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## (54) LIGHT EMITTING DEVICE

(57) A light emitting device includes a casing, a light shielding cap and a light emitting unit. The light shielding cap is disposed in the casing, and has a containing opening and a plurality of cavity structures surrounding the containing opening. Each of the cavity structures is adapted to reflect ambient light incident into the casing for multiple times. The light emitting unit is disposed in the casing and is disposed in the containing opening correspondingly.

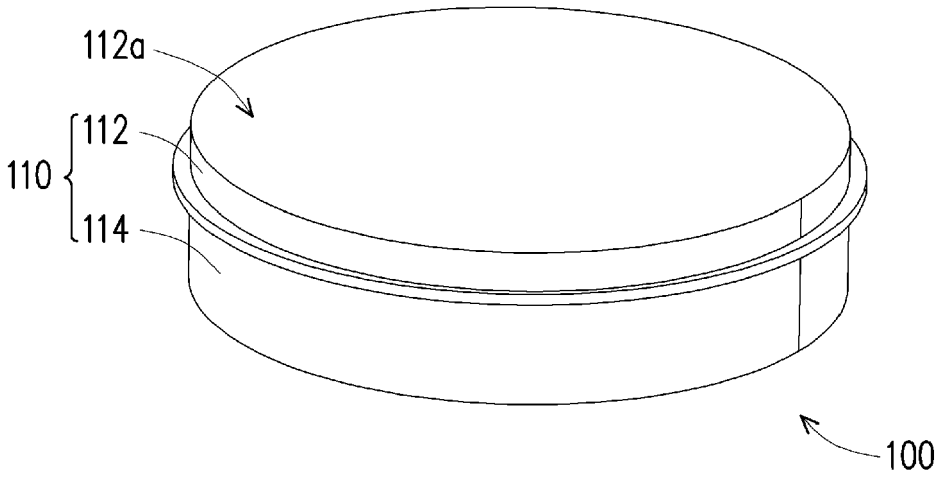


FIG. 1A

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## Description

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

**[0001]** The invention relates to a light emitting device, and particularly relates to a light emitting device capable of reducing reflected light and changing a focused position of incident light.

#### 2. Description of Related Art

**[0002]** Most of the conventional traffic light devices with a surface light source include a front cover, a rear cover, a point light source, and an internal element. The front cover has a lens part, a containing space is defined by the front cover and the rear cover, the point light source and the internal element are disposed on the rear cover and located in the containing space. When ambient light is emitted into the containing space through the lens part of the front cover, the incident ambient light is irradiated onto the rear cover and reflected out of the front cover. In the scenario, whether the point light source is lit up or not, a viewer may be misled to perceive that the traffic light device emits light. The safety on the road is thus affected. Besides, since the front cover has the lens part, the ambient light emitted into the containing space may be focused onto the internal element, and the high temperature is therefore generated at the focused position. So, the internal element may be damaged. Hence, how to modify the traffic light device with the surface light source has become an issue to work on.

### SUMMARY OF THE INVENTION

**[0003]** It is an object of the present invention to provide an improved light emitting device suited to overcome the above drawbacks of the prior art at least partially, particularly for reducing the effect of ambient light emitted into the containing space through the lens part of the front cover.

**[0004]** This problem is solved by a light emitting device as claimed by claim 1. Further advantageous embodiments are the subject-matter of the dependent claims.

**[0005]** A light emitting device according to the present invention is capable of reducing a chance that ambient light is reflected to a viewer after being irradiated into a casing, and is also capable of changing a focused position of the incident ambient light.

**[0006]** A light emitting device according to an embodiment of the invention includes a casing, a light shielding cap, and a light emitting unit. The light shielding cap is disposed in the casing and has a containing opening and a plurality of cavity structures surrounding the containing opening. Each of the cavity structures is adapted to reflect ambient light emitted into the casing for multiple times. The light emitting unit is disposed in the casing and is disposed in the containing opening correspondingly.

**[0007]** According to a further embodiment of the invention, the casing includes a front cover and a rear cover. The front cover is assembled to the rear cover to define a containing space. In addition, the light shielding cap and the light emitting unit are located in the containing space.

**[0008]** According to a further embodiment of the invention, the front cover has a lens part, and the ambient light enters the casing through the lens part.

**[0009]** According to a further embodiment of the invention, the light shielding cap and the light emitting unit are disposed on the rear cover of the casing.

**[0010]** According to a further embodiment of the invention, a first vertical distance is provided between a side of the light shielding cap relatively adjacent to the light emitting unit and the rear cover, a second vertical distance is provided between another side of the light shielding cap relatively distant to the light emitting unit and the rear cover, and the second vertical distance is greater than the first vertical distance.

**[0011]** According to a further embodiment of the invention, the light shielding cap is in a funnel shape.

**[0012]** According to a further embodiment of the invention, the light emitting device further includes at least one internal element. The at least one internal element is disposed on the rear cover of the casing, and an orthogonal projection of the light shielding cap on the rear cover is overlapped with an orthogonal projection of the internal element on the rear cover.

**[0013]** According to a further embodiment of the invention, the light shielding cap is disposed in parallel with the rear cover.

**[0014]** According to a further embodiment of the invention, the light emitting device further includes a plurality of support elements. The support elements are disposed between the light shielding cap and the rear cover, so as to define an accommodating space between the light shielding cap and the rear cover.

**[0015]** According to a further embodiment of the invention, a shape of each of the cavity structures from a top perspective includes a polygonal shape, a circular shape, an elliptical shape, or an irregular shape.

**[0016]** According to a further embodiment of the invention, a ratio of a depth to a width of each of the cavity structures is in a range from 1 to 100.

**[0017]** According to a further embodiment of the invention, a surface of the light shielding cap is coated with a light absorbing material.

**[0018]** According to a further embodiment of the invention, depths of the cavity structures of the light shielding cap are the same or different.

**[0019]** According to a further embodiment of the invention, a light shielding angle of the light shielding cap is greater than a light emitting angle of the light emitting unit.

**[0020]** According to a further embodiment of the invention, the light shielding cap includes a first light shielding cap and a second light shielding cap. The first light shield-

ing cap is assembled to the second light shielding cap, and the first light shielding cap is located between the second light shielding cap and the light emitting unit.

**[0021]** Based on the above, in the design of the light emitting device of the invention, the light shielding cap has a plurality of cavity structures, and the cavity structures are adapted to reflect the ambient light emitted into the casing for multiple times. Therefore, the cavity structures may absorb the ambient light to reduce the chance that the ambient light is reflected to the viewer after being irradiated into the casing. Accordingly, when the light emitting unit is not lit up, the viewer may be prevented from being misled to perceive that the light emitting device emits light. In addition, the design of the cavity structures of the light shielding cap of the invention may further change the focused position of the ambient light, so as to avoid damages to the internal elements due to a high temperature caused by focusing of the light. It is noted that the design according to the present invention is of particularly use for traffic light devices with a surface light source including a front cover, a rear cover, a point light source, and an internal element.

**[0022]** In order to make the aforementioned and other features and advantages of the invention comprehensible, several exemplary embodiments accompanied with figures are described in detail below.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0023]** The accompanying drawings are included to provide a further understanding of the invention, and are incorporated in and constitute a part of this specification. The drawings illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention.

FIG. 1A is a schematic perspective view illustrating a light emitting device according to an embodiment of the invention.

FIG. 1B is a schematic cross-sectional view illustrating the light emitting device of FIG. 1A.

FIG. 1C is a schematic perspective view illustrating a light shielding cap of FIG. 1B.

FIG. 1D is a partial schematic perspective cross-sectional view illustrating the light shielding cap of FIG. 1C.

FIG. 2A is a schematic perspective view illustrating a light shielding cap according to another embodiment of the invention.

FIG. 2B is a partial schematic perspective cross-sectional view illustrating the light shielding cap of FIG. 2A.

FIG. 3A is a schematic perspective view illustrating a light shielding cap according to yet another embodiment of the invention.

FIG. 3B is a partial schematic perspective cross-sectional view illustrating the light shielding cap of FIG. 3A.

FIG. 4A is a schematic cross-sectional view illustrating a light emitting device according to another embodiment of the invention.

FIG. 4B is a schematic perspective view illustrating a light shielding cap of FIG. 4A.

FIG. 5 is a schematic cross-sectional view illustrating a light emitting device according to still another embodiment of the invention.

FIG. 6 is a schematic cross-sectional view illustrating a light emitting device according to still another embodiment of the invention.

## DESCRIPTION OF THE EMBODIMENTS

**[0024]** Reference will now be made in detail to the present preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

**[0025]** FIG. 1A is a schematic perspective view illustrating a light emitting device according to an embodiment of the invention. FIG. 1B is a schematic cross-sectional view illustrating the light emitting device of FIG. 1A. FIG. 1C is a schematic perspective view illustrating a light shielding cap of FIG. 1B. FIG. 1D is a partial schematic perspective cross-sectional view illustrating the light shielding cap of FIG. 1C. Referring to FIGs. 1A, 1B, 1C, and 1D, a light emitting device 100 of the embodiment includes a casing 110, a light shielding cap 120a, and a light emitting unit 130. The light shielding cap 120a is disposed in the casing 110 and has a containing opening 122 and a plurality of cavity structures 124a surrounding the containing opening 122. In addition, each of the cavity structures 124a is adapted to reflect ambient light L emitted into the casing 110 for multiple times. The light emitting unit 130 is disposed in the casing 110, and is disposed in the containing opening 122 of the light shielding cap 120a correspondingly.

**[0026]** Specifically, referring to FIG. 1B, the casing 110 of the embodiment includes a front cover 112 and a rear cover 114. The front cover 112 is assembled to the rear cover 114 to define a containing space S. In addition, the light shielding cap 120a and the light emitting unit 130 are located in the containing space S. The front cover 112 has a lens part 112a, and the ambient light L enters the casing 110 through the lens part 112a. The light shielding cap 120a and the light emitting unit 130 are disposed on the rear cover 114 of the casing 110. In addition, a circuit board 150 is disposed on the rear cover 114 of the embodiment, and the light emitting unit 130 and the light shielding cap 120a are disposed on the circuit board 150. In addition, the light emitting unit 130 and the circuit board 150 are electrically connected. To facilitate light emitting efficiency of the light emitting unit 130, the light emitting device 100 of the embodiment also includes a lens 160. The lens 160 is disposed in the containing opening 122 and covers the light emitting unit 130.

**[0027]** Referring to FIGs. 1C and 1D, the light shielding cap 120a of the embodiment is a mask with a substantially uniform thickness. The light shielding cap 120a has a plurality of cavity structures 124a. In addition, depths of the cavity structures 124a may be the same or different. In other words, the light shielding cap 120a may have the cavity structures 124a with the same depth, or alternatively have the cavity structures 124a with different depths. The invention does not intend to impose a limitation in this regard. The light shielding cap 120a may be manufactured by using a dark and light-absorbing material, for example. However, the invention does not intend to impose a limitation in this regard. A shape of the cavity structure 124a of the embodiment from a top perspective may be a polygonal shape, a circular shape, an elliptical shape, or an irregular shape, for example. As shown in FIG. 1D, the cavity structures 124a include a plurality of cavity structures 124a1 and a plurality of cavity structures 124a2. In addition, the shape of the cavity structure 124a1 from a top perspective is implemented to be a hexagonal shape, whereas the cavity structure 124a2 is located on the edge of the light shielding cap 120a, and the shape of the cavity structure 124a2 from a top perspective is implemented to be an irregular shape due to an insufficient area.

**[0028]** Nonetheless, the invention does not intend to impose a limitation to the shape of the cavity structure 124a from a top perspective. In other embodiments, referring to FIGs. 2A and 2B, cavity structures 124b of a light shielding cap 120b include a plurality of cavity structures 124b1, a plurality of cavity structures 124b2, and a plurality of cavity structures 124b3. A shape of the cavity structure 124b1 from a top perspective is implemented to be a hexagonal shape, whereas the cavity structures 124b2 and 124b3 are located on the edge of the light shielding cap 120a, and a shape of the cavity structure 124b2 and a shape of the cavity structure 124b3 from a top perspective are respectively implemented to be an irregular shape and a circular shape due to an insufficient area.

**[0029]** The cavity structures 124a and 124b of the light shielding caps 120a and 120b are distributed on and across surfaces 121a and 121b. In addition, the cavity structures 124a and 124b are tightly adjacent to each other and are roughly arranged into an array. However, the invention does not intend to impose a limitation in this regard. In another embodiment, referring to FIGs. 3A and 3B, cavity structures 124c of a light shielding cap 120c are implemented as concentric circles arranged outward one circle after another along a containing opening 122c. In addition, a shape of the cavity structure 124c from a top perspective is implemented to be a circular shape.

**[0030]** Referring to FIG. 1B again, for multiple times of reflection, a ratio of a depth D to a width W of the cavity structure 124a is preferably in a range from 1 to 100. Since the ratio of the depth D to the width W of the cavity structure 124a of the embodiment is in the range from 1 to 100, when the incident ambient light L is irradiated to the cavity structure 124a, the incident ambient light L may be reflected and spread for multiple times and thus be absorbed by the cavity structure 124a. In other words, the design of the cavity structure 124a of the embodiment may facilitate a ratio of absorption of the incident ambient light L, and reduce a chance that the ambient light L is reflected to a viewer.

**[0031]** Moreover, as shown in FIG. 1B a first vertical distance H1 is provided between a side S1 of the light shielding cap 120a relatively adjacent to the light emitting unit 130 and the rear cover 114, and a second vertical distance H2 is provided between another side S2 of the light shielding cap 120a relatively distant to the light emitting unit 130 and the rear cover 114. In addition, the second vertical distance H2 is greater than the first vertical distance H1. In other words, the shielding cap 120a of the embodiment is substantially in a funnel shape, as shown in FIG. 1C.

**[0032]** Particularly, as shown in FIG. 1B, a light shielding angle A1 of the light shielding cap 120a of the embodiment is greater than a light emitting angle A2 of the light emitting unit 130. The light emitting unit 130 is a point light source, for example, such as a red light emitting diode, a green light emitting diode, or a yellow light emitting diode. However, the invention is not limited thereto. Here, the light shielding angle A1 is in a range from 141 degrees to 180 degrees, for example, and the light emitting angle A2 of the light emitting unit 130 is in a range from 0 degrees to 140 degrees, for example. Since the light shielding angle A1 of the light shielding cap 120a of the embodiment is greater than the light emitting angle A2 of the light emitting unit 130, disposing the light shielding cap 120a does not confine and block a range of light emission of the light emitting unit 130.

**[0033]** Moreover, the light emitting device 100 of the embodiment further includes at least one internal element (two internal elements 140a and 140b are shown in FIG. 1B for schematic illustration). The at least one internal element is disposed on the rear cover 114 of the casing 110. The internal elements 140a and 140b is a chip, a circuit board, or a combination thereof, for example. Particularly, an orthogonal projection of the light shielding cap 120a on the rear cover 114 is overlapped with orthogonal projections of the internal elements 140a and 140b on the rear cover 114. Therefore, when the ambient light L is emitted into the containing space S of the casing 110, the cavity structures 124a of the light shielding cap 120a may reflect and spread the ambient light L emitted into the casing 110 for multiple times. Therefore, the energy of the ambient light L may be absorbed and reduced, and the cavity structures 124a may also absorb the heat. Moreover, the light shielding cap 120a is disposed in front of the internal elements 140a and 140b. Therefore, a position of a focal point of the ambient light L may be changed through disposing the cavity structures 124a. Thus, the position of the focal point of the incident ambient light L may be prevented from being located at the internal elements 140a and

140b, so as to avoid damages to the internal elements 140a to 140b due to a high temperature. In other words, with the design of the cavity structures 124a, a light path of the ambient light L is distorted, and the energy of the ambient light L is received, so as to reduce the reflected light.

**[0034]** Referring to FIGs. 2A and 2B again, the light shielding cap 120b of the embodiment is not manufactured by using a dark light absorbing material. However, to facilitate light absorbing efficiency of the light shielding cap 120b, the surface 121b of the light shielding cap 120b may be coated with a light absorbing material 125. In addition, the light absorbing material 125 includes carbon nanotube, black resin, or other dark coating materials, for example. When the ambient light L enters the containing space S (as shown in FIG. 1B) through the lens part 112a of the front cover 112, the incident ambient light L may be irradiated onto the light shielding cap 120b and absorbed in the cavity structures 124b through multiple times of reflection and spreading. Since the surface 121b of the light shielding cap 120b is coated with the light absorbing material 125, the ratio of absorption of the ambient light L by the light shielding cap 120b is facilitated, and the chance that the incident ambient light L is reflected to the viewer is reduced.

**[0035]** It should be noted that the light shielding caps 120a, 120b, and 120c are all integrally formed structures. However, in another embodiment, referring to FIGs. 4A and 4B, a light shielding cap 120d of a light emitting device 100' includes a first light shielding cap 120d1 and a second light shielding cap 120d2. In addition, the first light shielding cap 120d1 is assembled to the second light shielding cap 120d2, and the first light shielding cap 120d1 is located between the second light shielding cap 120d2 and the light emitting unit 130. As shown in FIG. 4A, cavity structures 124d1 of the first light shielding cap 120d1 are implemented as concentric circles arranged outward one circle after another. In addition, a shape of the cavity structure 124d1 from a top perspective is a circular shape, for example, and a shape of a cavity structure 124d2 of the second light shielding cap 120d2 from a top perspective is a hexagonal shape, for example. However, the invention is not limited thereto.

**[0036]** In brief, with the design of the light shielding caps 120a, 120b, 120c, and 120d of the light emitting devices 100 and 100', when the ambient light L is emitted into the containing space S of the casing 110, the ambient light L is reflected and spread for multiple times in the cavity structures 124a, 124b, 124c, 124d1, and 124d2 of the light shielding caps 120a, 120b, 120c, and 120d and thus absorbed. Accordingly, the chance that the ambient light L is reflected to the viewer after being irradiated into the casing 110 is reduced. Besides, when the ambient light L is focused by the lens part 112a of the casing 110, the design of the light shielding caps 120a, 120b, 120c, and 120d may advance or interfere with the focused position of the ambient light L as well as receiving the energy of the incident ambient light L. Accordingly, the focused point may be prevented from being located at the internal elements 140a and 140b, thereby avoiding the damages to the internal elements 140a and 140b due to a high temperature.

**[0037]** It should be noted that the reference numerals and a part of the contents in the previous embodiment are used in the following embodiments, in which identical reference numerals indicate identical or similar components, and repeated description of the same technical contents is omitted. For a detailed description of the omitted parts, reference can be found in the previous embodiment, and no repeated description is contained in the following embodiments.

**[0038]** FIG. 5 is a schematic cross-sectional view illustrating a light emitting device according to still another embodiment of the invention. Referring to FIGs. 5 and 1B at the same time, a light emitting device 100a of the embodiment is similar to the light emitting device 100 of FIG. 1B, but differ in that a light shielding cap 120e of the embodiment is disposed to be substantially parallel to the rear cover 114, and the light emitting device 100a of the embodiment further includes a plurality of support element 170 disposed on the rear cover 114 to support the light shielding cap 120e.

**[0039]** Specifically, as shown in FIG. 5, the support columns 170 of the embodiment are located between the light shielding cap 120e and the rear cover 114 to define a containing space R between the light shielding cap 120e and the rear cover 114. In addition, the internal elements 140a and 140b are located in the containing space R. When the ambient light L is emitted into the containing space R, the ambient light L may be reflected and spread for multiple times in cavity structures 124e of the light shielding cap 120e and thus be absorbed. Accordingly, the chance that the ambient light L is reflected to the viewer after being irradiated into the casing 110 is reduced. Besides, when the ambient light L is focused by the lens part 112a of the casing 110, the design of the light shielding cap 120e may advance or interfere with the focused position of the ambient light L as well as receiving the energy of the incident ambient light L. Accordingly, the focused point may be prevented from being located at the internal elements 140a and 140b, thereby avoiding the damages to the internal elements 140a and 140b due to a high temperature. Here, the light shielding cap 120e is disposed to be substantially horizontal. Namely, a light shielding angle A1' of the light shielding cap 120e is configured to be 180 degrees, and a shape of the cavity structure 124e from a top perspective is configured to be a hexagonal shape. Here, reference is made to FIG. 1D. However, the invention is not limited thereto.

**[0040]** FIG. 6 is a schematic cross-sectional view illustrating a light emitting device according to still another embodiment of the invention. Referring to FIGs. 6 and 5 together, a light emitting device 100b of the embodiment is similar to the light emitting device 100a of FIG. 5, but differs in that a light shielding cap 120f of the embodiment includes a first light shielding cap 120f1 and a second

light shielding cap 120f2. The first light shielding cap 120f1 is assembled to the second light shielding cap 120f2, and the first light shielding cap 120f1 is located between the second light shielding cap 120f2 and the light emitting unit 130. Here, cavity structures 124f1 of the first light shielding cap 120f1 are implemented as concentric circles arranged outward one circle after another. In addition, a shape of the cavity structure 124f1 from a top perspective is a circular shape, for example, and a shape of a cavity structure 124f2 of the second light shielding cap 120f2 from a top perspective is a hexagonal shape, for example. Here, reference is made to FIG. 4B.

**[0041]** In view of the foregoing, in the design of the light emitting device of the invention, the light shielding cap has a plurality of cavity structures, and the cavity structures are adapted to reflect the ambient light emitted into the casing for multiple times. Therefore, the cavity structures may absorb the ambient light to reduce the chance that the ambient light is reflected to the viewer after being irradiated into the casing. Accordingly, when the light emitting unit is not lit up, the viewer may be prevented from being misled to perceive that the light emitting device emits light. In addition, the design of the cavity structures of the light shielding cap of the invention may further change the focused position of the ambient light, so as to avoid damages to the internal elements due to a high temperature caused by focusing of the light.

## Claims

**1.** A light emitting device (100, 100', 100a, 100b), comprising:

a casing (110);
a light shielding cap (120a, 120b, 120c, 120d, 120e, 120f), disposed in the casing (110) and having a containing opening (122, 122c) and a plurality of cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) surrounding the containing opening (122, 122c), wherein each of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) is adapted to reflect ambient light (L) emitted into the casing (110) for multiple times; and
a light emitting unit (130), disposed in the casing (110) and disposed in the containing opening (122, 122c) of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) correspondingly.

**2.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 1, wherein the casing (110) comprises a front cover (112) and a rear cover (114), the front cover (112) is assembled to the rear cover (114) to define a containing space (S), and the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) and the light emitting unit (130) are located in the containing space (S).

**3.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 2, wherein the front cover (112) has a lens part (112a), and the ambient light (L) enters the casing (110) through the lens part (112a).

**4.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 2 or 3, wherein the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) and the light emitting unit (130) are disposed on the rear cover (114) of the casing (110).

**5.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 4, wherein a first vertical distance (H1) is provided between a side (S1) of the light shielding cap (120a, 120b, 120c, 120d) relatively adjacent to the light emitting unit (130) and the rear cover (114), a second vertical distance (H2) is provided between another side (S2) of the light shielding cap (120a, 120b, 120c, 120d) relatively distant to the light emitting unit (130) and the rear cover (114), and the second vertical distance (H2) is greater than the first vertical distance (H1).

**6.** The light emitting device (100, 100') as claimed in claim 5, wherein the light shielding cap (120a, 120b, 120c, 120d) is in a funnel shape.

**7.** The light emitting device (100, 100', 100a, 100b) as claimed in any of claims 2 to 6, further comprising:

at least one internal element (140a, 140b), disposed on the rear cover (114) of the casing (110), wherein an orthogonal projection of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) on the rear cover (114) is overlapped with an orthogonal projection of the internal element (140a, 140b) on the rear cover (114).

**8.** The light emitting device (100a, 100b) as claimed in any of claims 2 to 5, wherein the light shielding cap (120e, 120f) is disposed in parallel with the rear cover (114).

**9.** The light emitting device (100a, 100b) as claimed in claim 8, further comprising:

a plurality of support elements (170) disposed between the light shielding cap (120e, 120f) and the rear cover (114), so as to define an accommodating space (R) between the light shielding cap (120e, 120f) and the rear cover (114).

**10.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein a

shape of each of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) from a top perspective comprises a polygonal shape, a circular shape, an elliptical shape, or an irregular shape.

**11.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein a ratio of a depth (D) to a width (W) of each of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) is in a range from 1 to 100.

**12.** The light emitting device (100) as claimed in any of the preceding claims, wherein a surface (121b) of the light shielding cap (120b) is coated with a light absorbing material.

**13.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein depths (D) of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) are the same or different.

**14.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein a light shielding angle (A1, A1') of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) is greater than a light emitting angle (A2) of the light emitting unit (130).

**15.** The light emitting device (100', 100b) as claimed in any of the preceding claims, wherein the light shielding cap (120d, 120f) comprises a first light shielding cap (120d1, 120f1) and a second light shielding cap (120d2, 120f2), the first light shielding cap (120d1, 120f1) is assembled to the second light shielding cap (120d2, 120f2), and the first light shielding cap (120d1, 120f1) is located between the second light shielding cap (120d2, 120f2) and the light emitting unit (130).

**Amended claims in accordance with Rule 137(2) EPC.**

**1.** A light emitting device (100, 100', 100a, 100b), comprising:

a casing (110);
a light shielding cap (120a, 120b, 120c, 120d, 120e, 120f), disposed in the casing (110) and having a containing opening (122, 122c) and a plurality of structures surrounding the containing opening (122, 122c) and adapted to reflect ambient light (L) emitted into the casing (110) for multiple times; and
a light emitting unit (130), disposed in the casing (110) and disposed in the containing opening (122, 122c) of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) correspondingly;
**characterized in that** the structures are formed as cup-shaped cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2), wherein a shape of each of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124d1, 124d2, 124e, 124f1, 124f2) from a top perspective is hexagonal.

**2.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 1, wherein the casing (110) comprises a front cover (112) and a rear cover (114), the front cover (112) is assembled to the rear cover (114) to define a containing space (S), and the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) and the light emitting unit (130) are located in the containing space (S).

**3.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 2, wherein the front cover (112) has a lens part (112a), and the ambient light (L) enters the casing (110) through the lens part (112a).

**4.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 2 or 3, wherein the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) and the light emitting unit (130) are disposed on the rear cover (114) of the casing (110).

**5.** The light emitting device (100, 100', 100a, 100b) as claimed in claim 4, wherein a first vertical distance (H1) is provided between a side (S1) of the light shielding cap (120a, 120b, 120c, 120d) relatively adjacent to the light emitting unit (130) and the rear cover (114), a second vertical distance (H2) is provided between another side (S2) of the light shielding cap (120a, 120b, 120c, 120d) relatively distant to the light emitting unit (130) and the rear cover (114), and the second vertical distance (H2) is greater than the first vertical distance (H1).

**6.** The light emitting device (100, 100') as claimed in claim 5, wherein the light shielding cap (120a, 120b, 120c, 120d) is funnel-shaped.

**7.** The light emitting device (100, 100', 100a, 100b) as claimed in any of claims 2 to 6, further comprising:
at least one internal element (140a, 140b), disposed on the rear cover (114) of the casing (110), wherein an orthogonal projection of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) on the rear cover (114) is overlapped with an orthogonal projection of the internal element (140a, 140b) on the rear

cover (114).

**8.** The light emitting device (100a, 100b) as claimed in any of claims 2 to 5, wherein the light shielding cap (120e, 120f) is disposed in parallel with the rear cover (114).

**9.** The light emitting device (100a, 100b) as claimed in claim 8, further comprising:
a plurality of support elements (170) disposed between the light shielding cap (120e, 120f) and the rear cover (114), so as to define an accommodating space (R) between the light shielding cap (120e, 120f) and the rear cover (114).

**10.** The light emitting device (100') as claimed in any of the preceding claims, wherein a shape of each of the cavity structures (124c) from a top perspective further comprises a circular shape or an irregular shape.

**11.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein a ratio of a depth (D) to a width (W) of each of the cavity structures (124a, 124a1, 124a2, 124b, 124bl, 124b2, 124b3, 124c, 124dl, 124d2, 124e, 124fl, 124f2) is in a range from 1 to 100.

**12.** The light emitting device (100) as claimed in any of the preceding claims, wherein a surface (121b) of the light shielding cap (120b) is coated with a light absorbing material.

**13.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein depths (D) of the cavity structures (124a, 124a1, 124a2, 124b, 124b1, 124b2, 124b3, 124c, 124dl, 124d2, 124e, 124fl, 124f2) of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) are the same or different.

**14.** The light emitting device (100, 100', 100a, 100b) as claimed in any of the preceding claims, wherein a light shielding angle (A1, A1') of the light shielding cap (120a, 120b, 120c, 120d, 120e, 120f) is greater than a light emitting angle (A2) of the light emitting unit (130).

**15.** The light emitting device (100', 100b) as claimed in any of the preceding claims, wherein the light shielding cap (120d, 120f) comprises a first light shielding cap (120d1, 120f1) and a second light shielding cap (120d2, 120f2), the first light shielding cap (120d1, 120f1) is assembled to the second light shielding cap (120d2, 120f2), and the first light shielding cap (120d1, 120f1) is located between the second light shielding cap (120d2, 120f2) and the light emitting unit (130).

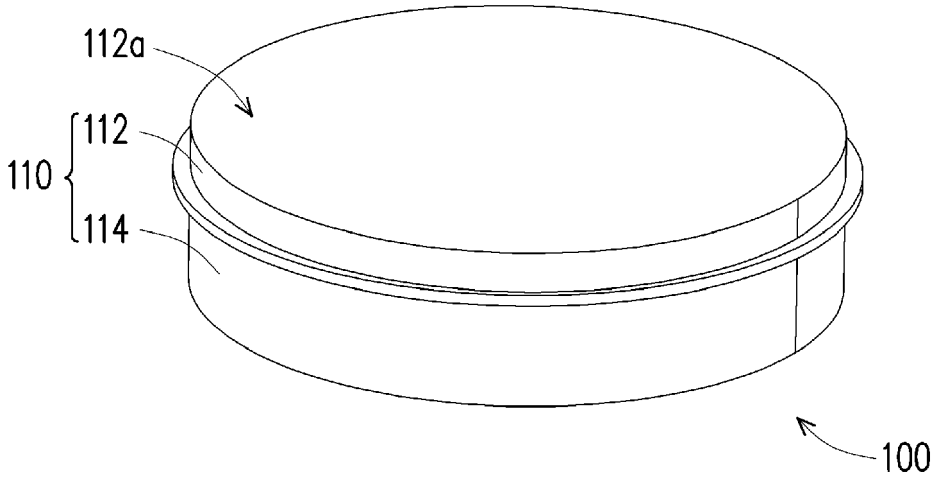


FIG. 1A

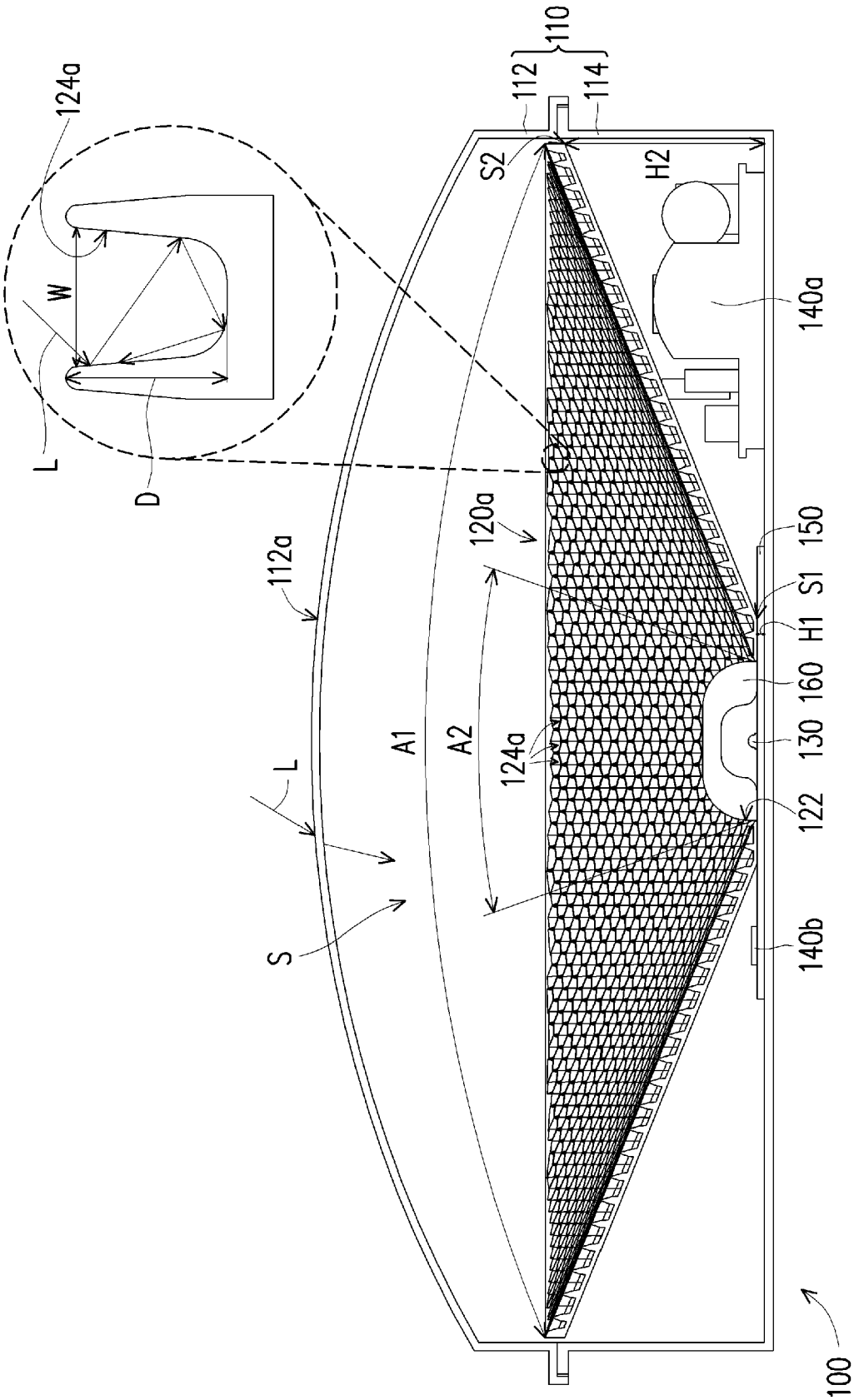
124a
W
L
D
110
112
114
S2
H2
140a
120a
112a
150
S1
H1
160
130
122
A1
A2
124a
L
S
140b
100

FIG. 1B

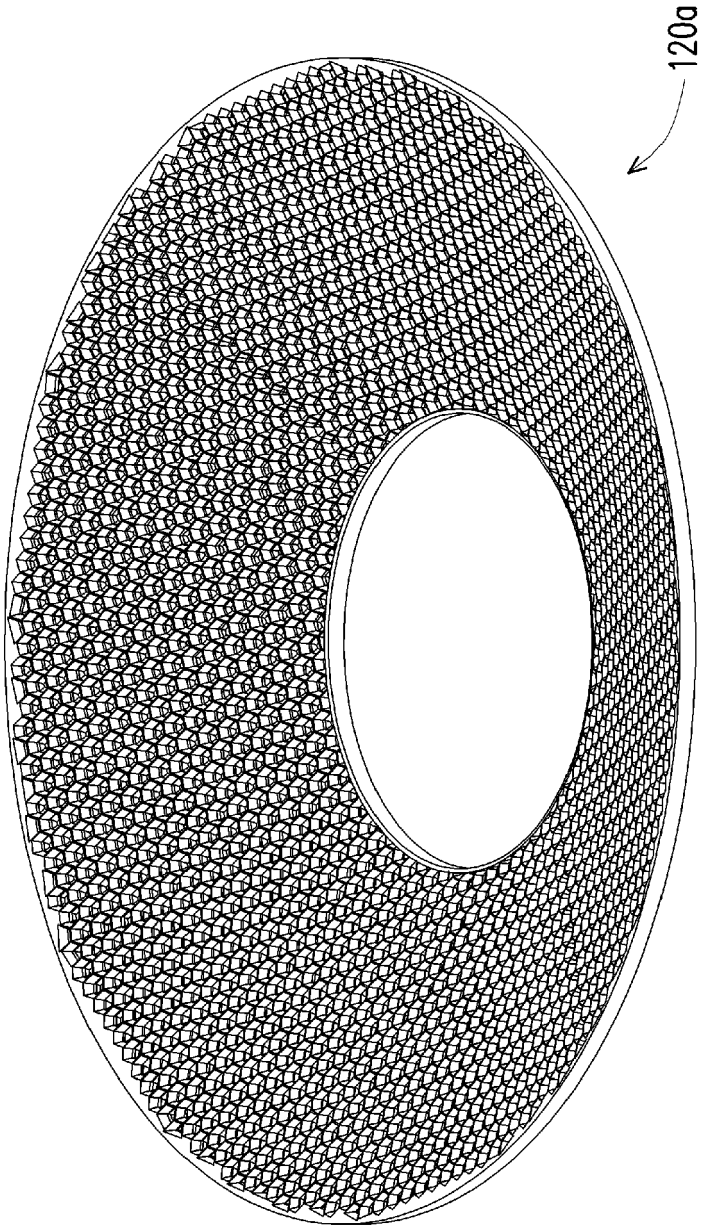


FIG. 1C

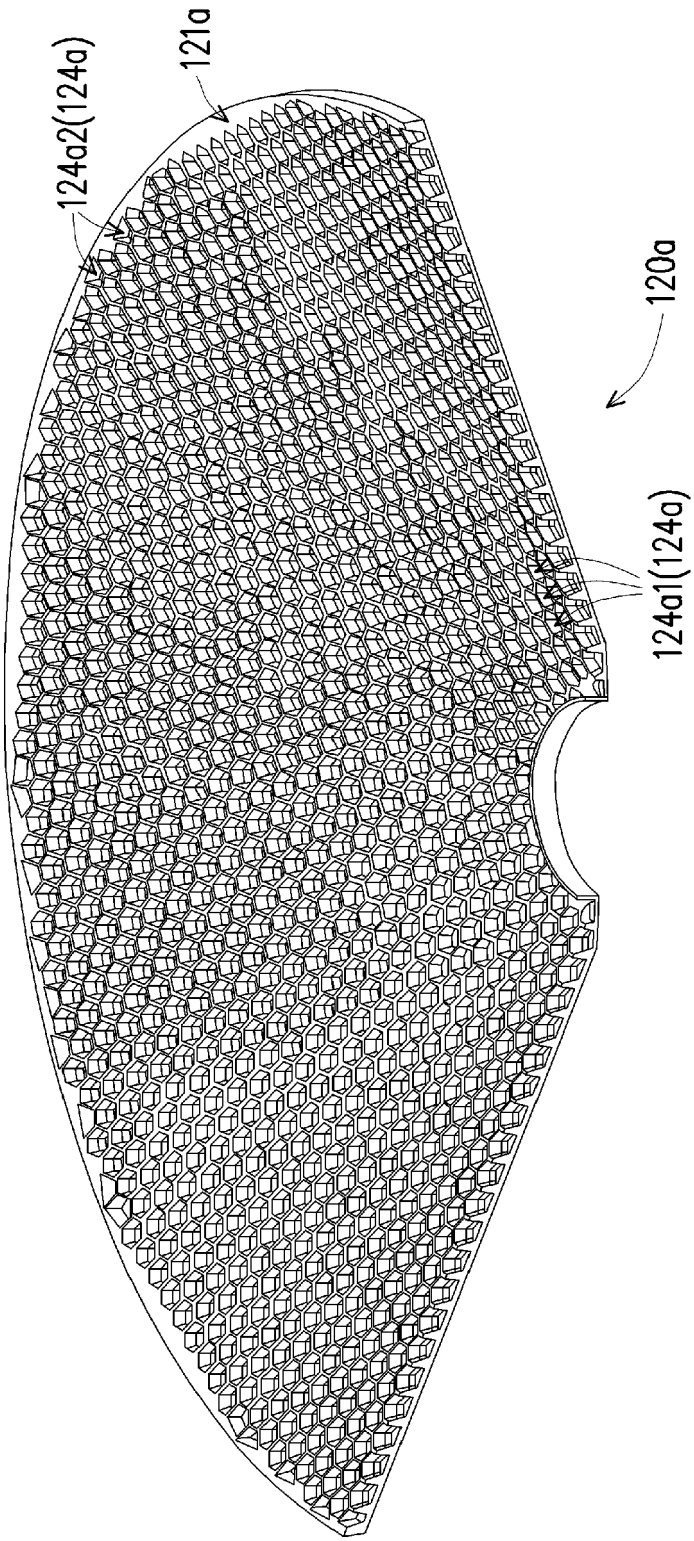


FIG. 1D

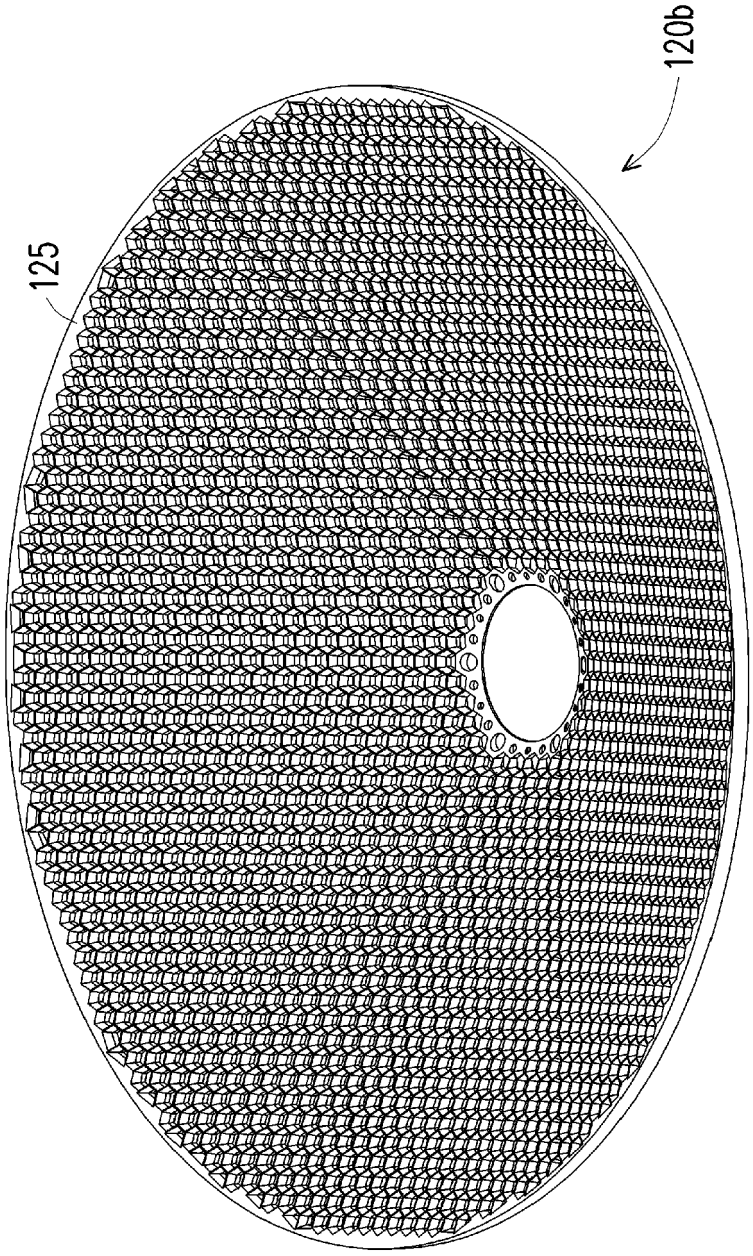


FIG. 2A

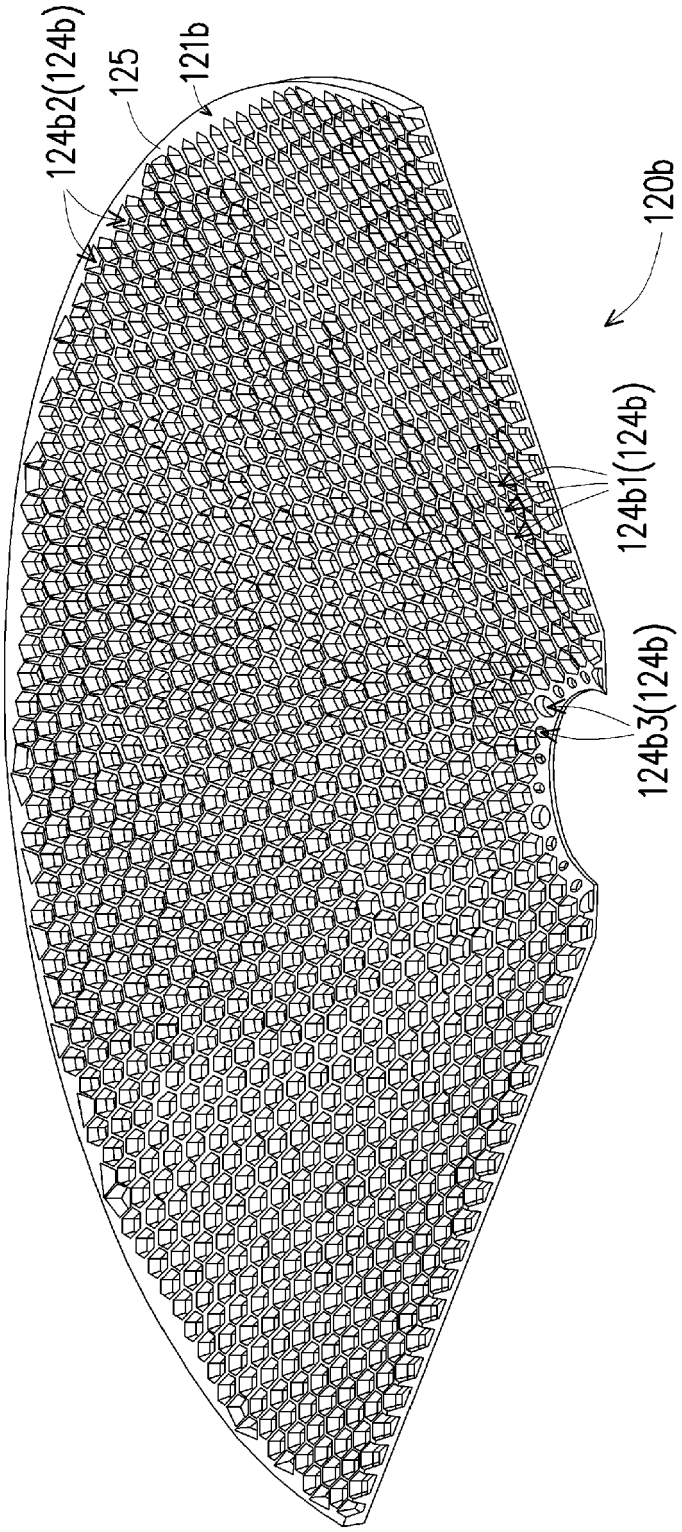


FIG. 2B

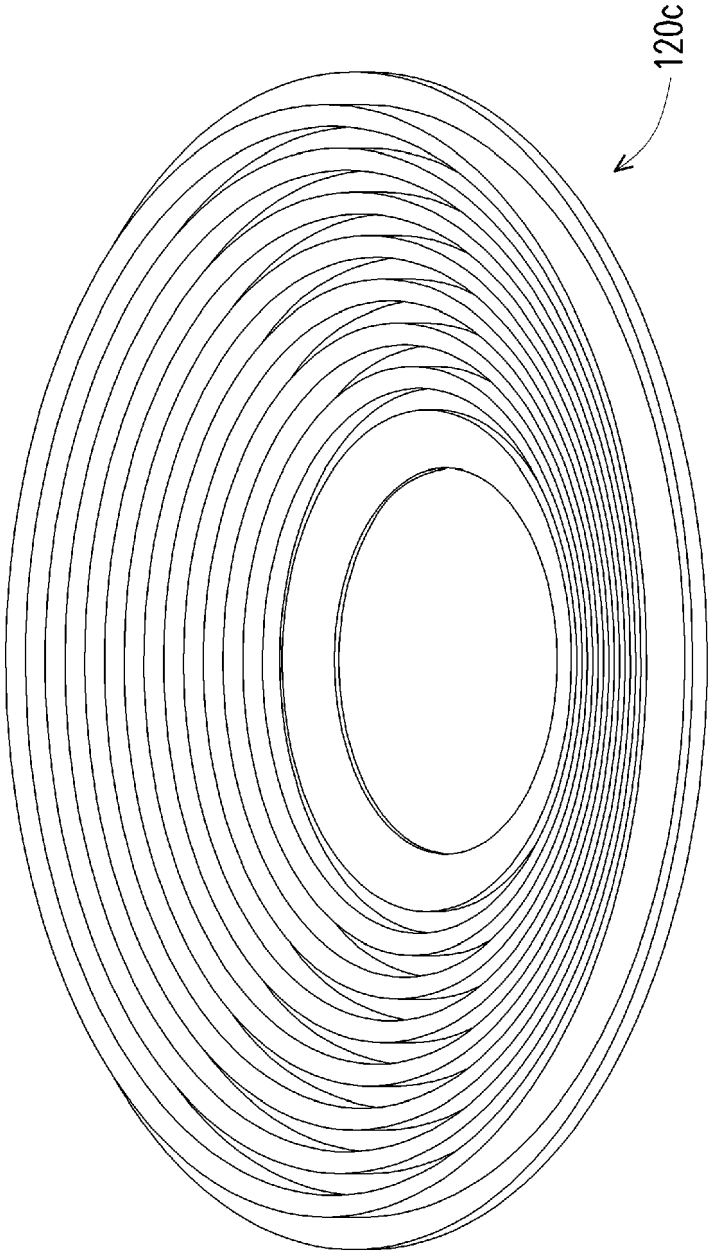


FIG. 3A

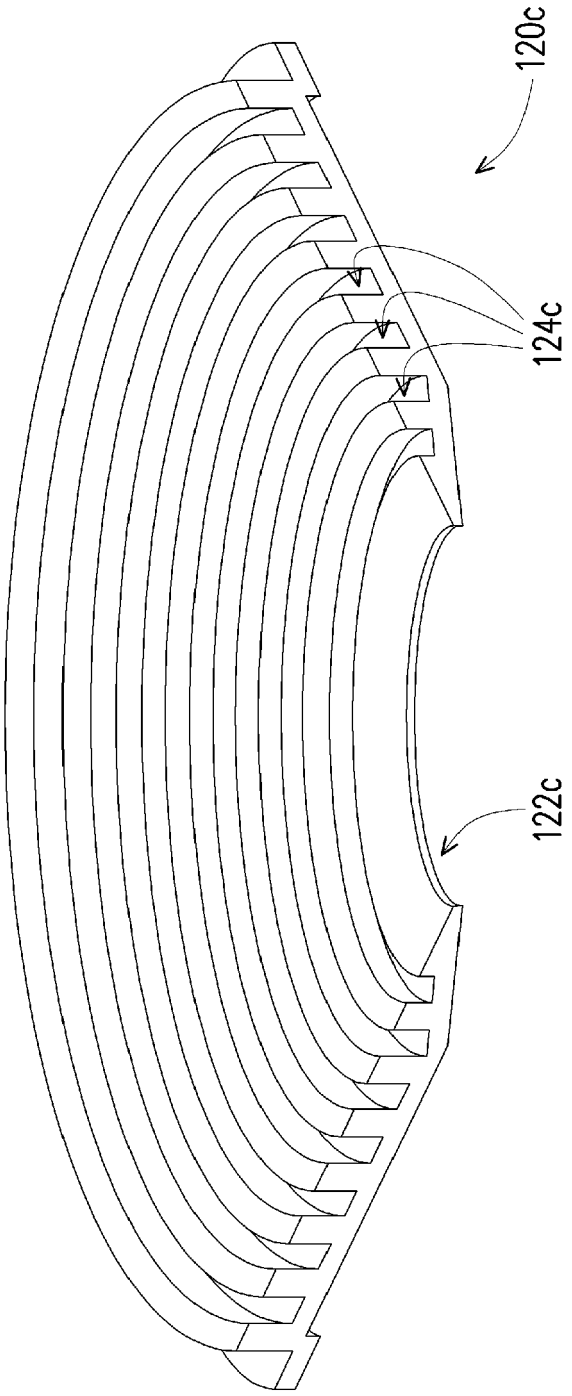


FIG. 3B

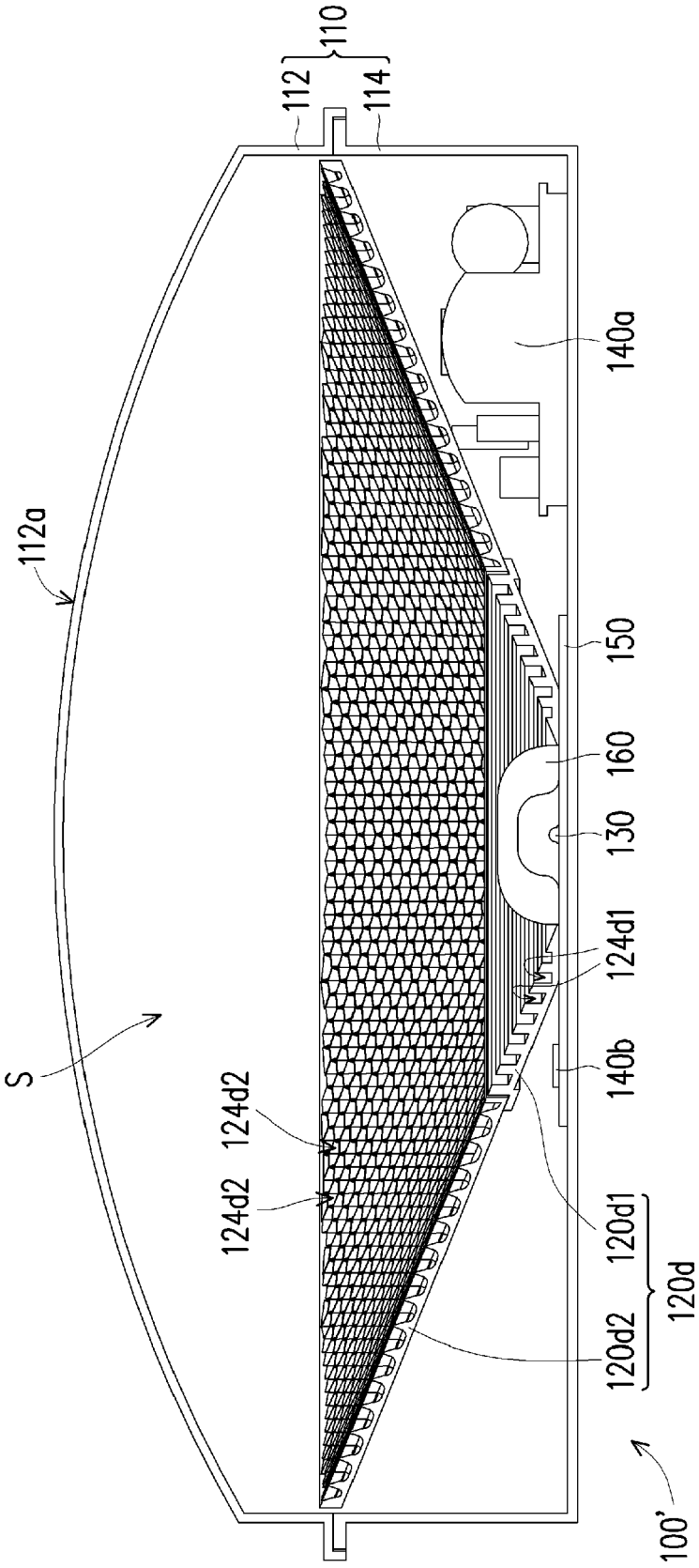
110
112
114
140a
112a
150
160
130
124d1
140b
S
124d2
124d2
120d1
120d
120d2
100'

FIG. 4A

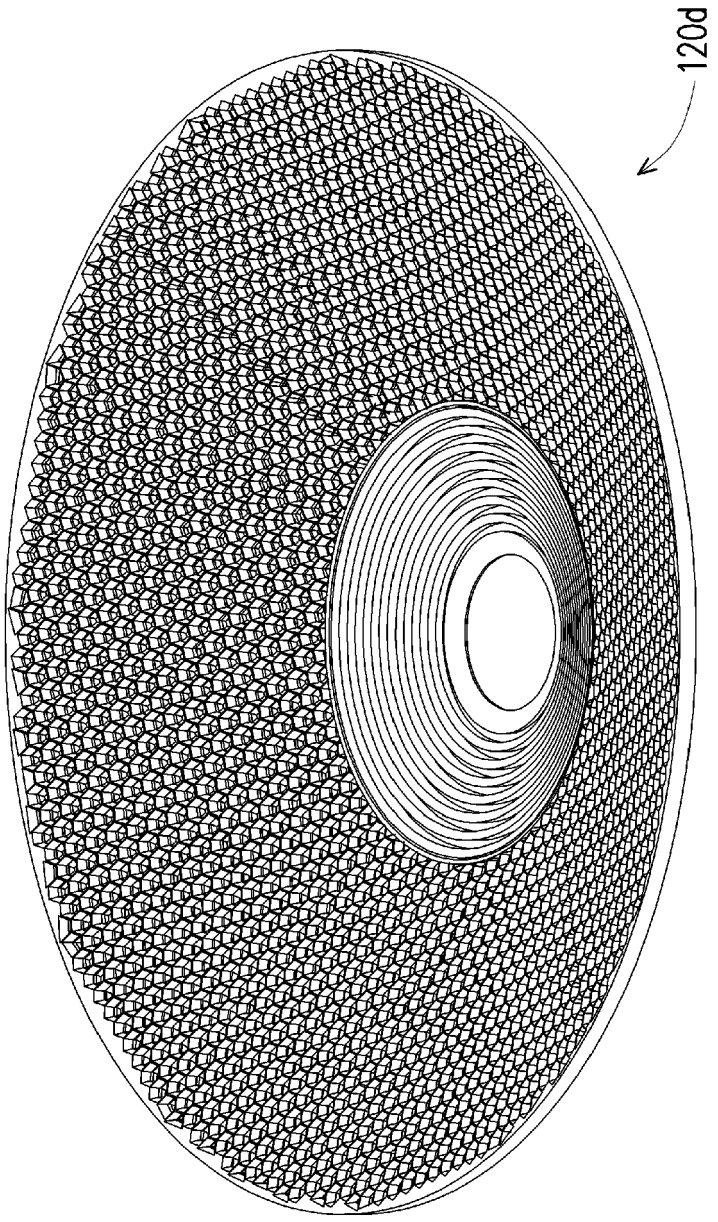


FIG. 4B

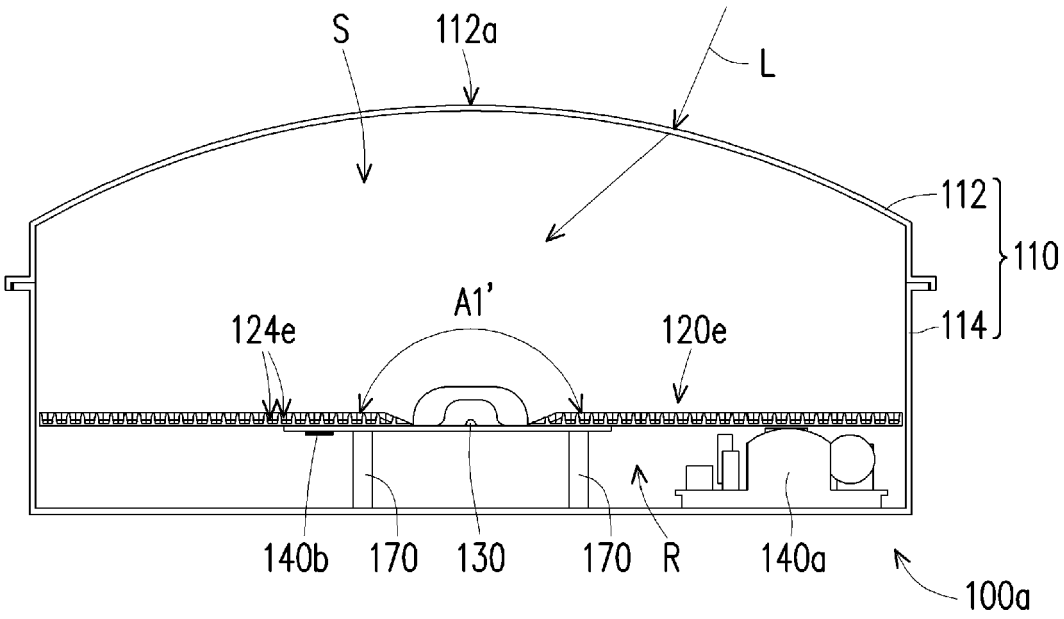
S
112a
L
112
110
A1'
124e
120e
114
140b
170
130
170
R
140a
100a

FIG. 5

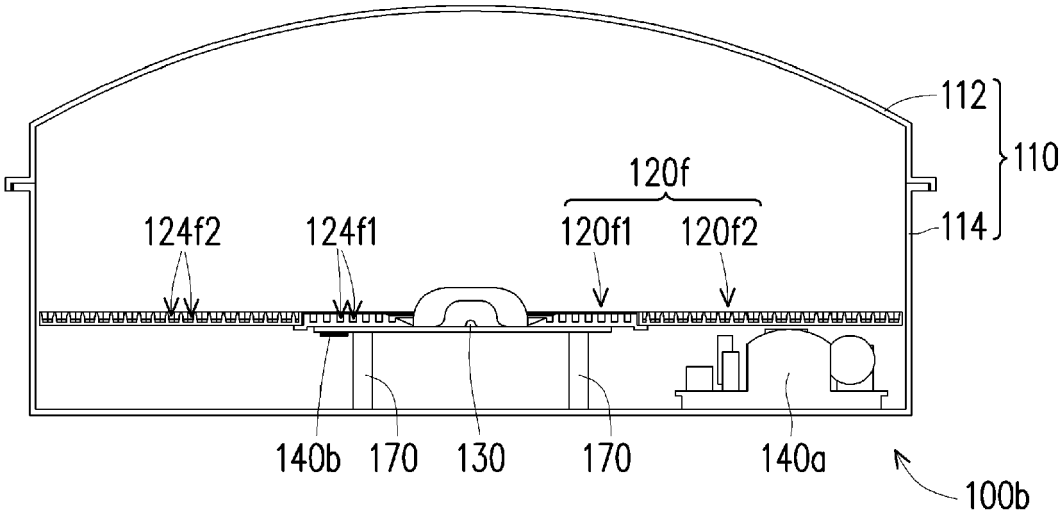
112
110
120f
124f2
124f1
120f1
120f2
114
140b
170
130
170
140a
100b

FIG. 6

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Application Number
EP 17 16 1574

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| The Hague | 29 May 2017 | Demirel, Mehmet |

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