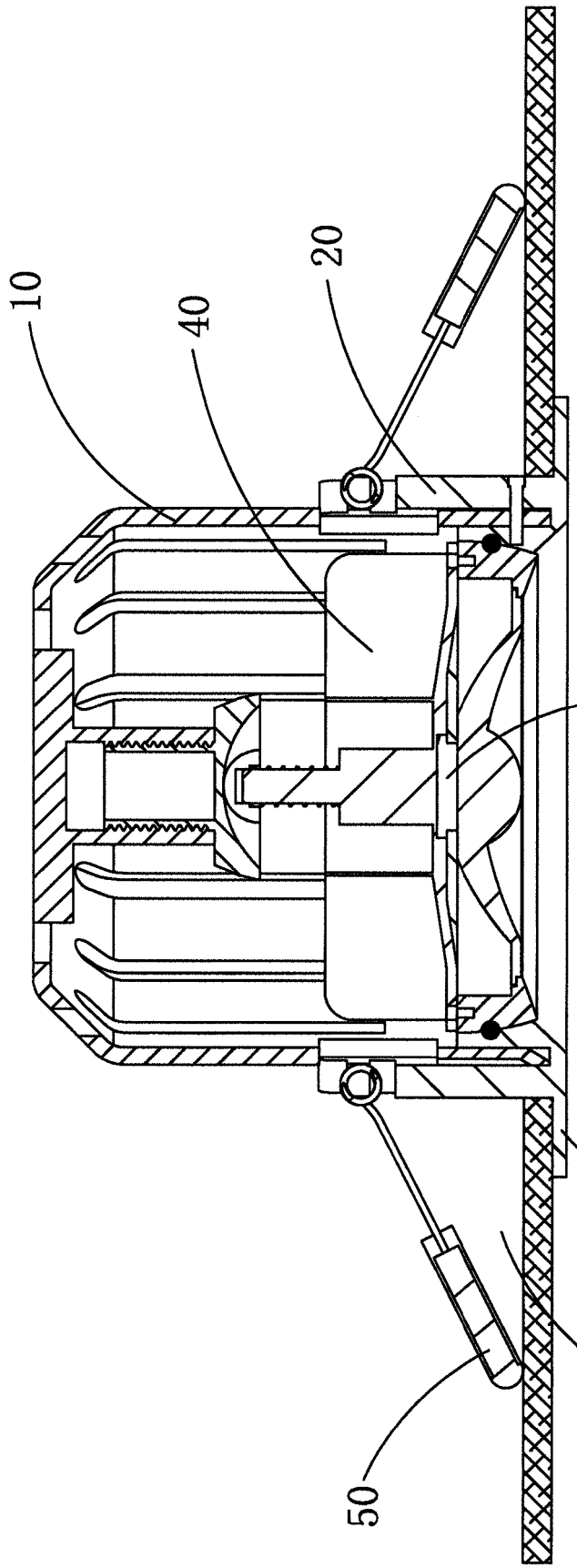

FIG.12

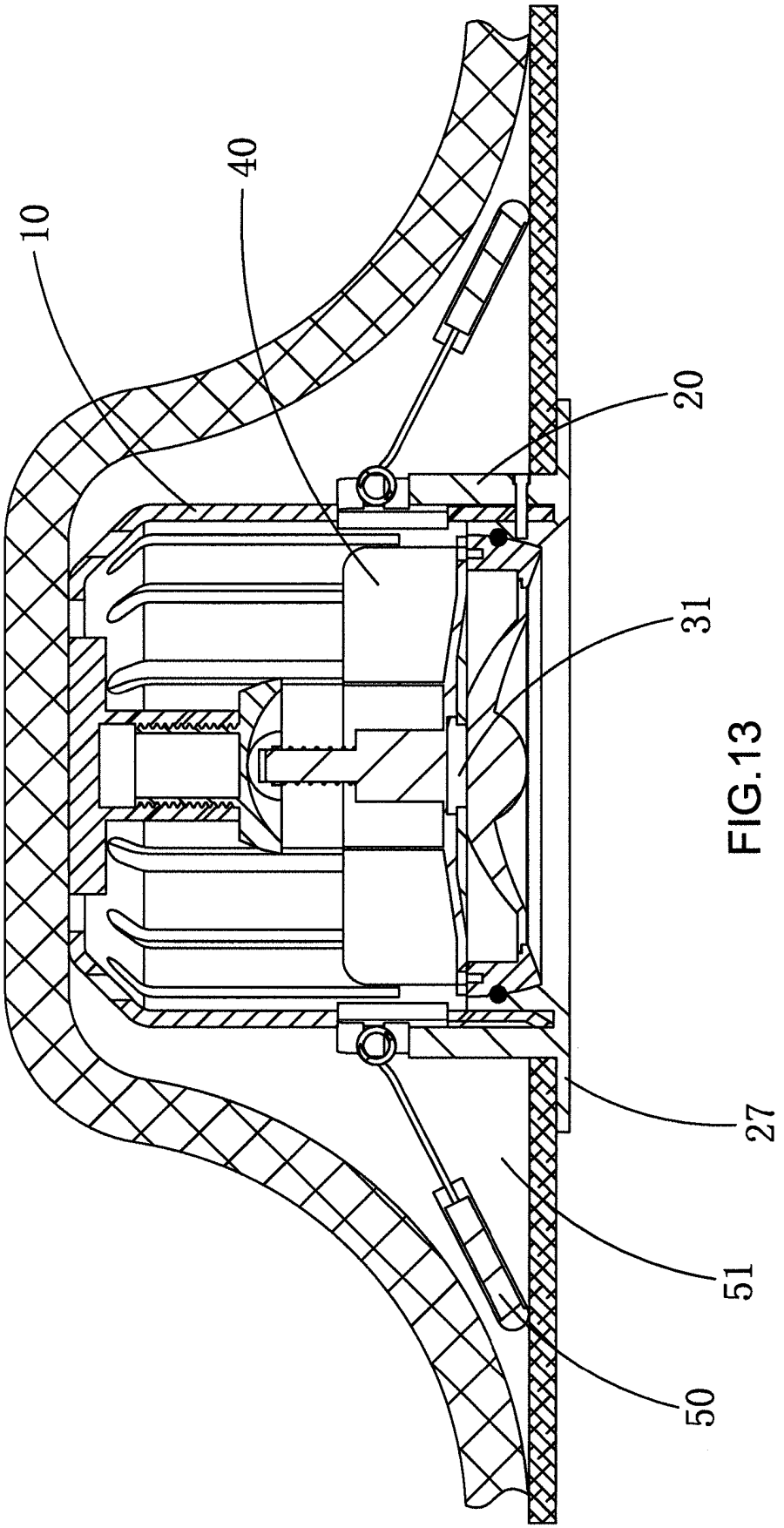

FIG.13

REFERENCES CITED IN THE DESCRIPTION

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