

(19)



(11)

EP 2 385 294 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

21.10.2020 Bulletin 2020/43

(51) Int Cl.:

F21S 2/00 ^(2016.01)

F21V 19/04 ^(2006.01)

F21Y 113/00 ^(2016.01)

F21V 29/00 ^(2015.01)

F21V 17/00 ^(2006.01)

F21Y 115/10 ^(2016.01)

F21V 5/04 ^(2006.01)

(21) Application number: **11164604.8**

(22) Date of filing: **03.05.2011**

(54) **Lighting apparatus with interchangeable modules**

Beleuchtungsvorrichtung mit austauschbaren Modulen

Appareil d'éclairage avec modules interchangeables

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**

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(30) Priority: **03.05.2010 KR 20100041552**

(43) Date of publication of application:

09.11.2011 Bulletin 2011/45

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority of Korean Patent Application No. 2010-0041552 filed on May 3, 2010, in the Korean Intellectual Property Office.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates to a lighting apparatus, and more particularly, to a lighting apparatus with interchangeable modules that can obtain a desired distribution of luminous intensity by interchanging and combining a plurality of modularized light sources.

Description of the Related Art

[0003] In general, a lighting apparatus is used to secure a clear view in a dark place and is configured to irradiate light, emitted from a light source, to the outside through a lens.

[0004] In recent years, light sources of a lighting apparatus have switched from lamps emitting light by making use of the resistance of filaments to light emitting diodes (LEDs) having a long lifespan and high energy efficiency in line with issues such as environmental-friendliness, power consumption and the lifespan of light sources.

[0005] A light emitting diode emits light with high directionality. For this reason, when a light emitting diode is used in a streetlight, light, emitted from the light emitting diode, is tilted at various angles by using a lens or the like, thereby obtaining a wide distribution of luminous intensity.

[0006] In the related art, however, a distribution of luminous intensity of short-distance illumination (for example, approximately 10m) is different from that of long-distance illumination (for example, approximately 100m). Therefore, different lighting apparatuses (that is, a light emitting diode and a lens structure) need to be used.

[0007] Therefore, for illumination at various distances, there is a need to provide lighting apparatuses showing distributions of luminous intensity corresponding to the respective distances.

[0008] Document DE 10 2006 018 298 A1 discloses a modular lighting system comprising a body retaining a set of light sources. The light sources are arranged in respective light modules which are interchangeably accommodated within the body.

[0009] US 2008/273327 A1 relates to an LED apparatus including a mounting board, a plurality of LED packages thereon, a lens member over each LED package, and a safety barrier positioned over the mounting board, the barrier having sufficient thickness for enclosure of electrical elements on the mounting board and including

a plurality of openings each sized to permit light from an LED package to pass therethrough and through a light-transmission portion of the lens member over such LED package to prevent finger-contact of electrical elements on the mounting board when the light-transmission portion is not present.

[0010] It is the object of the present invention to provide a lighting apparatus with interchangeable modules that can obtain a desired distribution of luminous intensity in an efficient manner.

[0011] The object is solved by the subject matter of the independent claim. Preferred embodiments of the present invention are defined by the dependent claims.

SUMMARY OF THE INVENTION

[0012] An aspect of the present invention provides a lighting apparatus with interchangeable modules that can obtain a desired distribution of luminous intensity by combining a plurality of modularized light sources.

[0013] According to an aspect of the present invention, there is provided a lighting apparatus with interchangeable modules, the lighting apparatus including: a frame; and at least two light source modules detachably coupled to the frame, wherein the light source modules are interchangeable.

[0014] The at least two light source modules are selected from a first light source module emitting light at a large radiation angle and a second light source module emitting light at a small radiation angle.

[0015] Each of the light source modules includes: a board having a plurality of light emitting diodes arranged thereon; and a lens unit provided in front of the light emitting diodes to control a radiation angle of light emitted from the light emitting diodes.

[0016] The first light source module may include the lens unit including a diffusing lens.

[0017] The second light source module may include the lens unit including a condenser lens.

[0018] The lens unit may be mounted in front of the light emitting diode.

[0019] The lens unit includes a plurality of lenses arranged at positions corresponding to the plurality of light emitting diodes and a lens bracket securing the plurality of lenses to the board.

[0020] The lens bracket is detachably coupled to the board.

[0021] The frame may be shaped like a plate formed of metal and discharge heat generated from the light source modules.

[0022] A heat transfer material may be interposed between the frame and the light source modules.

[0023] The frame may be divided in a lattice pattern, individual lattices may be formed of recesses, and the light source modules may be detachably inserted into the recesses.

[0024] The number of light source modules may be three.

[0025] The light source modules being arranged may be either first light source modules or second light source modules.

[0026] The light source modules may be first and second light source modules alternating with each other.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The above and other aspects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1A is a perspective view illustrating a lighting apparatus according to an exemplary embodiment of the present invention;

FIG. 1B is a perspective view illustrating a light source module of FIG. 1A;

FIG. 2A is a cross-sectional view taken along line A-A' of FIG. 1A to illustrate a first light source module; FIG. 2B is a cross-sectional view taken along line B-B' of FIG. 1A to illustrate a second light source module;

FIGS. 3A through 3D are cross-sectional views taken along line B-B' of FIG. 1A and views illustrating distributions of luminous intensity;

FIG. 4 is a cross-sectional view illustrating engagement between a frame and light source modules according to another exemplary embodiment of the present invention;

FIGS. 5A and 5B are cross-sectional views illustrating light source modules according to an exemplary embodiment of the present invention;

FIG. 6A is a perspective view illustrating a lighting apparatus according to another exemplary embodiment of the present invention;

FIG. 6B is a perspective view illustrating a light source module of FIG. 6A; and

FIG. 7 is a perspective view illustrating a lighting apparatus according to another exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0028] Prior to a detailed description of the present invention, the terms and words, which are used in the specification and claims to be described below, should not be construed as typical or dictionary meanings. The terms and words used herein should be construed in conformity with the technical idea of the present invention on the basis of the principle that the inventors can appropriately define terms in order to describe their invention in the best manner. Embodiments described in the specification and structures illustrated in drawings are merely exemplary embodiments of the present invention. Thus, it is intended that the scope of the present invention is de-

fined by the appended claims.

[0029] Exemplary embodiments of the present invention and further examples useful for understanding the present invention will now be described in detail with reference to the accompanying drawings. The same reference numerals will be used throughout to designate the same or like components in the accompanying drawings. Moreover, detailed descriptions related to well-known functions or configurations will be ruled out in order not to unnecessarily obscure subject matters of the present invention. In the drawings, some components may be exaggerated, omitted or schematically illustrated. Also, the size of each element does not entirely reflect the actual size thereof.

[0030] Exemplary embodiments of the present invention will now be described in detail with reference to the accompanying drawings.

[0031] FIG. 1A is a perspective view illustrating a lighting apparatus according to an exemplary embodiment of the invention. FIG. 1B is a perspective view illustrating a light source module of the lighting apparatus shown in FIG. 1A. FIG. 2A is a cross-sectional view taken along line A-A' of FIG. 1A.

[0032] Referring to FIGS. 1A and 2A, a lighting apparatus 100 according to this embodiment includes a frame 10 and light source modules 20 that are coupled to the frame 10.

[0033] The frame 10 is a plate-like part made of metal, and has the light source modules 20 fixed to one surface thereof. The frame 10 serves as a housing of the light source modules 20 and also serves as a heat dissipation plate that discharges heat, radiating from the light source modules 20, to the outside. Further, in this embodiment, the one surface of the frame 10, on which the light source modules 20 are arranged, may be formed of a reflector or be coated with a reflective material so that the one surface of the frame 10 reflects light, emitted from the light source modules 20 and diffused around them, to thereby emit the light in a forward direction.

[0034] The light source modules 20 each include a board 21, on which light emitting diodes 22 are disposed, and lens units 25a. The light source modules 20 are arranged to be adjacent to each other on the frame 10, and are detachably fixed to the frame 10 by using fixing screws 28. Here, the light source modules 20 according to this embodiment include a first light source module 20a, shown in FIG. 2A, and a second light source module 20b, shown in FIG. 2B. For convenience of explanation, however, a description will be made of the first light source module 20a.

[0035] The board 21 may be a general PCB board or a flexible board (PCB). One or more light emitting diodes 22 are arranged on one surface of the board 21, and through holes 23 are formed on four edges thereof so that the fixing screws 28 may be inserted therein when the board 21 is engaged with the frame 10.

[0036] In FIGS. 1A, 1B, and 2A, an example is shown in which the board 21 is formed to have a rectangular

shape and the light emitting diodes 22 are arranged in a longitudinal direction of the board 21. However, the present invention is not limited thereto. A board may come in various shapes, and the light emitting diodes 22 may also be configured in various arrangements.

[0037] In an example, the respective lens units 25a are individually provided in front of the light emitting diodes 22 arranged on the board 21. Here, the lens units 25a may be attached to the board 21 by fixing units (not shown) such as fixing screws, such that the lens units 25a can be detachable from the board 21.

[0038] In this example, the lens unit 25a controls a radiation angle of light, radiating from the light emitting diode 22, to thereby emit the light to the outside. In particular, the lens unit 25a irradiates light from the light emitting diode 22 at a small radiation angle or a large radiation angle. Therefore, as for the lens unit 25a, either a condenser lens providing irradiation at a small radiation angle or a diffusing lens providing irradiation at a large radiation angle may be used. Thus, the light source modules 20 are divided into a first light source module 20a and a second light source module 20b according to the shape of the lens units 25a. The first and second light source modules 20a and 20b are selectively used as the need arises.

[0039] FIG. 2B is a cross-sectional view illustrating a second light source module. FIG. 2A is a cross-sectional view illustrating the first light source module 20a including the lens units 25a composed of diffusion lenses 26a, while FIG. 2B is a cross-sectional view illustrating the second light source module 20b including lens units 25b composed of condenser lenses 26b.

[0040] All the lens units 25a of the first light source module 20a are formed of the diffusion lenses 26a, and evenly diffuse light from the light emitting diodes 22 to thereby emit the light to the outside. In the same manner, referring to FIG. 2B, all the lens units 25b of the second light source module 20b are formed of the condenser lenses 26b, and emit light from the light emitting diodes 22 to the outside so that the light is concentrated at one point. Here, the diffusion lenses 26a and the condenser lenses 26b, shown in FIGS. 2A and 2B, respectively, are not limited to the shapes shown in the drawings. However, the diffusion lenses 26a and the condenser lenses 26b may be configured in various shapes as long as they can diffuse and focus light emitted from light sources.

[0041] According to the configurations of the lens units 25a and 25b, light, emitted from the first light source module 20a, exhibits a short, wide distribution of luminous intensity, and light, emitted from the second light source module 20b, exhibits a long, narrow distribution of luminous intensity.

[0042] While the first light source module 20a and the second light source module 20b have the lens units 25a and 25b, respectively different from each other, the first light source module 20a and the second light source module 20b have the same light emitting diodes 22 and the board 21. Therefore, by selectively providing the lens

units 25a and 25b on the same board 21, it is possible to switch between the first light source module 20a and the second light source module 20b.

[0043] At least two light source modules 20 having the above-described configurations are fixed to the frame 10. The at least two light source modules 20, arranged on the frame 10, may be the same light source module 20 or different light source modules 20. For example, two first light source modules 20a may be arranged on the frame 10 or one first light source module 20a and one second light source module 20b may be arranged thereon.

[0044] As for the embodiment, shown in FIG. 1A, three light source modules 20, arranged on the frame 10, are exemplified. As described above, the three light source modules 20 may be the same type of light source modules 20 or different types of light source modules 20.

[0045] According to this embodiment of the invention, in the case that different light source modules 20 are arranged on the frame 10, first and second light source modules alternate with each other. That is, the first and second light source modules 20a and 20b are alternately arranged on the frame 10, which is shown in FIGS. 3A through 3D.

[0046] FIGS. 3A through 3D are cross-sectional views taken along line B-B' of FIG. 1A. In FIGS. 3A through 3D, various arrangements of light source modules and distributions of luminous intensity corresponding thereto are shown. Specifically, FIG. 3A is a view illustrating an example in which the three light source modules 20, which are all first light source modules 20a, are arranged on the frame 10. FIG. 3B is a view illustrating an example in which the three light source modules 20, which are all second light source modules 20b, are arranged on the frame 10. Furthermore, FIG. 3C is a view illustrating an example in which two first light source modules 20a and one second light source module 20b are arranged on the frame 10. FIG. 3D is a view illustrating an example in which two second light source modules 20b and one first light source module 20a are arranged on the frame 10.

[0047] As such, when the light source modules 20 are configured in various arrangements, different distributions of luminous intensity of the lighting apparatus 100 corresponding to the arrangements are obtained as shown in FIGS. 3A through 3D. Therefore, by appropriately combining the light source modules 20 of the lighting apparatus 100 according to places or locations where the lighting apparatus 100 is installed, a desired distribution of luminous intensity can be obtained.

[0048] When the lighting apparatus 100 according to this embodiment has the first and second light source modules 20a and 20b arranged on the frame 10, as shown in FIGS. 3C and 3D, as described above, the first and second light source modules 20a and 20b alternate with each other. However, the first and second light source modules 20a and 20b may be configured in various arrangements as the need arises.

[0049] Furthermore, the lighting apparatus 100 ac-

According to this embodiment serves as a heat dissipation plate of the frame 10. Therefore, in order to increase heat transfer efficiency, various applications are possible. FIG. 4 is a cross-sectional view illustrating engagement between a frame and light source modules according to another exemplary embodiment of the invention. As shown in FIG. 4, according to this embodiment, a heat transfer material 70 is interposed between the frame 10 and the light source modules 20 so that heat generated from the light source modules 20 can be easily transmitted to the frame 10. As for the heat transfer material 70, thermal grease may be used. However, the present invention is not limited thereto, and various materials or members may be used as long as they can effectively transmit heat from the board 21 to the frame 10.

[0050] In addition to the above-described components, as shown in FIG. 1A, the lighting apparatus 100 according to this embodiment may include a power supply 40 supplying power to the individual light source modules 20, a protection cover 60 formed of a transparent material to protect the light source modules 20, and a support 50 engaged with the frame 10 and supporting the lighting apparatus 100. However, these components are generally provided in lighting apparatuses according to the related art. Thus, a detailed description thereof will be omitted.

[0051] In the lighting apparatus 100 according to this embodiment, the boards 21 of the light source modules 20, which are arranged on the frame 10, are of the same size. As shown in FIGS. 3A through 3D, the light source modules 20 may be arranged in various combinations on the frame 10 and may be selectively interchanged as the need arises. Therefore, it is easy to obtain various distributions of luminous intensity.

[0052] The lighting apparatus 100 according to the present invention is not limited to the above-described embodiments, and can be applied in various manners. Lighting apparatuses according to other embodiments of the invention to be described below have similar configurations to that of the lighting apparatus 100 except for some components such as light source modules and frames. Thus, a detailed description of the same components will be omitted, and different components will be described in greater detail.

[0053] FIGS. 5A and 5B are cross-sectional views illustrating a light source module 120a and a light source module 120b according to an embodiment of the invention.

[0054] Referring to FIGS. 5A and 5B, the light source modules 120a and 120b according to this embodiment include the boards 21, which are equal to those of the above-described embodiments, and have lens units 125a and 125b having configurations different from those of the above-described examples.

[0055] The lens units 125a and 125b according to this embodiment include one or more lenses 26a and 26b, respectively, arranged at positions corresponding to the individual light emitting diodes 22, and lens brackets 27a

and 27b fixing the respective lenses 26a and 26b to the boards 21.

[0056] Like the above-described embodiments, the lenses 26a and 26b may be a diffusion lens 26a or a condenser lens 26b. The lenses 26a and 26b, which are of the same type, are used within a single module.

[0057] The lens brackets 27a and 27b dispose the lenses 26a and 26b, respectively, at positions corresponding to the light emitting diodes 22, and at the same time, secure the lenses 26a and 26b to the board 21 in order to prevent the movement of the respective lenses 26a and 26b. As shown in FIGS. 5A and 5B, in the case that a plurality of light emitting diodes 22 are provided, the plurality of lenses 26a and 26b are secured by the lens brackets 27a and 27b, respectively. The lens brackets 27a and 27b may be secured to the respective boards 21 by fixing devices such as the fixing screws 28. The lens brackets 27a and 27b are detachably secured to the respective boards 21.

[0058] In the lighting apparatus having the configuration as described above, the lens units 125a and 125b can be easily detachable from the boards 21. Therefore, unlike the above-described examples in which the entire light source module 20 needs to be replaced, a desired distribution of luminous intensity can be obtained by interchanging only the lens units 125a and 125b.

[0059] FIG. 6A is a perspective view illustrating a lighting apparatus according to another exemplary embodiment of the invention. FIG. 6B is a perspective view illustrating a light source module of FIG. 6A.

[0060] Referring to FIGS. 6A and 6B, a lighting apparatus 200 according to this embodiment is different from the lighting apparatus, shown in FIG. 1A, in terms of the shape and arrangement of the light source modules 220.

Other components including lens units, equal to those of the above-described embodiments, may be applied.

[0061] The lighting apparatus 200 according to this embodiment has substantially square-shaped boards 221, on which light emitting diodes 222 are arranged in a square rather than in a row.

[0062] In this embodiment, light source modules 220, which are arranged in a horizontal direction on a frame 210, are exemplified. However, the frame 210 may extend longitudinally, and the light source modules 220 may be arranged in a vertical direction.

[0063] The lighting apparatuses 100 and 200 according to the exemplary embodiments of the invention may be configured in various arrangements according to the size and shape of the light source modules 220. According to how the lighting apparatuses 100 and 200 are used, various applications are possible.

[0064] Furthermore, the frame of the lighting apparatus according to the exemplary embodiment of the invention can be realized in various applications as long as those applications can stably fix light source modules thereto.

[0065] FIG. 7 is a perspective view illustrating a lighting apparatus according to another exemplary embodiment of the invention.

[0066] Referring to FIG. 7, a lighting apparatus 300 according to this embodiment is different from the above-described embodiments in terms of the configuration of a frame 310. Other components including lens units, which are the same as those of the above-described embodiments, can be equally applied.

[0067] The lighting apparatus 300 according to this embodiment has a frame 310, which is divided in a lattice pattern. Individual lattices are formed of recesses 311, into which light source modules 320 are respectively inserted and fixed. Here, like the above-described embodiments, the light source modules 320 are detachably secured to the frame 310 by using the fixing screws 28 or the like. First light source modules 320a and second light source modules 320b alternate with each other. As such, according to an exemplary embodiment of the invention, a frame is not limited to the frame shaped like a plate, shown in FIG. 1A. Various applications such as a frame having a lattice structure, as shown in FIG. 7, or a frame structure obtained by removing a rear plate from the lattice structure, are possible.

[0068] The lighting apparatus 300 according to this embodiment has six light source modules 320, which are the same as the light source modules 220, as shown in FIG. 6B, arranged on the frame 310. The lighting apparatus 300 according to this embodiment may use various numbers of light source modules 320 in order to obtain necessary distributions of luminous intensity. The light source modules 320 can therefore be arranged in various combinations.

[0069] As set forth above, according to exemplary embodiments of the invention, a lighting apparatus may have a plurality of light source modules arranged in various combinations in order to obtain a necessary distribution of luminous intensity. That is, even the lighting apparatus is installed in different surroundings or a desired distribution of luminous intensity is changed, the desired distribution of luminous intensity can be obtained by interchanging light source modules instead of replacing the entire lighting apparatus.

[0070] Therefore, costs incurred when a plurality of lighting apparatuses are installed at various locations can be reduced.

[0071] Meanwhile, a lighting apparatus with interchangeable modules according to an exemplary embodiment is not limited to the above-described embodiments. It is intended that the present invention covers the modifications and variations of this invention by a person skilled in the art.

[0072] For example, in the above-described embodiments, a description has been made of an example in which light source modules are arranged evenly on a frame. However, the invention is not limited thereto. The frame may be configured so that angles between individual light source modules can be adjusted to thereby control the distribution of luminous intensity.

[0073] Furthermore, in this embodiment, a frame is formed of a metal so that the frame serves as a heat

dissipation plate. However, the frame may be formed of a member having high heat dissipation efficiency. For example, a thermoelectric element may be used as the frame in order to forcibly discharge heat.

[0074] Plus, in this embodiment, a lighting apparatus using light emitting diodes has been exemplified. In addition to this lighting apparatus, various applications are possible as long as the light sources of a lighting apparatus can be modularized and lens units can be provided therein.

[0075] While the present invention has been shown and described in connection with the exemplary embodiments, it will be apparent to those skilled in the art that modifications and variations can be made without departing from the scope of the invention as defined by the appended claims.

Claims

1. A lighting apparatus (100) with interchangeable modules, the lighting apparatus comprising:

a frame (10); and
at least two light source modules detachably coupled to the frame (10),
wherein the light source modules (20) are interchangeable and each of the light source modules (20) comprises:

a board (21) having a plurality of light emitting diodes (22) arranged thereon; and
a lens unit (125) provided in front of the light emitting diodes (22) to control a radiation angle of light emitted from the light emitting diodes (22), wherein the lens unit (125) comprises a plurality of lenses (26) arranged at positions corresponding to the plurality of light emitting diodes (22) and a lens bracket (27) securing the plurality of lenses (22) to the board (21), wherein the lens bracket (27) is detachably coupled to the board (21);

characterized in that

the at least two light source modules (20) are selected from a first light source module emitting light at a large radiation angle and a second light source module emitting light at a small radiation angle.

2. The lighting apparatus (100) of claim 1, wherein the first light source module comprises the lens unit (125) including diffusing lenses.

3. The lighting apparatus (100) of claim 1, wherein the second light source module comprises the lens unit (125) including condenser lenses.

4. The lighting apparatus (100) of claim 1, wherein the lens unit (125) is mounted in front of the light emitting diodes (22).
5. The lighting apparatus (100) of claim 1, wherein the frame (10) is shaped like a plate formed of metal and discharges heat generated from the light source modules (20).
6. The lighting apparatus (100) of claim 5, wherein a heat transfer material (70) is interposed between the frame (70) and the light source modules (20).
7. The lighting apparatus (100) of claim 1, wherein the frame (70) is divided in a lattice pattern, individual lattices are formed of recesses, and the light source modules (20) are detachably inserted into the recesses.
8. The lighting apparatus (100) of claim 1, wherein the number of light source modules (20) is three.
9. The lighting apparatus (100) of claim 8, wherein the light source modules (20) being arranged are either first light source modules or second light source modules.
10. The lighting apparatus (100) of claim 8, wherein the light source modules (20) are first and second light source modules alternating with each other.

Patentansprüche

1. Beleuchtungsvorrichtung (100) mit austauschbaren Modulen, wobei die Beleuchtungsvorrichtung umfasst:

einen Rahmen (10) und
wenigstens zwei Lichtquellenmodule, die mit dem Rahmen lösbar gekoppelt sind (10),
wobei die Lichtquellenmodule (20) austauschbar sind und jedes der Lichtquellenmodule (20) umfasst:

eine Platine (21) mit mehreren darauf angeordneten lichtemittierenden Dioden (22) und
eine Linseneinheit (125), die vor den lichtemittierenden Dioden (22) bereitgestellt wird, um einen Strahlungswinkel von Licht zu steuern, das von den lichtemittierenden Dioden (22) emittiert wird, wobei die Linseneinheit (125) mehrere Linsen (26), die an Positionen entsprechend den lichtemittierenden Dioden (22) angeordnet sind, und eine Linsenhalterung (27) umfasst, die die mehreren Linsen (22) an der Platine (21)

sichert, wobei die Linsenhalterung (27) mit der Platine (21) lösbar gekoppelt ist;

dadurch gekennzeichnet, dass

die wenigstens zwei Lichtquellenmodule (20) aus einem ersten Lichtquellenmodul, das Licht mit einem großen Strahlungswinkel emittiert, und einem zweiten Lichtquellenmodul ausgewählt wird, das Licht mit einem kleinen Strahlungswinkel emittiert.

2. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei das erste Lichtquellenmodul die Linseneinheit (125) mit Streulinsen umfasst.
3. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei das zweite Lichtquellenmodul die Linseneinheit (125) mit Sammellinsen umfasst.
4. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei die Linseneinheit (125) vor den lichtemittierenden Dioden (22) montiert ist.
5. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei der Rahmen (10) wie eine aus Metall gebildete Platte geformt ist und die von den Lichtquellenmodulen (20) erzeugte Wärme abführt.
6. Beleuchtungsvorrichtung (100) nach Anspruch 5, wobei ein Wärmeübertragungsmaterial (70) zwischen dem Rahmen (70) und den Lichtquellenmodulen (20) angeordnet ist.
7. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei der Rahmen (70) in ein Gittermuster unterteilt ist, individuelle Gitter aus Aussparungen ausgebildet sind und die Lichtquellenmodule (20) in den Aussparungen lösbar eingesetzt sind.
8. Beleuchtungsvorrichtung (100) nach Anspruch 1, wobei die Anzahl der Lichtquellenmodule (20) drei ist.
9. Beleuchtungsvorrichtung (100) nach Anspruch 8, wobei die Lichtquellenmodule (20) entweder als erste Lichtquellenmodule oder als zweite Lichtquellenmodule angeordnet sind.
10. Beleuchtungsvorrichtung (100) nach Anspruch 8, wobei die Lichtquellenmodule (20) erste und zweite abwechselnd angeordnete Lichtquellenmodule sind.

Revendications

1. Appareil d'éclairage (100) à modules interchangeables, l'appareil d'éclairage comprenant :

- un châssis (10) ; et
au moins deux modules de source lumineuse couplés de manière détachable au châssis (10), dans lequel les modules de source lumineuse (20) sont interchangeables et chacun des modules de source lumineuse (20) comprend :
- une carte (21) sur laquelle est agencée une pluralité de diodes électroluminescentes (22) ; et
une unité de lentille (125) pourvue devant les diodes électroluminescentes (22) pour contrôler l'angle de radiation de la lumière émise par les diodes électroluminescentes (22), dans lequel l'unité de lentille (125) comprend une pluralité de lentilles (26) agencées à des positions correspondant à la pluralité de diodes électroluminescentes (22) et un support de lentille (27) fixant la pluralité de lentilles (22) sur la carte (21), dans lequel le support de lentille (27) est couplé de manière détachable à la carte (21) ;
- caractérisé en ce que**
lesdits au moins deux modules de source lumineuse (20) sont sélectionnés parmi un premier module de source lumineuse qui émet de la lumière sur un grand angle de radiation et un deuxième module de source lumineuse qui émet de la lumière sur un petit angle de radiation.
2. Appareil d'éclairage (100) selon la revendication 1, dans lequel le premier module de source lumineuse comprend l'unité de lentille (125) qui comporte des lentilles de diffusion.
 3. Appareil d'éclairage (100) selon la revendication 1, dans lequel le deuxième module de source lumineuse comprend l'unité de lentille (125) qui comporte des lentilles de condenseur.
 4. Appareil d'éclairage (100) selon la revendication 1, dans lequel l'unité de lentille (125) est montée devant les diodes électroluminescentes (22).
 5. Appareil d'éclairage (100) selon la revendication 1, dans lequel le châssis (10) est conformé comme une plaque constituée d'un métal et décharge de la chaleur générée par les modules de source lumineuse (20).
 6. Appareil d'éclairage (100) selon la revendication 5, dans lequel un matériau de transfert de chaleur (70) est interposé entre le châssis (70) et les modules de source lumineuse (20).
 7. Appareil d'éclairage (100) selon la revendication 1, dans lequel le châssis (70) est divisé en un motif de maillage, des maillages individuels sont formés à partir de renforcements, et les modules de source lumineuse (20) sont insérés de manière détachable dans les renforcements.
 8. Appareil d'éclairage (100) selon la revendication 1, dans lequel le nombre de modules de source lumineuse (20) est de trois.
 9. Appareil d'éclairage (100) selon la revendication 8, dans lequel les modules de source lumineuse (20) agencés sont soit des premiers modules de source lumineuse, soit des deuxième modules de source lumineuse.
 10. Appareil d'éclairage (100) selon la revendication 8, dans lequel les modules de source lumineuse (20) sont des premier et deuxième modules de source lumineuse qui alternent.

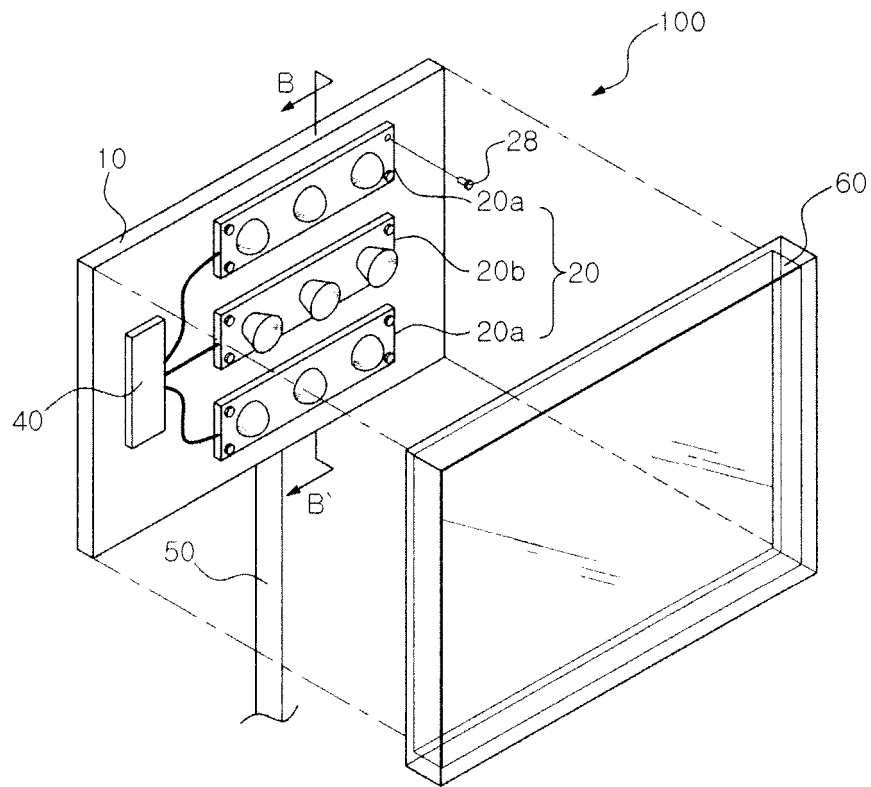


FIG. 1A

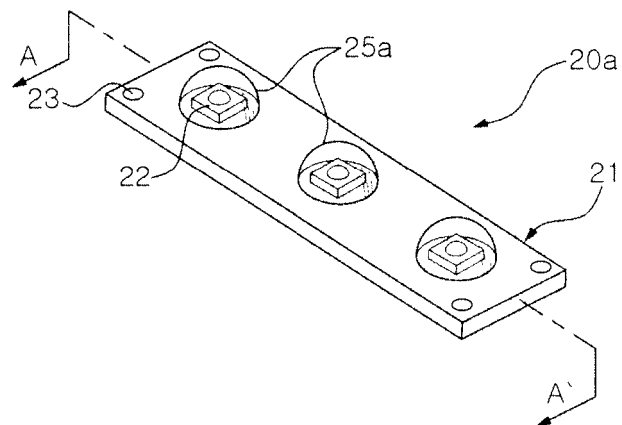


FIG. 1B

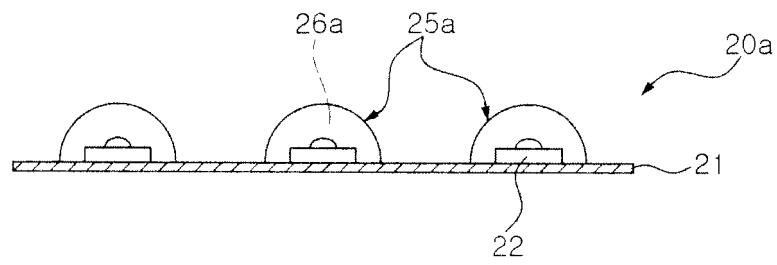


FIG. 2A

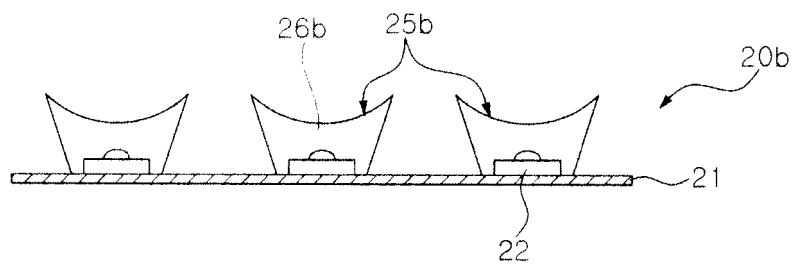


FIG. 2B

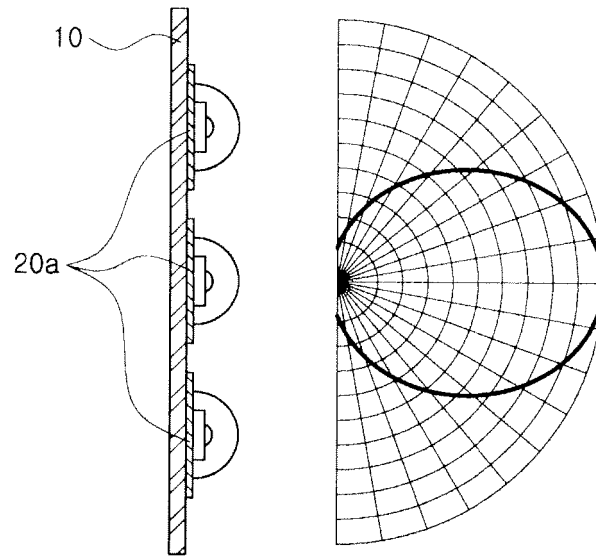


FIG. 3A

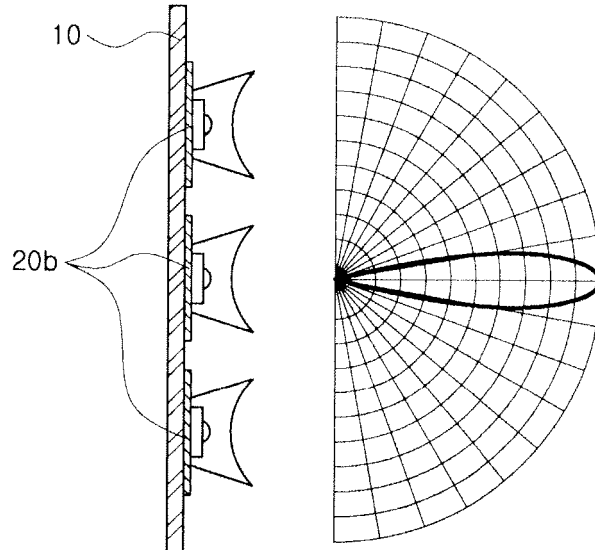


FIG. 3B

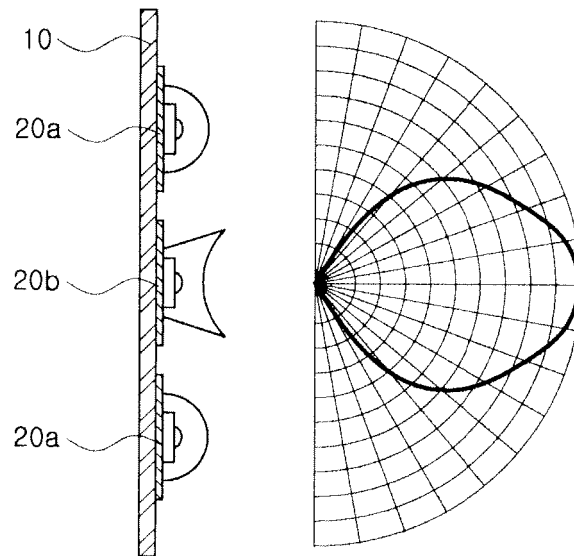


FIG. 3C

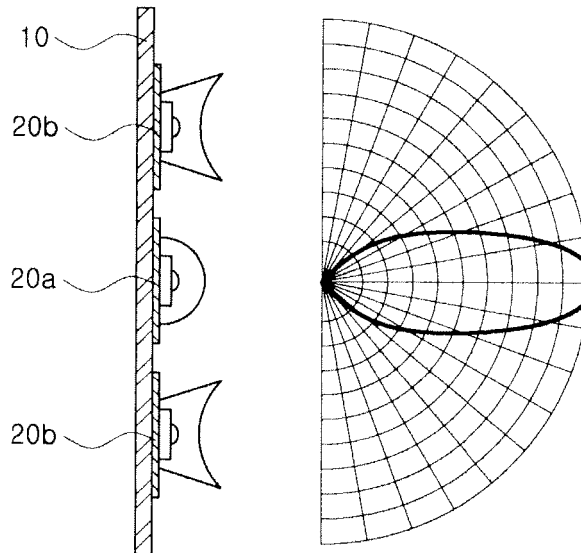


FIG. 3D

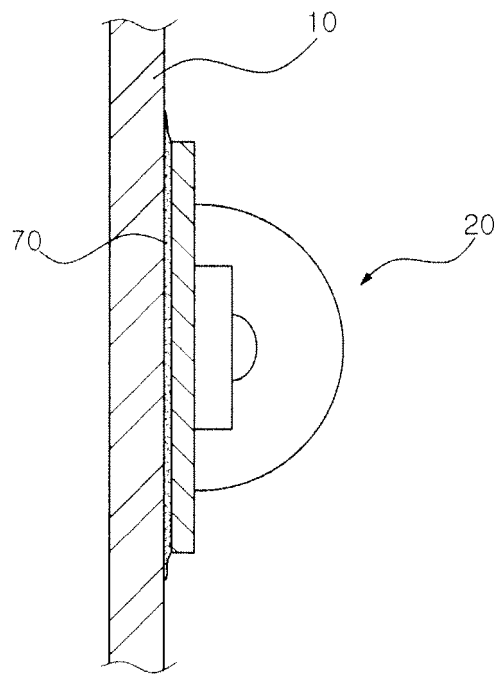


FIG. 4

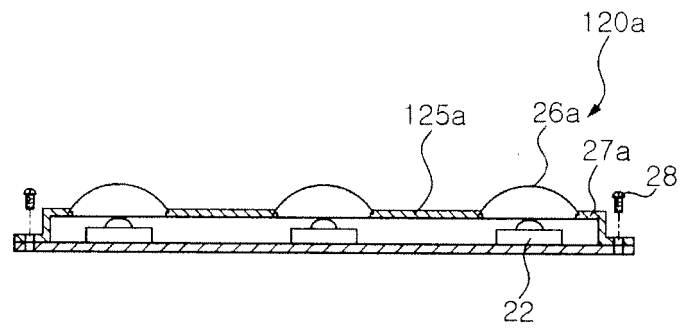


FIG. 5A

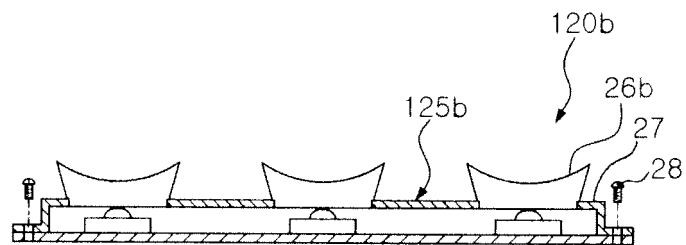


FIG. 5B

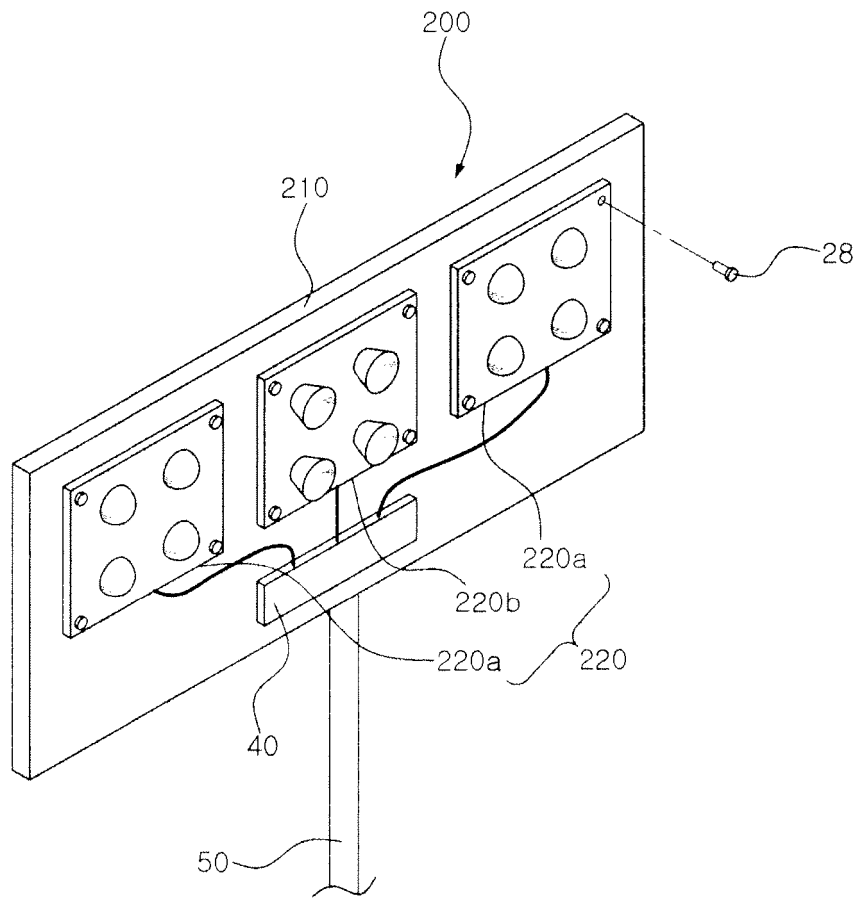


FIG. 6A

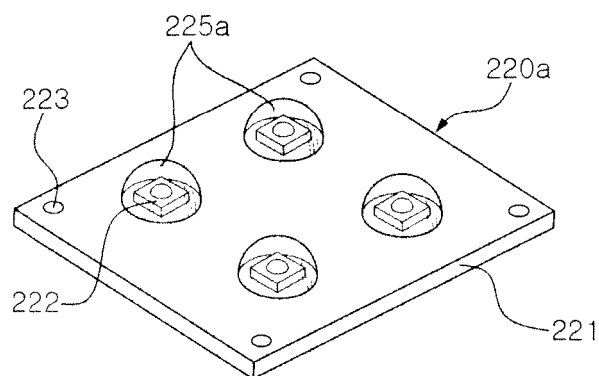


FIG. 6B

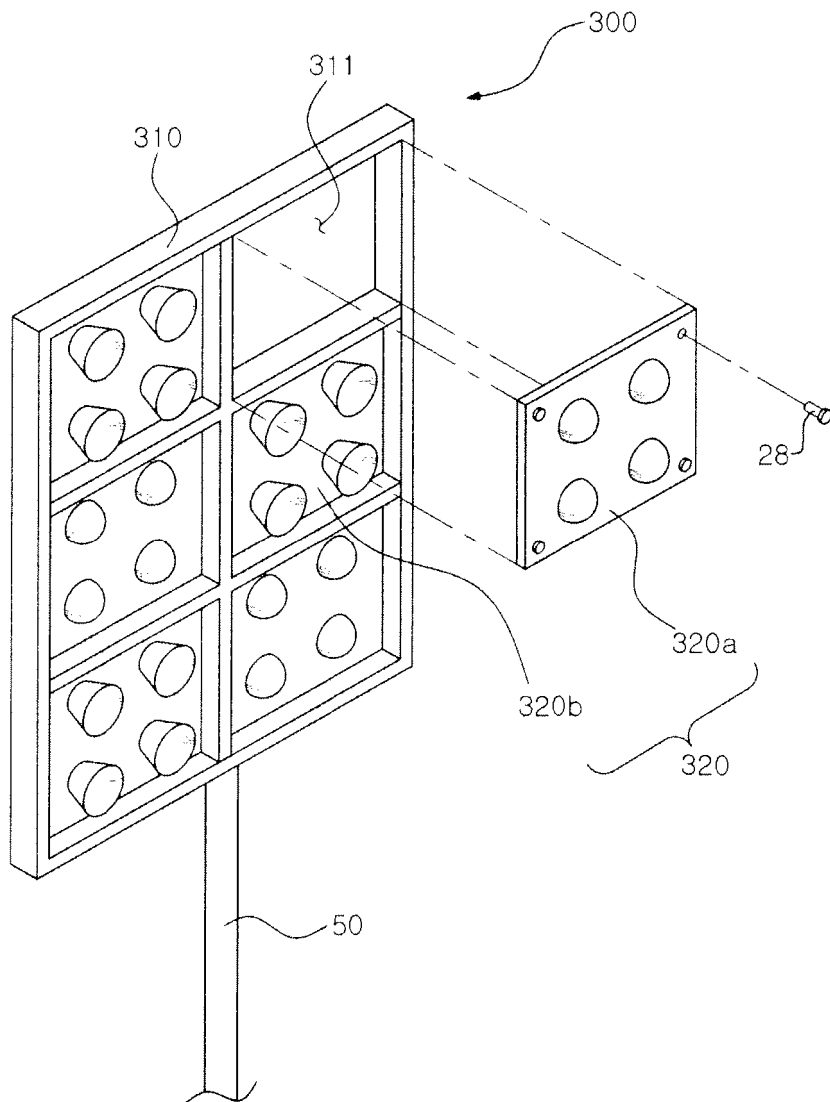


FIG. 7

REFERENCES CITED IN THE DESCRIPTION

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