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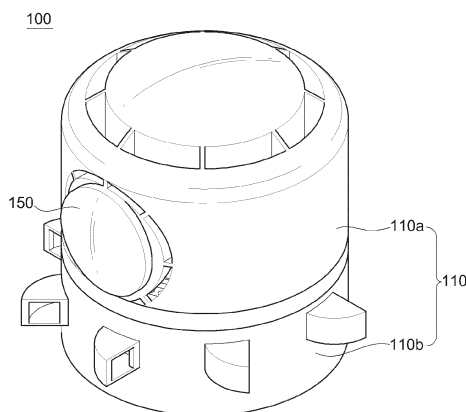
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(54) **LED LIGHTHOUSE BEACON**

(57) The present invention relates to an LED beacon that is capable of improving a light-collecting efficiency, decreasing a focal distance, reducing the size of the beacon, and performing light collection to a desired light distribution pattern, through first light collection of LED light-collecting lenses, second light collection and optical path change of a reflection part, and third light collection of a light-collecting lens.

Fig. 2



Description

[Technical Field]

[0001] The present invention relates to a light-emitting diode (which is simply referred to as "LED") beacon, and more particularly, to an LED beacon that is capable of improving a light-collecting efficiency, decreasing a focal distance, reducing the size of the beacon, and performing light collection to a desired light distribution pattern, through first light collection of LED light-collecting lenses, second light collection and optical path change of a reflection part, and third light collection of a light-collecting lens.

[Background Art]

[0002] Generally, a lighthouse is provided with lights, that is, beacons that give position information of a signal station with flashing lights and repeated periods of the flashing lights (characters of light), and the beacons are classified into a large-sized beacon which has a range of more than 25 NM, a medium-sized beacon which has a range of 10 to 25 NM, and a small-sized beacon which has a range of less than 10 NM.

[0003] A conventional rotating beacon is configured wherein a rotating motor shaft successively shifts different gear teeth by means of a gear driving motor type rotary device, thus conducting direct and indirect driving functions, and in this case, the rotating beacon makes use of a prism lens made of glass so as to concentrate the light emitted from incandescent lamps, thus illuminating a long distance with the concentrated light.

[0004] However, the conventional rotating beacon has a limitation in the illumination for a long distance due to the introduction of the incandescent lamps, and instead of the incandescent lamps, recently, an LED beacon, which is adequate for the illumination for a long distance because of straightness characteristics, has been introduced and developed, which is disclosed in Korean Patent No. 10-1123284 entitled 'high intensity LED omnidirectional flashing lamp'.

[0005] FIG. 1 is a perspective view showing a conventional high intensity LED omnidirectional flashing lamp. As shown, the conventional high intensity LED omnidirectional flashing lamp 20 includes a plurality of light-diffusing lenses 10, a hemispherical cap 21, a vertical bar 21', an upper reflection plate 22, light modules 23, reflection plates 23', heat radiation plates 23", a lower reflection plate 24, bolts 24', and a body housing 25.

[0006] The light modules 23 have LED lamps (not shown) embedded in the interiors thereof and take shapes of vertical bars in such a manner as to be cylindrically arranged in parallel with their adjacent light modules 23 on the lower reflection plate 22. That is, the six light modules 23 are arranged along the outer periphery of the flashing lamp 20 to have a hexagonal shape, thus irradiating light to all of directions.

[0007] According to the conventional LED lamp, however, it is impossible to adjust the focal distances of the LED light modules, thus making it hard to ensure appropriate focal distances and reducing the performance and reliability of the lamp, and further, a plurality of light modules and a plurality of light-diffusing lenses should be disposed to maintain given light intensity, thus making the lamp undesirably bulky.

[Disclosure]

[Technical Problem]

[0008] Accordingly, the present invention has been made in view of the above-mentioned problems occurring in the prior art, and it is an object of the present invention to provide an LED beacon that is capable of improving a light-collecting efficiency, decreasing a focal distance, reducing the size of the beacon, and performing light collection to a desired light distribution pattern, through first light collection of LED light-collecting lenses, second light collection and optical path change of a reflection part, and third light collection of a light-collecting lens.

[Technical Solution]

[0009] To accomplish the above-mentioned object, according to the present invention, there is provided an LED beacon including: a housing having a lens mounting portion formed on one side surface thereof; an LED module mounted inside the housing so as to collect the light emitted therefrom and output the collected light toward the upper side of the housing; a reflection part located over the LED module so as to reflect the light emitted from the LED module in such a manner as to allow the path of the light to be changed to a horizontal direction of the housing; a light-collecting lens mounted on the lens mounting portion of the housing so as to collect the light reflected from the reflection part in such a manner as to form a given light distribution pattern; a motor disposed at the interior of the housing so as to provide a driving force in such a manner as to allow the housing, the reflection part, and the light-collecting lens to rotate in a given direction; and a rotation support part located under the housing so as to support the rotation of the motor.

[0010] According to the present invention, preferably, the LED beacon further includes a heat radiation part located on the underside of the LED module so as to absorb and radiate the heat generated from the LED module.

[0011] According to the present invention, preferably, the LED module includes: a plurality of LED chips for emitting light therefrom; and a plurality of LED light-collecting lenses located on top of the plurality of LED chips so as to collect and output the light emitted from the plurality of LED chips.

[0012] According to the present invention, preferably, the reflection part is selected from a dome-like hemi-

sphere, a parabola-like hemisphere, and an oval-like hemisphere, which have open one side.

[0013] According to the present invention, preferably, the light-collecting lens is selected from a convex lens and a Fresnel lens.

[Advantageous Effects]

[0014] According to the present invention, the LED beacon can improve the light-collecting efficiency, decrease the focal distance, reduce the size of the beacon according to the decreased focal distance, and perform the light collection to the desired light distribution pattern, through the first light collection of the LED light-collecting lenses, the second light collection and optical path change of the reflection part, and the third light collection of the light-collecting lens.

[Description of Drawings]

[0015]

FIG.1 is a perspective view showing a conventional high intensity LED omni-directional flashing lamp.

FIG.2 is a perspective view showing an LED beacon according to the present invention.

FIG.3 is an exploded perspective view showing the configuration of the LED beacon of FIG.2.

FIG.4 is a sectional view showing the LED beacon of FIG.2.

[Mode for Invention]

[0016] Hereinafter, an explanation on an LED beacon according to the present invention will be in detail given with reference to the attached drawings.

[0017] FIG.2 is a perspective view showing an LED beacon according to the present invention, FIG.3 is an exploded perspective view showing the configuration of the LED beacon of FIG.2, and FIG.4 is a sectional view showing the LED beacon of FIG.2.

[0018] As shown in FIGS.2 to 4, an LED beacon 100 according to the present invention includes a housing 110, an LED module 120, a heat radiation part 130, a reflection part 140, a light-collecting lens 150, a motor 160, and a rotation support part 170.

[0019] The housing 110 is divided into an upper housing 110a and a lower housing 110b. The upper housing 110a is a cylindrical member open on bottom thereof and hollow in the interior thereof in such a manner as to accommodate the reflection part 140 thereinto, and further, the upper housing 110a has a lens mounting portion 111a formed on one side surface thereof in such a manner as to fix the light-collecting lens 150 thereto.

[0020] The lower housing 110b is a cylindrical member open on top thereof and hollow in the interior thereof in such a manner as to accommodate the LED module 120, the heat radiation part 130 and the motor 160 thereinto,

and further, the lower housing 110b has a through-hole 111b formed on the bottom surface thereof.

[0021] The LED module 120 is mounted over the lower housing 110b and includes a plurality of LED chips 121 and a plurality of LED light-collecting lenses 122. Accordingly, the LED module 120 is configured to collect the light emitted from the plurality of LED chips 121 and to output the collected light toward the upper side of the housing 110 in a vertical direction of the housing 110. Further, the LED module 120 includes a driving part (not shown) embedded therein so as to drive the plurality of LED chips 121.

[0022] The LED chips 121 are adapted to emit light therefrom and include high power LEDs.

[0023] The LED light-collecting lenses 122 are located on top of the LED chips 121 and serve to primarily collect the light emitted from the LED chips 121, thus outputting the collected light in a given direction of the housing 110, that is, toward the upper side of the housing 110 in the vertical direction of the housing 110.

[0024] The heat radiation part 130 is located on the underside of the LED module 120 and serves to absorb and radiate the heat generated from the LED module 120, thus allowing the LED module 120 to conduct an optimal operation.

[0025] Further, the heat radiation part 130 is supported coupled to a motor-rotating shaft 161 of the motor 160 and fixed to the motor-rotating shaft 161, while being not rotated together with the housing 110 and the reflection part 140 during their rotation.

[0026] The reflection part 140 is located over the LED module 120 and has a shape of a hemisphere having a concave dome-like inner aspheric surface, while being open at one side of the hemispherical surface thereof.

[0027] Further, the reflection part 140 is located to cover the LED module 120 and thus serves to collect the light emitted vertically from the LED module 120 to the interior thereof, thus performing second light collection. Next, the reflection part 140 serves to reflect the secondarily collected light to change the path of the secondarily collected light from the vertical direction of the housing 110 to the horizontal direction of the housing 110.

[0028] In addition, the reflection part 140 is coupled to the inner peripheral surface of the upper housing 110a and rotates together with the housing 110 during the rotation of the housing 110.

[0029] According to the present invention, the reflection part 140 is defined to have the dome-like hemispherical shape, but it may have a variety of shapes like plan-, parabola-, and oval-like hemispherical shapes, while being not limited thereto.

[0030] The light-collecting lens 150 is mounted on the lens mounting portion 111a of the upper housing 110a and serves to thirdly collect the light reflected from the reflection part 140 and thus to output the collected light having a light distribution pattern having a given light distribution angle. The light-collecting lens 150 is formed of any one of a convex lens and a Fresnel lens, and is de-

sirably formed of a Fresnel lens. However, the light-collecting lens 150 is not necessarily limited to the Fresnel lens.

[0031] That is, the light-collecting lens 150 forms the light distribution pattern having the given light distribution angle so that the light of the LED module 120 collected through the reflection part 140 can be observed from ships located at given long distances from the LED beacon 100 according to the present invention.

[0032] Further, the light-collecting lens 150 may be changed to another light-collecting lens having a different light distribution angle if necessary, thus forming light distribution patterns having various light distribution angles.

[0033] The motor 160 is disposed at the interior of the lower housing 110b in such a manner as to allow one side thereof to pass through the through-hole 111b and thus serves to provide a driving force in such a manner as to allow the upper housing 110a, the lower housing 110b, the reflection part 140, and the light-collecting lens 150 to rotate in a given direction. Desirably, the motor 160 is a brushless motor.

[0034] Additionally, the motor 160 is configured wherein one side of the motor-rotating shaft 161 is connected to the heat radiation part 130 and the other side thereof is passed through the through-hole 111b of the lower housing 110b and connected to a rotation shaft 171 of the rotation support part 170, and the case of the motor 160 is brought into close contact with the bottom of the lower housing 110b and thus rotates around the motor-rotating shaft 161.

[0035] The rotation support part 170 is located under the lower housing 110b and configured to have the rotation shaft 171 coupled to the motor-rotating shaft 161 of the motor 160 in such a manner as to allow the motor 160 to be rotatably supported.

[0036] Now, an explanation on the operation of the LED beacon 100 according to the present invention will be given.

[0037] If power is supplied to the LED module 120, the plurality of LED chips 121 emit light therefrom, and the emitted light toward the upper side of the housing 110 in the vertical direction of the housing 110 is first collected and outputted by means of the LED light-collecting lenses 122 mounted on the LED module 120.

[0038] The primarily collected light through the LED light-collecting lenses 122 is secondarily collected and reflected by means of the inner aspheric surface of the reflection part 140 to change the optical path from the vertical direction of the housing 110 to the horizontal direction thereof.

[0039] The light whose path is changed by means of the reflection part 140 is incident on the light-collecting lens 150 and thirdly collected thereon. The light collected on the light-collecting lens 150 is outputted with the light distribution pattern having a given light distribution angle.

[0040] That is, the light primarily collected on the LED light-collecting lenses 122 is secondarily collected and reflected on the reflection part 140 and thirdly collected

on the light-collecting lens 150, thus allowing a focal distance to be minimized through the reflection part 140 and accordingly reducing the size of the LED beacon 100.

[0041] If power is applied to the motor 160, further, the case of the motor 160 rotates around the motor-rotating shaft 161, and accordingly, the lower housing 110b disposed over the rotation support part 170 rotates, thus allowing the upper housing 110a coupled to the lower housing 110b to rotate together.

[0042] Further, the reflection part 140 disposed at the interior of the upper housing 110a rotates together, thus allowing the light to be irradiated in all directions of 360°.

[0043] As mentioned above, the LED beacon according to the present invention can improve the light-collecting efficiency, decrease the focal distance, reduce the size of the beacon according to the decreased focal distance, and perform the light collection to the desired light distribution pattern, through the first light collection of the LED light-collecting lenses, the second light collection and optical path change of the reflection part, and the third light collection of the light-collecting lens.

[0044] While the present invention has been described with reference to the particular illustrative embodiments, it is not to be restricted by the embodiment but only by the appended claims. It is to be appreciated that those skilled in the art can change or modify the embodiments without departing from the scope and spirit of the present invention.

[0045] In the description, the thicknesses of the lines or the sizes of the components shown in the drawing may be magnified for the clarity and convenience of the description. Further, the terms as discussed herein are defined in accordance with the functions of the present invention, but may be varied under the intention or regulation of a user or operator. Therefore, they should be defined on the basis of the whole scope of the present invention.

Claims

1. An LED beacon comprising:

- a housing 110 having a lens mounting portion 111a formed on one side surface thereof;
- an LED module 120 mounted inside the housing 110 so as to collect the light emitted therefrom and output the collected light toward the upper side of the housing 110;
- a reflection part 140 located over the LED module 120 so as to reflect the light emitted from the LED module 120 in such a manner as to allow the path of the light to be changed to a horizontal direction of the housing 110;
- a light-collecting lens 150 mounted on the lens mounting portion 111a of the housing 110 so as to collect the light reflected from the reflection part 140 in such a manner as to form a given

light distribution pattern;
a motor 160 disposed at the interior of the housing 110 so as to provide a driving force in such a manner as to allow the housing 110, the reflection part 140, and the light-collecting lens 150 to rotate in a given direction; and
a rotation support part 170 located under the housing 110 so as to support the rotation of the motor 160.

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2. The LED beacon according to claim 1, further comprising a heat radiation part 130 located on the underside of the LED module 120 so as to absorb and radiate the heat generated from the LED module 120.

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3. The LED beacon according to claim 1 or 2, wherein the LED module 120 comprises:

a plurality of LED chips 121 for emitting light therefrom; and
a plurality of LED light-collecting lenses 122 located on top of the plurality of LED chips 121 so as to collect and output the light emitted from the plurality of LED chips 121.

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4. The LED beacon according to claim 1 or 2, wherein the reflection part 140 is selected from a dome-like hemisphere, a parabola-like hemisphere, and an oval-like hemisphere, which have open one side.
5. The LED beacon according to claim 1 or 2, wherein the light-collecting lens 150 is selected from a convex lens and a Fresnel lens.

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Fig. 1

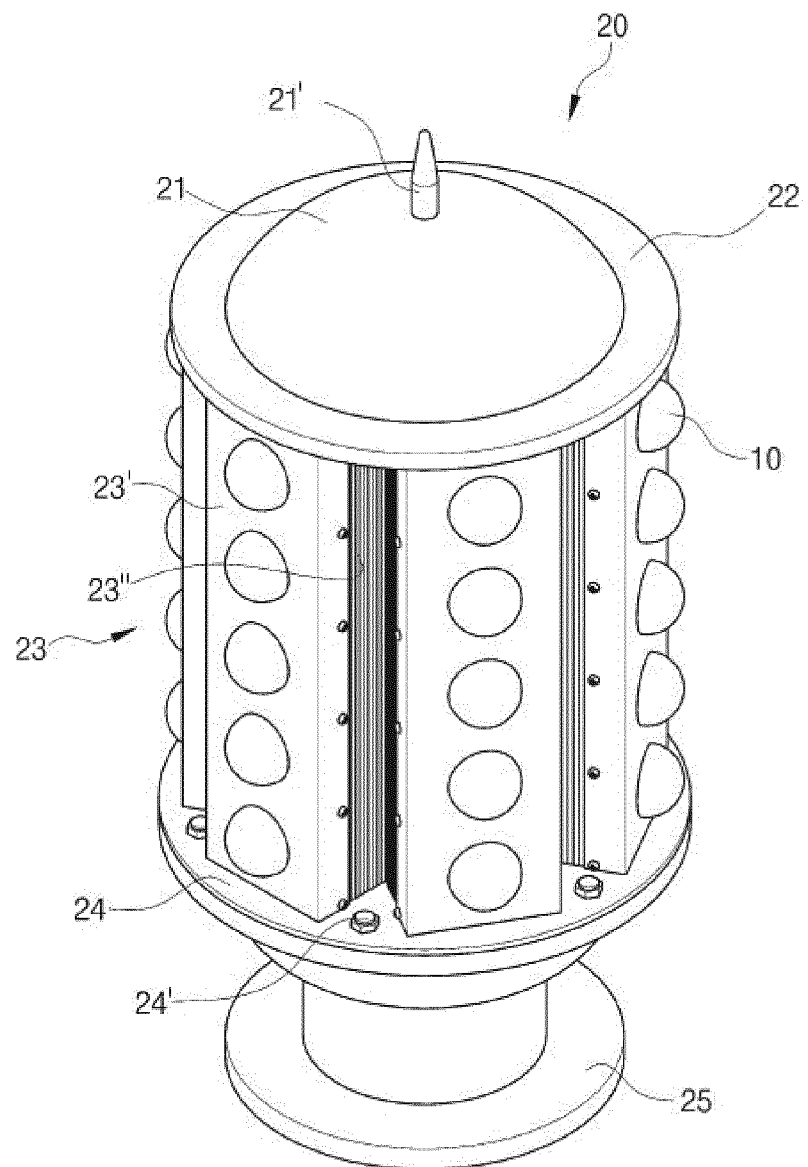


Fig. 2

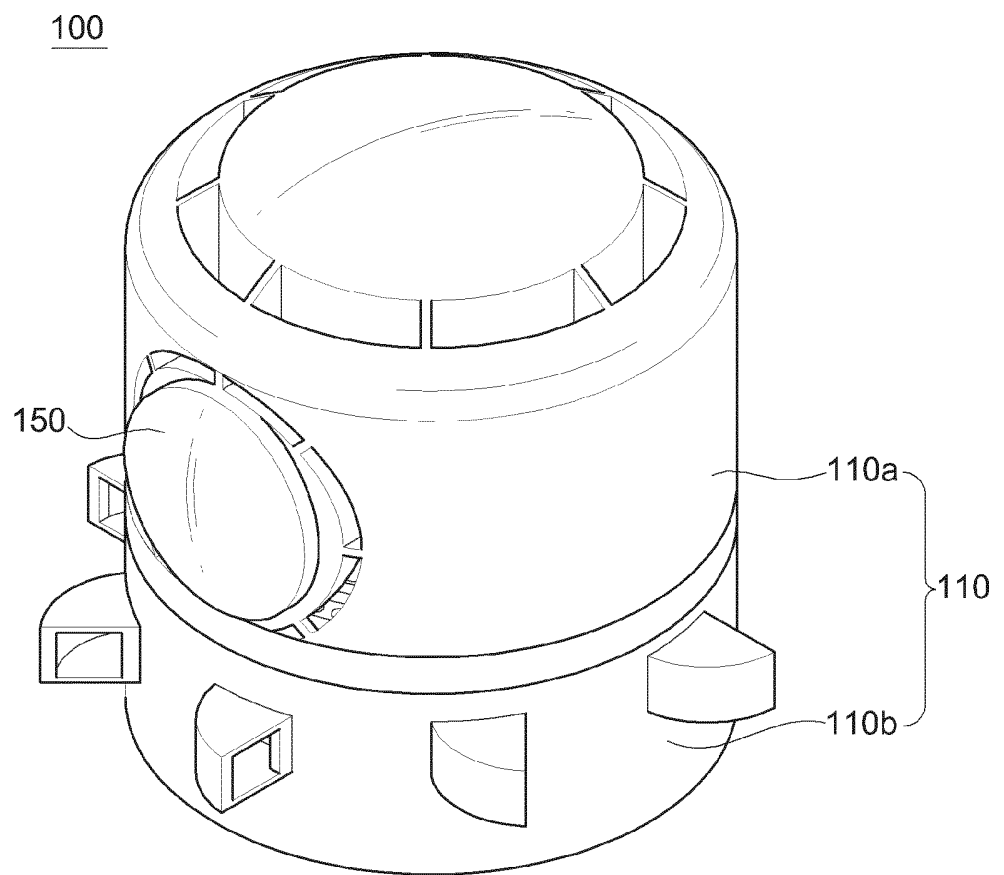


Fig. 3

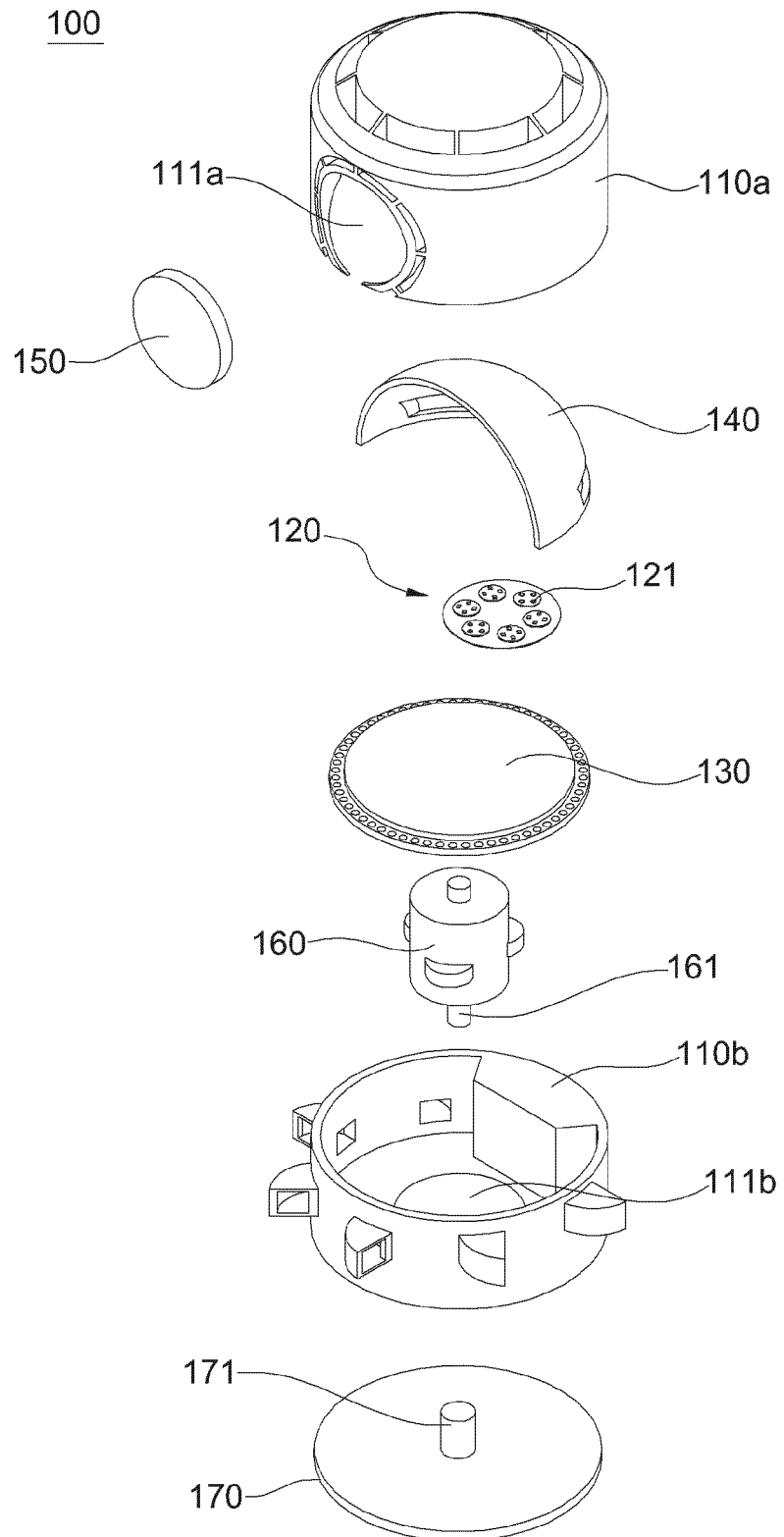
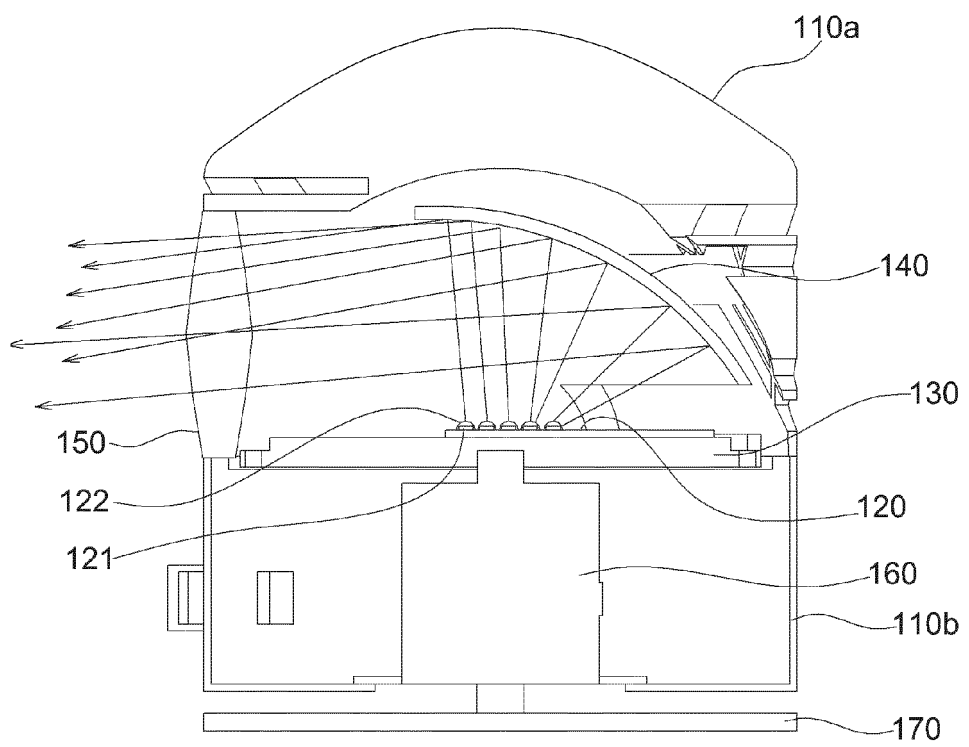


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2014/001506

A. CLASSIFICATION OF SUBJECT MATTER

F21V 5/04(2006.01); F21V 7/00(2006.01);

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F21V 5/04; F21V 15/01; F21S 2/00; G09F 13/32; F21V 7/09; F21S 8/00; F21V 14/00; F21V 7/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: LED, lighthouse lantern, light collecting lens, reflection part, rotation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☐ Further documents are listed in the continuation of Box C.
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* Special categories of cited documents:

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Date of the actual completion of the international search

27 JUNE 2014 (27.06.2014)

Date of mailing of the international search report

27 JUNE 2014 (27.06.2014)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

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