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[54]	Title:	LED SECURITY LIGHT OR STREET LIGHT	
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[57]	Abstract:	The present invention relates to a light emitting diode (LED) lighting device, and more particularly, to an LED security light or street light, in which light efficiency of high illumination and high brightness of an LED light source is maximized. The LED security light or street light includes: a light pillar; a pole connected to the light pillar; and a solar cell-type light connected to the pole, in which the solar cell-type light includes: a solar cell plate, on which a plurality of solar cells is arranged; a printed circuit board (PCB) board assembly (PBA) board, which is an electric circuit board including a plurality of arranged LEDs; a light concentrating and emitting body, which includes reflectors as many as the number of the plurality of LEDs at positions corresponding to positions of the plurality of LEDs, the reflector having a shape protruding in a direction of the LED and being connected by a curvature surface, in which an external opened circle and an internal opened circle smaller than the external opened circle have different curvature radiuses; a controller board, which is electrically connected with the PBA to control the plurality of LEDs, and is connected with an external power source; a battery, which is charged with .power obtained from the solar cell plate; and a transparent or opaque cover coupled to a lowermost end.	

drawing is considered as a part of the description of the entire invention. A direction or directionality is mentioned for convenience of the description, and does not intend to limit the scope of the present invention in any method.

Specifically, terms, such as “lower, upper, horizontal, vertical, upper side,
5 lower side, upper direction, lower direction, upper portion, and lower portion”,
indicating a location or derivatives thereof (for example, “horizontally, downwardly,
and upwardly”) shall be understood with reference to the described drawings and the
relevant descriptions. Particularly, the relative terms are simply for the purpose of
convenience of the description, and the apparatus of the present invention is not
10 required to be constituted or operated in a specific direction.

Terms, such as “mounted, attached, coupled, connected, and interconnected”,
indicating a mutual coupling relation between the constituent elements may mean the
state where individual constituent elements are directly or indirectly attached or
connected or fixed unless otherwise mentioned, and shall be understood as a term
15 encompassing the state where the individual constituent elements are unmovably
attached, connected, and fixed, as well as the state where the individual constituent
elements are movably attached, connected, and fixed.

It should be noted that in giving reference numerals to elements of each
drawing, like reference numerals refer to like elements even though like elements are
20 shown in different drawings. Further, in the following description, a detailed
explanation of known related constitutions and functions may be omitted when it is
judged that the detailed description may make the subject matter of the present
invention unclear.

FIG. 1 is a perspective view of an LED security light or street light according
25 to the present invention and FIG. 2 is an exploded perspective view of the LED security

light or street light according to the present invention.

As illustrated in FIGS. 1 and 2, an LED security light or street light 10 according to the present invention includes a light pillar 11, a solar cell-type light 12, a mounting bracket 13, and a pole 14.

5 The light pillar 11 is a support pillar, and has one end fixed to the ground and the other end enabling the solar cell-type light 12 to be mounted by means of the mounting bracket 13 and the pole 14 to enable the solar cell-type light 12 to emit light at a height of 4 and 5 m from the ground and serve as a security light or a street light.

10 In the solar cell-type light 12, a solar cell plate is disposed on an upper end surface and a light source emitting light in a down direction is disposed at a lower end, and the solar cell plate, a battery for charging, and the LED light source may be integrally formed.

15 The mounting bracket 13 fixes the pole 14 to the light pillar 11, and the pole 14 serves as a connection medium connecting the light pillar 11 and the solar cell-type light 12.

 The structures and the connection relation between the light pillar 11, the solar cell-type light 12, the mounting bracket 13, and the pole 14 constituting the LED security light or street light 10 will be described in detail with reference to FIG. 2.

20 The LED security light or street light 10 includes the light pillar 11, the solar cell-type light 12, the mounting bracket 13, the pole 14, and a pole bracket 215.

 The mounting bracket 13 is a medium connecting the light pillar 11 and the pole 14 to each other, and may be formed of a light pillar bracket 211 and a band 213.

25 The light pillar bracket 211 has a cross-section shaped like “”, and is provided with holes, to which the bands 213 may be inserted, in both lateral surfaces thereof in a longitudinal direction, and the pole 14 is connected to one lateral surface of

the light pillar bracket 211 and the light pillar 11 is in close contact with the other lateral surface (opened surface).

In the close contact state, the band 213 is fitted to the hole to be fixed, and the band 213 may be the form bendable in a vertical direction for fixed strength and
5 adjustable in a length.

The pole 14 is positioned in a direction bent at an acute angle or an obtuse angle based on a direction of the pillar light 11, and has one side end connected with the light pillar bracket 211 and the other side end connected with the pole bracket 215 to serve a bridge function of connecting the light pillar 11 and the solar cell-type light 12
10 to each other.

The solar cell-type light 12 may include lateral frames 221a to 221d, a base frame 223, an LED frame 225, a battery frame 227, a battery bracket 229, a printed circuit board (PCB) board assembly (PBA) board 231, a light concentrating and emitting body 233, a cover 235, a battery 237, a controller board 239, a passive infrared
15 (PIR) sensor (body infrared sensor) 241, and a solar cell plate 243.

The lateral frames 221a to 221d, the base frame 223, the LED frame 225, and the battery frame 227 may be formed of a metal material or a synthetic resin material, and the lateral frames 221a to 221d may be manufactured by extruding molding, and a length of the lateral frame may be adjusted to a length demanded by a demander
20 according to the manufacturing by extruding molding.

The lateral frames 221a to 221d may be manufactured by separately manufacturing four surfaces and coupling the four separate surfaces according to the manufacturing by extruding molding, or may also be manufactured in one quadrangular frame.

25 The lateral frames 221a to 221d may form a body of the solar cell-type light

10, the base frame 223 may be fastened to a lower surface, and the LED frame 225, the battery frame 227, and the controller board 239 may be mounted on an upper surface of the base frame 223, and the PIR sensor 241 may be mounted on the upper surface of the base frame 223.

5 The PBA board 231 may be seated on an upper end of the LED frame 225 and the light concentrating and emitting body 233 may be seated under the PBA board 231, and the transparent or opaque cover 235 may be mounted to a lower surface of the light concentrating and emitting body 233.

 The cover 235 may be manufactured of transparent or opaque acryl, and may
10 serve as a front cover of the solar cell-type light 12.

 The light concentrating and emitting body 233 may be formed of a metal material, and may be provided with reflectors as many as the number of LEDs at positions corresponding to positions of the LEDs inside thereof.

 The battery 237 may be seated to the battery frame 227, and the battery 237
15 may be fixed by the battery bracket 229.

 In the state where the internal components are coupled to the base frame 223, the lateral frames 221a to 221d are coupled, and the solar cell plate 243 is coupled to upper ends of the four lateral frames 221a to 221d.

 The solar cell plate 243 is disposed to head in an upper direction, and in
20 contrast to this, the PBA board 231 is disposed to head in the lower direction.

 The PBA board 231 is an electric circuit board, on which the plurality of LEDs 313 is arranged.

 The pole bracket 215 is coupled to an external side of the lateral frame 221b to be coupled with the light pillar 11, and the pole bracket 215 has a structure which is
25 coupled to the pole 14 and is fastened with the light pillar 11.

The controller board 239 is a DC/DC controller board, and has one side connected with the PBA board 231 to electrically control the LED, and the other side connected with the battery 237 to use charged power.

5 The PIR sensor 241 is a body detecting sensor, and may detect a body and automatically turn on/off the LED.

FIG. 3 is a lateral cross-sectional view of the LED security light or street light according to the present invention and is a cross-sectional view taken along line A-A of FIG. 1, and FIG. 4 is a cross-sectional view of the solar cell-type light according to the present invention and is a cross-sectional view taken along line B-B of FIG. 2.

10 Referring to FIG. 3, the lateral frames 221a and 221c may be manufactured by extrusion molding, so that the lengths of the lateral frames 221a and 221c are not limited and the lateral frames 221a and 221c may be used by cutting in lengths desired by a demander, and tap parts 315 formed with taps for fastening the lateral frames 221b and 221d with bolts may be formed at upper and lower corners of the lateral frames
15 221a and 221c.

The LED frame 225 may be fastened to the base frame 223 by a bolt and the like in the state where the PBA board 231, the light concentrating and emitting body 233, and the cover 235 are mounted in the vertical direction.

20 Guide recesses 317 may be formed in a length direction at both ends of upper lateral ends of the lateral frames 221a and 221c so that the solar cell plate 243 may laterally slide and be fastened.

The light concentrating and emitting body 233 may be positioned between the PBA board 231 and the cover 235.

25 A structure of the LED lighting device will be described with reference to FIG. 4.

The LED security light or street light according to the present invention includes one pair of first LED lighting device 110a and second LED lighting device 110b.

5 The first and second LED lighting devices 110a and 110b are arranged side by side, and each of the first and second LED lighting devices 110a and 110b has a structure, in which the PBA board 231, the light concentrating and emitting body 233, and the cover 235 are vertically arranged in order, and the PBA board 231, the light concentrating and emitting body 233, and the cover 235 are embedded in and fixed to the LED frame 225.

10 Each of the first and second LED lighting devices 110a and 110b independently receives a control signal from the controller board 239 and receives power from the battery 237.

Accordingly, the first and second LED lighting devices 110a and 110b may be controlled so that only one lighting device is turned on or two lighting devices are
15 turned on at the same time according to outside illumination or a time zone, and the first and second LED lighting devices 110a and 110b are designed in such a manner that when any one lighting device unexpectedly has a problem, light is temporarily emitted by the other lighting device.

The LED frame 225 has the form having a quadrangular border (see FIG. 2),
20 and lateral walls 327a are formed at both sides of the LED frame 225 and a center wall 327b is formed at a center of the LED frame 225.

An insertion recess 321, to which the PBA board 231 may be slid and fitted, is formed in each of the lateral wall 327a and the center wall 327b. The insertion recess 321 may be formed at an inner side of each of the lateral walls 327a and both sides of
25 the center wall 327b.

A protrusion piece 323 may be formed at each of the lateral walls 327a so that the light concentrating and emitting body 233 may be disposed at a lower side of the insertion recess 321, and a bent portion 325 may be formed at a lower end side of each of the lateral walls 327a so that the cover 235 may be fixed.

5 FIGS. 5A and 5B are perspective views of the PBA board and the light concentrating and emitting body in the LED security light or street light according to the present invention, and FIGS. 6A and 6B are a top plan view and a cross-sectional view of a unit cell reflector and the LED of the light concentrating and emitting body according to the present invention.

10 FIGS. 5A and 5B are perspective views illustrating a coupling structure of the PBA board 231 and the light concentrating and emitting body 233 viewed at different angles.

Referring to FIGS. 5 and 6, the light concentrating and emitting body 233 may be a sort of a reflecting device or lighting shade, and a plurality of reflectors 311 is
15 arranged on a front plate, and may be formed of a metal material.

The LEDs 313 emitting a light source are arranged on the PBA board 231, and the reflectors 311 as many as the number of LEDs 313 are formed, and the LED 313 and the reflector 311 are positioned at regular arrangement positions.

The reflector 311 has a shape curved in a direction, in which the LED 313 is
20 positioned, based on the front plate, and curved portions may have a plurality of curvature radiuses R1 and R2 and may be connected to each other in a tangent line of the two curvature radiuses.

A tip end portion of the reflector 311 may be formed while maintaining a constant gap from a portion, in which the LED 313 is positioned.

25 The reflector 311 has an external circle and an internal circle, in which the

external circle has a relatively larger diameter than that of the internal circle, and maintains the curvature radiuses, in which R1 is larger than R2, and may be designed to have $R1 = 6 \text{ mm}$ and $R2 = 5 \text{ mm}$.

5 The shape (the two opened circles and the two curvature radiuses) of the reflector 311 and the maintenance of the gap are designed so as to concentrate and diffuse the light source emitted from the LED 313 and emit the light to the outside again while maintaining straightness.

FIGS. 7A to 7C are diagrams illustrating examples of diffusion and light concentration of light by the light concentrating and emitting body in the LED security light or street light according to the present invention.

FIG. 7A illustrates the form, in which the light source of the LED emits light, in the cross-sectional view of the reflector and the LED in the cell unit, FIG. 7B illustrates the form, in which the emitted light source is emitted to a subject surface, and FIG. 7C schematically illustrates light source forms 411, in which the light sources of the LEDs 313 are emitted through the reflectors 311 in the entire cells through the light concentrating and emitting body 233.

As illustrated in FIGS. 7A to 7C, the light sources emitted from the LEDs 313 may be collected and diffused along the curvature surfaces of the reflectors 311, and be emitted to the outside through the external opened circles of the reflectors 311 while securing straightness. The light source of the LED 313 may be emitted to the outside surface according to the light source form 411, in which the light source of the LED 313 is emitted, with efficiency of the light source as it is. A radiated region 413 may emit light in more areas by the shape of the reflector 311 with the same efficiency.

It can be seen that from the shape of the reflector 311 and the location relation between the reflector 311 and the LED 313, the light source of the LED 313 has

improvement of light efficiency by about 30%, compared to the case where there is no light concentrating and emitting body 233.

As described above, the exemplary embodiments have been described and illustrated in the drawings and the specification. The exemplary embodiments were
5 chosen and described in order to explain certain principles of the invention and their practical application, to thereby enable others skilled in the art to make and utilize various exemplary embodiments of the present invention, as well as various alternatives and modifications thereof. As is evident from the foregoing description, certain aspects of the present invention are not limited by the particular details of the examples
10 illustrated herein, and it is therefore contemplated that other modifications and applications, or equivalents thereof, will occur to those skilled in the art. Many changes, modifications, variations and other uses and applications of the present construction will, however, become apparent to those skilled in the art after considering the specification and the accompanying drawings. All such changes, modifications,
15 variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention which is limited only by the claims which follow.

LED SECURITY LIGHT OR STREET LIGHT

5

TECHNICAL FIELD

The present invention relates to a light emitting diode (LED) lighting device,
10 and more particularly, to an LED security light or street light, in which light efficiency
of high illumination and high brightness of an LED light source is maximized.

BACKGROUND ART

A lighting fixture is installed on a ceiling or a support structure inside or
15 outside to light a neighboring area.

As a light source of the lighting fixture, a light emitting diode (LED) having
various advantages, such as low power, semi-permanent life, and high illumination
(high brightness), is a general trend.

The LED has high straightness and high illumination (brightness), so that
20 when light is directly emitted to a visual field, glaring is caused, and when light is
directly continuously and repeatedly emitted to a visual field, eyesight may deteriorate
and an optic nerve may be damaged.

Korean Patent No. 10-1288576 discloses the "LED street light and security
light".

25 In the patent, the street light and the security light includes a base plate, in

which a power supply unit and a controller are electrically connected with each other, a printed circuit board (PCB) board, which is fixed to an upper portion of the base plate and is electrically connected with the controller, has a cross-section curved in a shape of a circular arc, and is coupled with a plurality of LED modules in a shape of a circular arc shape, and a transparent cover, which is coupled to a border of the base plate while surrounding the PCB board.

The patent is the invention for maximizing light efficiency of emitted light by forming the PCB board to be curved in the shape of the circular arc and increasing a range of light emitted from a street light or a security light, but the patent has an effect in that light efficiency is improved, but has a limit in maximizing light efficiency.

[Related Art Literature]

[Patent Document]

(Patent Document 0001) 1. Korean Patent No. 10-1288576

SUMMARY OF THE INVENTION

The present invention has been made in an effort to provide a security light or a street light, in which a light, a pole, and a light pillar are divided, so that the security light or the street light is easily coupled and disassembled.

The present invention has also been made in an effort to provide a light emitting diode (LED) security light or street light using a specially designed light concentrating and emitting body, which is capable of emitting light by maximizing light efficiency of a light source emitted from an LED.

The present invention has also been made in an effort to provide a security light or a street light, which efficiently operates a power source and the like by utilizing a passive infrared (PIR) sensor (body infrared sensor) and is formed of a solar cell

integrated LED light.

An exemplary embodiment of the present invention provides a light emitting diode (LED) security light or street light, including: a light pillar; a pole connected to the light pillar; and a solar cell-type light connected to the pole, in which the solar cell-type light includes: a solar cell plate, on which a plurality of solar cells is arranged; a printed circuit board (PCB) board assembly (PBA) board, which is an electric circuit board including a plurality of arranged LEDs; a light concentrating and emitting body, which includes reflectors as many as the number of the plurality of LEDs at positions corresponding to positions of the plurality of LEDs, the reflector having a shape protruding in a direction of the LED and being connected by a curvature surface, in which an external opened circle and an internal opened circle smaller than the external opened circle have different curvature radiuses; a controller board, which is electrically connected with the PBA to control the plurality of LEDs, and is connected with an external power source; a battery, which is charged with power obtained from the solar cell plate; and a transparent or opaque cover coupled to a lowermost end.

The PBA board and the light concentrating and emitting body may be arranged side by side in pair and be individually controlled, so that it is possible to further improve light efficiency and decrease unnecessary power consumption, and a replacement means may be assisted at the time of a problem.

The PBA board, the light concentrating and emitting body, and the cover may be sequentially stacked in a vertical direction, and may be mounted to and integrated with an LED frame.

The LED frame may have a rectangular parallelepiped border, and have lateral walls and a center wall, insertion recesses, to which the PBA boards slide and are inserted, may be formed at internal sides of the lateral walls and both sides of the center

wall, a protrusion piece, on which the light concentrating and emitting body is held, may be provided under the insertion recess of each of the lateral walls and the center wall, and a bent portion for fixing the cover may be formed under the protrusion piece of the lateral wall.

5 A curvature surface of the reflector may have two curvature radiuses, and a curvature radius of the curvature surface connected with the external opened circle may be smaller than a curvature radius of the curvature surface connected with the internal opened circle.

10 The reflector may have a shape, in which the external opened circle and the internal opened circle are connected with each other by the curvature surface, the bent portions may have a plurality of curvature radiuses and be connected with each other in a tangent line of the two curvature radiuses, and a diameter of the external opened circle may be larger than a diameter of the internal opened circle.

15 One side of the pole may be connected to a frame of the solar cell-type light by a pole bracket, and the other side of the pole may be connected to the light pillar by a light pillar bracket and a band.

20 The solar cell-type light may have a body formed of four frames, a solar cell plate may be installed at a topmost end with a size of a quadrangle formed of the four frames, one pair of PBA boards may be arranged side by side under the solar cell plate, and one pair of light concentrating and emitting bodies may be arranged side by side under each one pair of PBA boards, a cover, which covers the entire light concentrating and emitting body, may be positioned under the one pair of light concentrating and emitting bodies, the one pair of PBA boards, the one pair of light concentrating and emitting bodies, and the cover may be integrally mounted to one LED frame and be
25 fastened to a base frame in a lower surface, and the controller board may be positioned

on a lateral surface of the LED frame and the battery may be positioned on a lateral surface of the controller board.

According to the configuration of the present invention, it is possible to provide the LED security light or street light, in which light efficiency of an LED
5 lighting tool is improved by increasing straightness of an LED light source and increasing a diffusion property of the LED light source by using the light concentrating and emitting body.

It is possible to provide the solar cell integrated LED security light (street light), in which a light, a pole, and a light pillar are divided, so that the LED security
10 light (street light) may be easily coupled and disassembled, and it is possible to efficiently operate a power source of the light by utilizing a passive infrared (PIR) sensor (body infrared sensor).

The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features
15 described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a light emitting diode (LED) security light or
20 street light according to the present invention.

FIG. 2 is an exploded perspective view of the LED security light or street light according to the present invention.

FIG. 3 is a cross-sectional view of the LED security light or street light according to the present invention.

25 FIG. 4 is a cross-sectional view of a solar cell-type light according to the

present invention.

FIGS. 5A and 5B are perspective views of a PBA board and a light concentrating and emitting body in the LED security light or street light according to the present invention.

5 FIGS. 6A and 6B are a top plan view and a cross-sectional view of a reflector and an LED of a unit cell of the light concentrating and emitting body according to the present invention.

FIGS. 7A to 7C are diagrams illustrating examples of diffusion and light concentration of light by the light concentrating and emitting body in the LED security
10 light or street light according to the present invention.

It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the present invention as disclosed herein, including, for example, specific dimensions, orientations,
15 locations, and shapes will be determined in part by the particular intended application and use environment.

In the figures, reference numbers refer to the same or equivalent parts of the present invention throughout the several figures of the drawing.

20

DETAILED DESCRIPTION

Hereinafter, a structure and an effect of a light emitting diode (LED) security light or street light according to the present invention will be described with reference to the accompanying drawings.

The detailed description of the specific embodiment illustrated in the
25 accompanying drawings is read in association with the accompanying drawings, and the

WHAT IS CLAIMED IS:

1. A light emitting diode (LED) security light or street light, comprising:

a light pillar;

5 a pole connected to the light pillar; and

a solar cell-type light connected to the pole,

wherein the solar cell-type light includes:

a solar cell plate, on which a plurality of solar cells is arranged;

10 a printed circuit board (PCB) board assembly (PBA) board, which is an electric circuit board including a plurality of arranged LEDs;

a light concentrating and emitting body, which includes reflectors as many as the number of the plurality of LEDs at positions corresponding to positions of the plurality of LEDs, the reflector having a shape protruding in a direction of the LED and being connected by a curvature surface, in which an external opened circle and an
15 internal opened circle smaller than the external opened circle have different curvature radiuses;

a controller board, which is electrically connected with the PBA to control the plurality of LEDs, and is connected with an external power source;

a battery, which is charged with power obtained from the solar cell plate; and

20 a transparent or opaque cover coupled to a lowermost end.

2. The LED security light or street light of claim 1, wherein the PBA board and the light concentrating and emitting body are arranged side by side in pair and are individually controlled.

25

3. The LED security light or street light of claim 1, wherein the PBA board, the light concentrating and emitting body, and the cover are sequentially stacked in a vertical direction, and are mounted to and integrated with an LED frame.

5 4. The LED security light or street light of claim 3, wherein the LED frame has a rectangular parallelepiped border, and has lateral walls and a center wall,

insertion recesses, to which the PBA boards slide and are inserted, are formed at internal sides of the lateral walls and both sides of the center wall,

10 a protrusion piece, on which the light concentrating and emitting body is held, is provided under the insertion recess of each of the lateral walls and the center wall, and

a bent portion for fixing the cover is formed under the protrusion piece of the lateral wall.

15 5. The LED security light or street light of claim 1, wherein a curvature surface of the reflector has two curvature radiuses, and a curvature radius of the curvature surface connected with the external opened circle is smaller than a curvature radius of the curvature surface connected with the internal opened circle.

20 6. The LED security light or street light of claim 1, wherein the reflector has a shape, in which the external opened circle and the internal opened circle are connected with each other by the curvature surface, the bent portions have a plurality of curvature radiuses and are connected with each other in a tangent line of the two curvature radiuses, and

25 a diameter of the external opened circle is larger than a diameter of the

internal opened circle.

7. The LED security light or street light of claim 1, wherein one side of the pole is connected to a frame of the solar cell-type light by a pole bracket, and the other
5 side of the pole is connected to the light pillar by a light pillar bracket and a band.

8. The LED security light or street light of claim 1, wherein the solar cell-type light has a body formed of four frames,

a solar cell plate is installed at a topmost end with a size of a quadrangle
10 formed of the four frames,

one pair of PBA boards is arranged side by side under the solar cell plate, and one pair of light concentrating and emitting bodies is arranged side by side under each one pair of PBA boards,

a cover, which covers the entire light concentrating and emitting body, is
15 positioned under the one pair of light concentrating and emitting bodies,

the one pair of PBA boards, the one pair of light concentrating and emitting bodies, and the cover are integrally mounted to one LED frame and are fastened to a base frame in a lower surface, and

the controller board is positioned on a lateral surface of the LED frame and
20 the battery is positioned on a lateral surface of the controller board.

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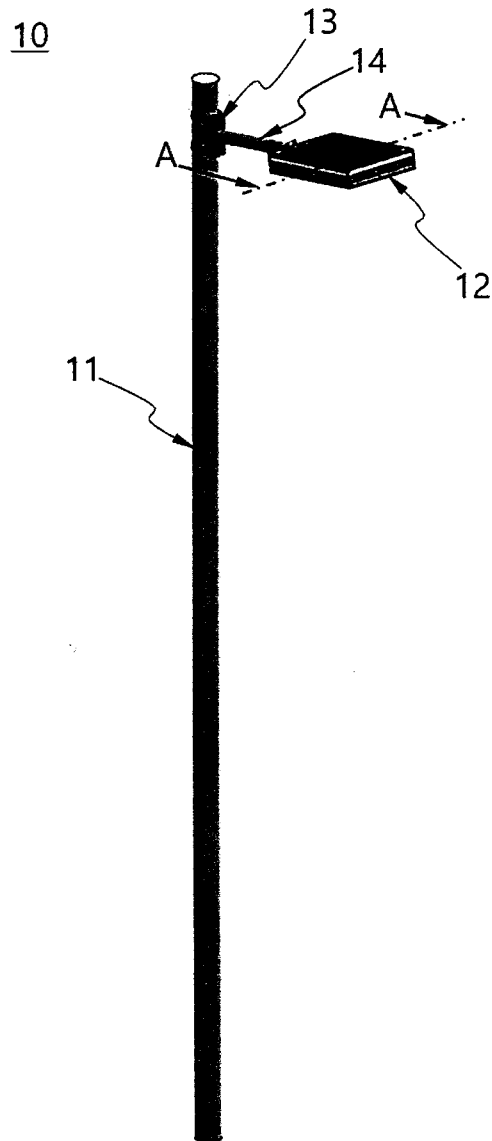


FIG. 1

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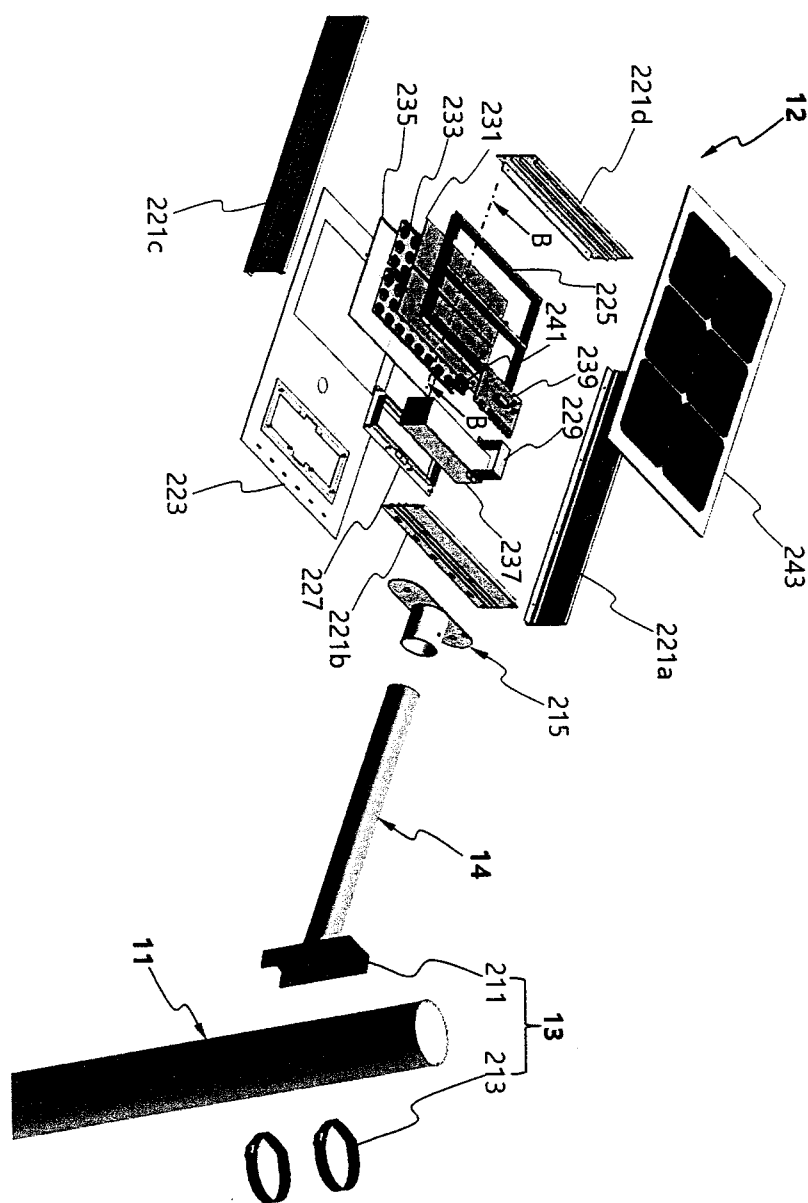


FIG. 2

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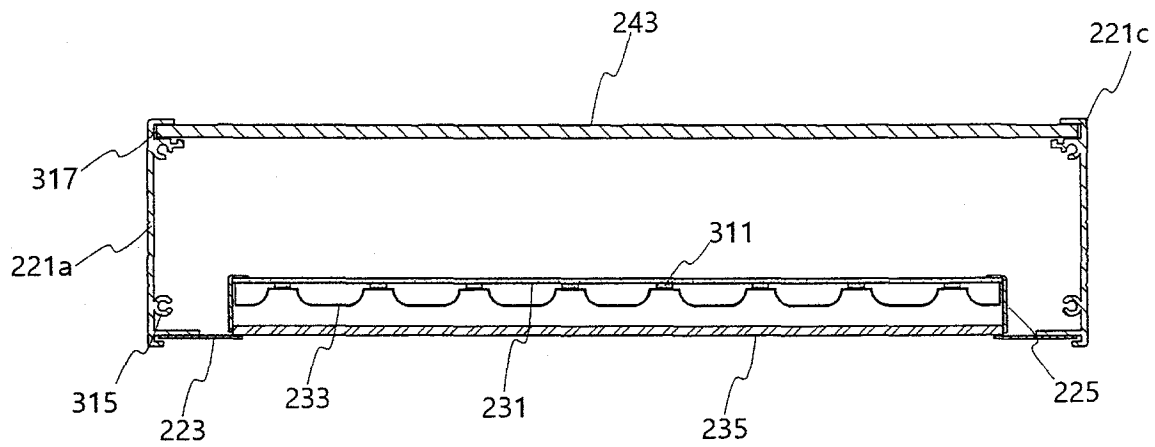


FIG. 3

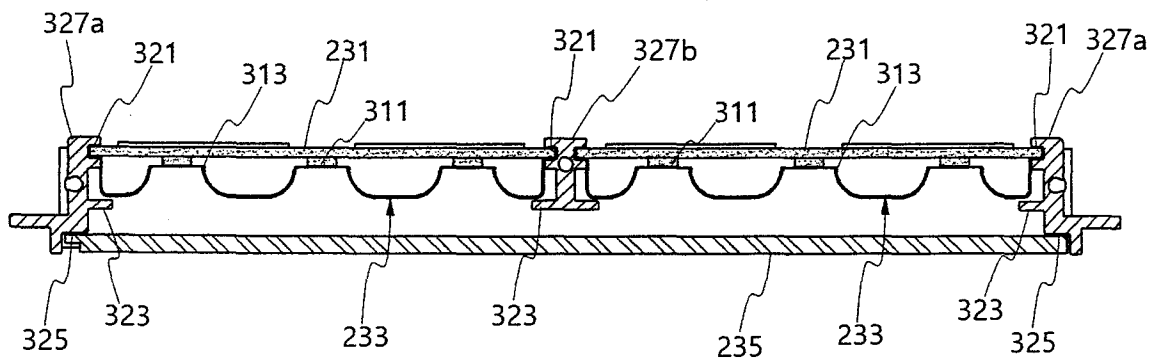
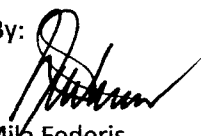


FIG. 4

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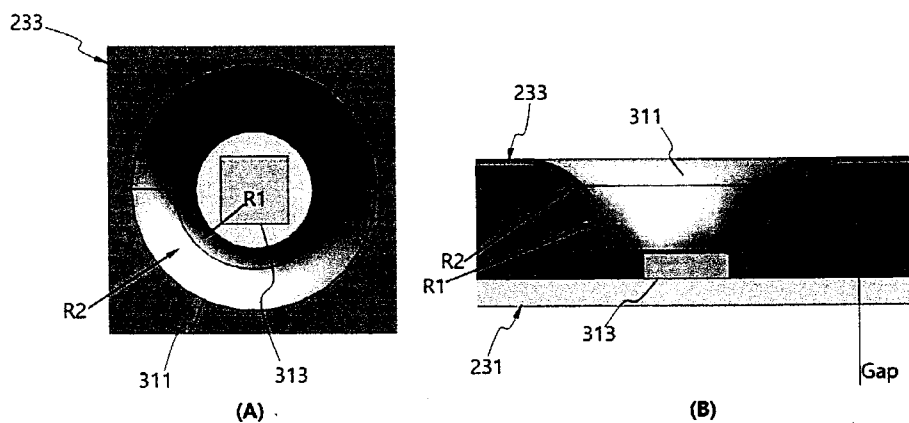


FIG. 6

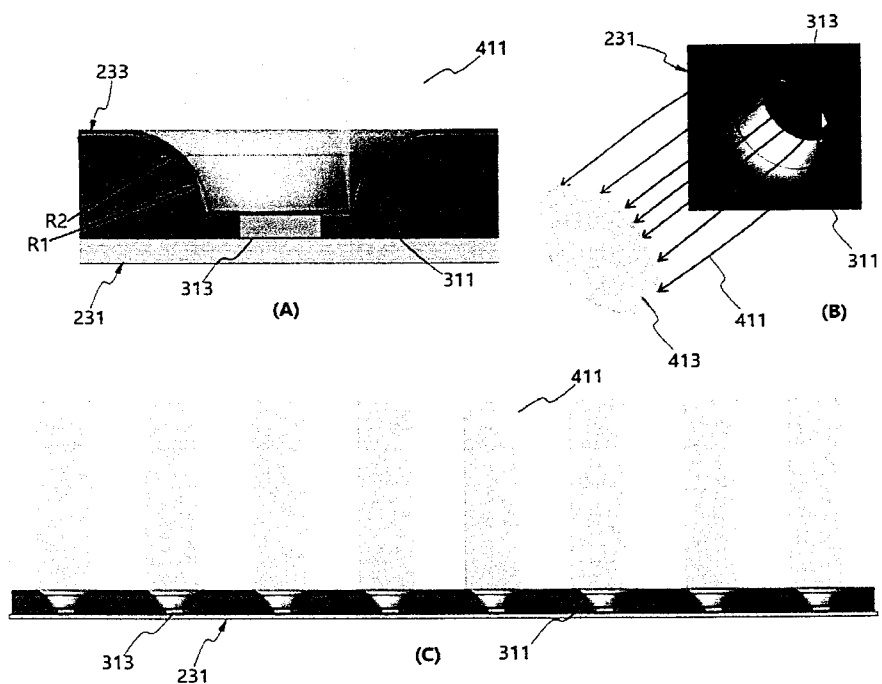


FIG. 7

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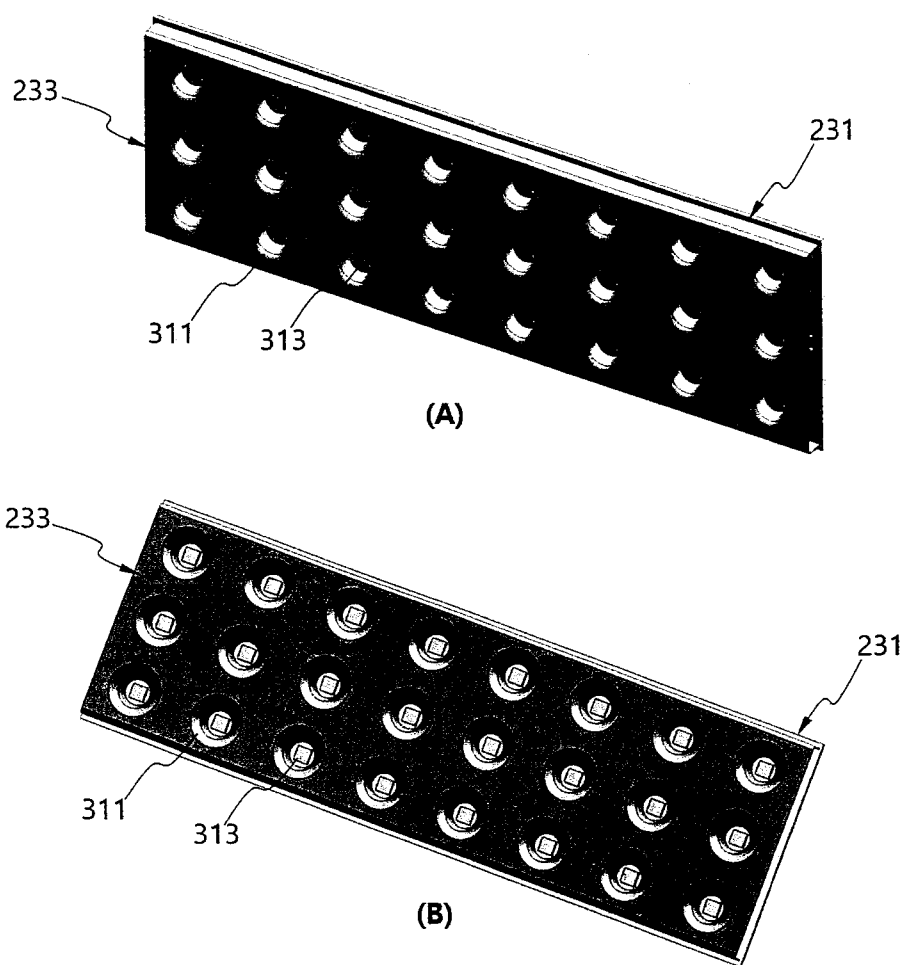


FIG. 5

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