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(54) LED lamp and illumination device

(57) The present invention relates to the field of illumination and provides a LED lamp and an illumination device. The LED lamp includes a LED light source 1 and a power apparatus 2 supplying for the LED light source 1, wherein the LED lamp further includes a thermally conductive lamp housing 3, a thermally conductive reflective cup 4 within the lamp housing and a thermally conductive base 5 under the reflective cup. The LED light source 1 is mounted on the base which is integrally molded with the reflective cup 4 or the lamp housing 3. In the present invention a thermally conductive base 5 is added under the reflective cup 4, and the LED light source 1 is directly mounted on the base 5. All of the base 5, the reflective cup 4 and the lamp housing 3 are thermally conductive, and the produced heat may be timely and directly transferred to the reflective cup 4 and/or the lamp housing 3 by the base 5, which greatly increases the heat dissipation area and effectively improves the performance of the heat dissipation. The heat can be dissipated quickly and efficiently without increasing the complexity of the lamp, thereby improving the utilization efficiency of the original structure of the lamp and having higher practicability.

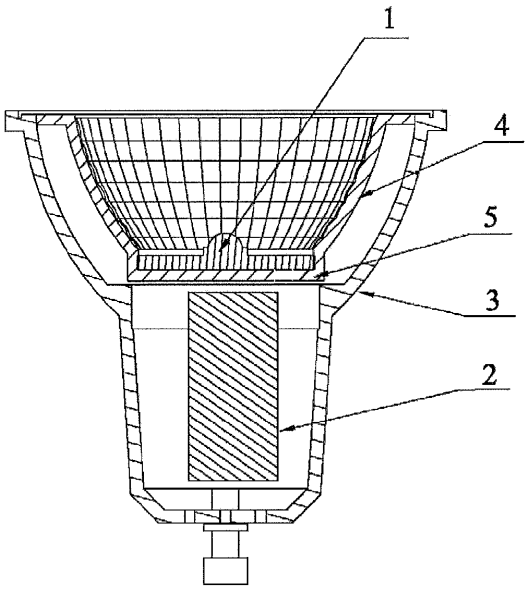

Fig. 2

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Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to the field of illumination, and more particularly, to an LED lamp and an illumination device.

2. Description of Related Art

[0002] Heat dissipation is one of the important factors impacting on the performance of light emitting diode (LED) lamp. In the prior art, generally, the LED light source directly contacts with the radiator or uses heat-conductive pathway to lead heat out so that the LED light source can work normally. However, the performance of heat dissipation by the means is still far from perfect. As an aid in the heat dissipation, some through holes are defined in opposite work plane of the reflective cup, but it does not obviously improve the effect of heat dissipation. Moreover, the means is mainly applied to a groove-shaped reflector cups and is not proper to a trumpet-shaped reflector cup. Therefore, it is necessary to adopt a more effective measure to improve the effect of heat dissipation.

BRIEF SUMMARY OF THE INVENTION

[0003] The present invention is to provide an LED lamp to solve the shortcomings of heat dissipation for the traditional LED lamps.

[0004] The present invention adopts the following technical solutions to solve the technical problem: a LED lamp including an LED light source and a power apparatus supplying power for the LED light source, the LED lamp further includes a thermally conductive lamp housing, a thermally conductive reflective cup within the lamp housing, and a thermally conductive base under the reflective cup, the LED light source is mounted on the base, the base and the reflective cup or the lamp housing are integrally molded.

[0005] The preferred technical solutions of the present invention may be one or more of the following:

[0006] The reflective cup and the lamp housing are integrally molded.

[0007] A light exit of the reflective cup connects with an opening of the lamp housing.

[0008] The base has a through hole, and the power apparatus is provided with electrode leading wires which connect with the power apparatus by passing through the through hole.

[0009] An internal surface of the reflective cup is a reflecting surface formed by sequential arrangement of a plurality of reflecting circular bands, each of which is comprised of sequential arrangement of a plurality of rectangular plane units around a central axis of the reflective cup.

[0010] The base is a flat structure.

[0011] The base is circular.

[0012] The base is convex, and the LED light source is mounted on a convex platform of the convex base.

[0013] The base is concave, and the LED light source is mounted on a concave platform of the concave base.

[0014] The other object of present invention is to provide an illumination device including at least an LED light which has the LED lamp.

[0015] In the present invention a base is added under the reflective cup, and the LED light source is mounted on the base. All of the base, the reflective cup and the lamp housing by which heat can be absorb quickly and dissipate quickly are thermally conductive, which increases the heat dissipation area, efficiently improves the effect of heat dissipation and extends service life of the LED light source. When the LED light source is lighting, the produced heat may be timely and directly transferred to the reflective cup and/or the lamp housing by the base, The heat can be dissipated quickly and efficiently without increasing the complexity of the lamp, thereby improving the utilization efficiency of the original structure of the lamp, effectively controlling the increase of the cost and being provided with higher practicability.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0016]

Fig. 1 is a schematic exploded structure view of the LED lamp of an embodiment in accordance with the present invention;

Fig. 2 is a first schematic sectional structure view of the LED lamp of an embodiment thereof;

Fig. 3 is a second schematic sectional structure view of the LED lamp of an embodiment thereof;

Fig. 4(a), Fig. 4(b) and Fig. 4(c) are respectively a schematic sectional structure view, a perspective structure view and a top structure view of the integral structure formed by a reflective cup and a lamp housing;

Fig. 5(a), Fig. 5(b) and Fig. 5(c) are respectively a first schematic sectional structure view, perspective structure view and top structure view of the integral structure formed by the reflective cup and a base;

Fig. 6(a), Fig. 6(b) and Fig. 6(c) are respectively a second schematic sectional structure view, perspective structure view and top structure view of the integral structure formed by the reflective cup and the base;

Fig. 7(a), Fig. 7(b) and Fig. 7(c) are respectively a third schematic sectional structure view, perspective structure view and top structure view of the integral structure formed by the reflective cup and the base;

Fig. 8(a), Fig. 8(b) and Fig. 8(c) are respectively a fourth schematic sectional structure view, perspec-

tive structure view and top structure view of the integral structure formed by the reflective cup and the base;

Fig. 9(a), Fig. 9(b) and Fig. 9(c) are respectively a fifth schematic sectional structure view, perspective structure view and top structure view of the integral structure formed by the reflective cup and the base.

DETAILED DESCRIPTION OF THE INVENTION

[0017] In order to make the objects, technical solutions and advantages of the invention clearer, the present invention will be explained below in detail with reference to the accompanying drawings and embodiments. It is to be understood that the following description of the embodiments is merely to explain the present invention and is no way intended to limit the invention.

[0018] Referring to Fig. 1, Fig. 2 and Fig. 3, the LED lamp provided in an embodiment of the present invention includes an LED light source 1, a power apparatus 2 supplying power for the LED light source 1, a thermally conductive lamp housing 3 and a thermally conductive reflective cup 4 within the lamp housing 3. Thereinto, the reflective cup 4 and lamp housing 3 are fixed each other, and the LED light source 1 is positioned at a bottom of the reflective cup 4 from which a part of light is directly sent out and another part is reflected out of the LED lamp by the internal reflecting surface of the reflective cup. The power apparatus 2 may be configured within the lamp housing 3 or outside of the lamp housing 3. The LED light source 1 may connect with the power apparatus 2 via a wire 21. Furthermore, the thermally conductive base 5 is mounted under the reflective cup 4 and the LED light source 1 is directly mounted on the base 5. Moreover, the base 5 and the reflective cup 4 are integrally molded. In the embodiment, the LED light source 1 has a direct contact with the base 5. All of the base 5, the reflective cup 4 and the lamp housing 3 are thermally conductive. When the LED light source is lighted, the produced heat may be timely and directly transferred to the reflective cup 4 or the lamp housing 3 by the base 5 and then quickly emitted into air, which increases the heat dissipation area, effectively improves the effect of heat dissipation and extends the service life of the LED light source. The problem of heat dissipation is solved by additionally using the radiator. Moreover, the reflective cup is provided with light distribution and heat dissipation. Meanwhile the devices within the lamp housing are protected by the lamp housing which also dissipates the heat. Therefore, quick and effective heat dissipation is obtained by the LED lamp, which avoids a complicated structure of the lamp and improves the utilization efficiency of the original structure. Moreover, comparing with addition of a radiator, the present invention effectively controls the cost and has higher practicability.

[0019] Referring to the Fig. 2, Fig. 3 and Fig. 4, as a further improvement of an embodiment of the present invention, the reflective cup 4 and the lamp housing 3 may be integrally molded, whatever the base 5 is integrally molded together with the reflective cup 4 or the lamp housing 3, so that the reflective cup 4 and light housing 3 may be made into an element. The heat generated by the light source 1 may be emitted into air via the base 5, the reflective cup 4 and the lamp housing 3 so that the heat dissipation area is increased, the manufacture process and the manufacture cost is not increased. Therefore, as a preferred embodiment, in order to obtain better heat dissipation, the reflective cup and lamp housing are integrally molded.

[0020] Additionally, the reflective cup 4 and lamp housing 3 may connect with each other at an opening of the lamp housing 3, namely, the light exit of the reflective cup 4 and the opening of the lamp housing 3 are integrally molded, which is convenient to manufacture and has a good shape.

[0021] In the embodiment, preferably, the base 5, the reflective cup 4 and the lamp housing 3, may be made of metal, the thermal conductivity of which is high, so that the heat can be quickly absorbed and dissipated. Definitely, other thermally conductive material may be used.

[0022] In the embodiment of the present invention, the internal surface of the reflective cup 4 is the reflecting surface 41. In order to improve the angle of light distribution and the degree of uniformity of the light, the reflecting surface 41 may be in the form of grid. As seen from the Fig. 5, in detail, the reflecting surface may be formed by sequential arrangement of a plurality of reflecting circular bands, each of which is comprised of sequential arrangement of a plurality of rectangular plane units 411 around the centric axis of the reflective cup. The light may be reflected by the grid reflecting surface according to a predefined direction, and then the exit light with the required angle and degree of uniformity is obtained.

[0023] In the embodiment of the present invention, several electrode leading wire 21 may be leaded out from the power apparatus 2, and a small through hole 51 is provided in the base 5. Passing through the through hole 51, the electrode leading wire 21 connects with the LED light source 1 to supply power for the LED light source 1.

[0024] In the embodiment of the present invention, whatever the base 5 is integrally molded together with the reflective cup 4 or the lamp housing 3, the base 5 may be provided with the following structure as shown in Fig. 5. The base 5 may be a flat structure to match with an opening at a bottom of the reflective cup 4. The LED light source 1 is directly mounted under the base 5. The flat base is easy to be processed. Further see Fig. 6, the hole whose shape is circular or others may be defined in the center of the flat base, and the entire base is ring-shaped. A substrate of the LED light source 1 contacts with a circular platform of the base 5. The area of the substrate located at the hole directly contacts with air, which has an aid in heat dissipation. See Fig. 7, the base 5 may be convex, a center of which is a protrusion 52, and the LED lamp is mounted on the protrusion 52. In Fig. 8, the base 5 may be concave, and the LED light

source is mounted on the concave plane 53 of the concave base. The aforementioned base 5 may be integrally molded with the reflective cup 4 or the lamp housing 3. From Fig. 5 to Fig. 8 are schematic views in which the base and the reflective cup are integrally molded and the structure formed by integrally molding the base and the lamp housing is not represented.

[0025] The base 5 may be represented as shown in Fig. 9. The base 5 are proper to be molded with the reflective cup 4 , and the base 5 includes the cylinder 54 defining a hole in a center thereof. The top of cylinder 54 extends a ring-shaped platform 55 which connects with the bottom of the reflective cup 7. The hollow cylinder may be used for supporting the reflective cup. At the same time, the hollow cylinder may increase the area of heat dissipation and the ring-shaped platform may be used for supporting the LED light source.

[0026] It is appreciated that, the aforementioned bases are only the preferred embodiments, and may be designed into other reasonable structures according to the requirement of applications. It is appreciated that, as long as the thermally conductive base is added to the LED lamp, and used for supporting the LED light source, and integrally molded with the thermally conductive reflective cup and/or a thermally conductive lamp housing, high-efficiency heat dissipation can be obtained. All of the LED lamps incorporated the aforementioned structures shall be within the protective scope of the present invention.

[0027] The LED lamp provided in the embodiment of the present invention may be used separately, also can be used in an illumination device as a lighting apparatus.

[0028] Features, components and specific details of the structures of the above-described embodiments may be exchanged or combined to form further embodiments optimized for the respective application. As far as those modifications are readily apparent for an expert skilled in the art they shall be disclosed implicitly by the above description without specifying explicitly every possible combination, for the sake of conciseness of the present description.

[0029] The above-mentioned is only the preferred embodiments of the present invention, but places no limit to the invention. Therefore, any modification, equivalent replacement and improvement etc on the basis of the spirit and principle of invention shall be within the protective scope of the present invention.

Claims

1. An LED lamp comprising: an LED light source (1) and a power apparatus (2) for supplying power for the LED light source (1), wherein the LED lamp further comprises a thermally conductive lamp housing (3), a thermally conductive reflective cup (4) within the lamp housing (3) and a thermally conductive base (5) arranged under the reflective cup (4), the LED light source (1) is mounted on the base (5) which is integrally molded with the reflective cup (4) or lamp housing (3).

2. The LED lamp according to Claim 1, wherein the reflective cup (4) and the lamp housing (3) are integrally molded.

3. The LED lamp according to Claim 2, wherein a light exit of the reflective cup (4) connects with an opening of the lamp housing (3).

4. The LED lamp according to at least one of Claims 1 to 3, wherein the base (5) has a through hole, and the power apparatus (2) is provided with electrode leading wires which connect with the LED light source (1) by passing through the through hole.

5. The LED lamp according to at least one of Claims 1 to 4, wherein an internal surface of the reflective cup (4) is a reflective surface (41) formed by sequential arrangement of a plurality of reflecting circular bands, each of which is comprised of sequential arrangement of a plurality of rectangular plane units around a central axis of the reflective cup (4).

6. The LED lamp according to at least one of Claims 1 to 5, wherein the base (5) is a flat board structure.

7. The LED lamp according to Claim 6, wherein the base (5) is circular.

8. The LED lamp according to at least one of Claims 1 to 5, wherein the base (5) is convex, and the LED light source (1) is mounted on a convex platform of the convex base.

9. The LED lamp according to at least one of Claims 1 to 5, wherein the base (5) is concave, the LED light source (1) is mounted on a concave platform of the concave base.

10. An illumination device, comprising at least a LED light, wherein the LED light comprises the LED lamp of at least one of Claims 1 to 9.

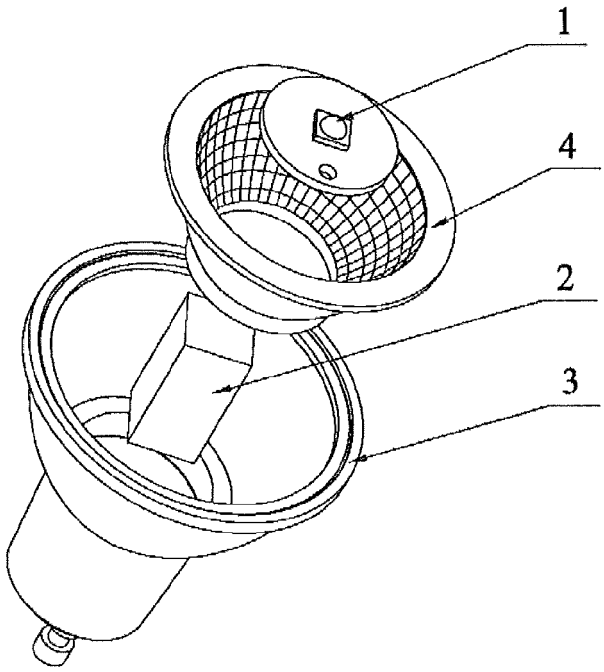

Fig. 1

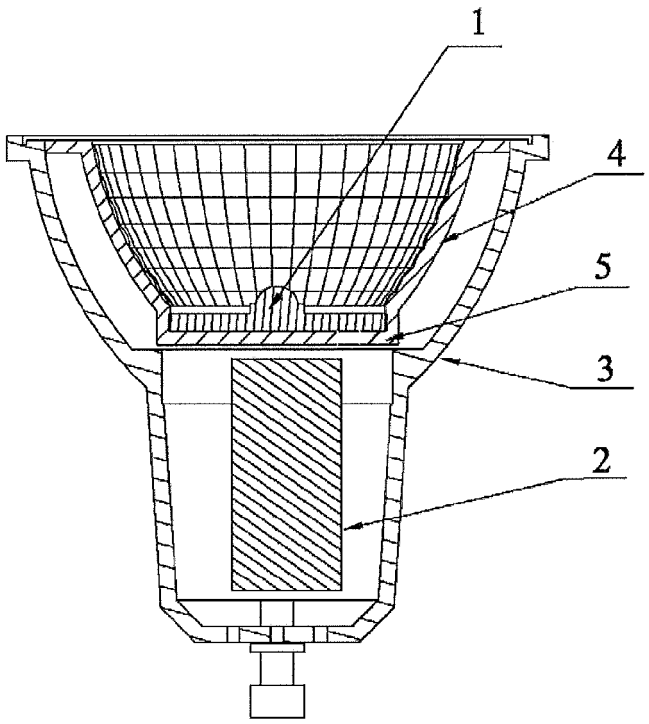

Fig. 2

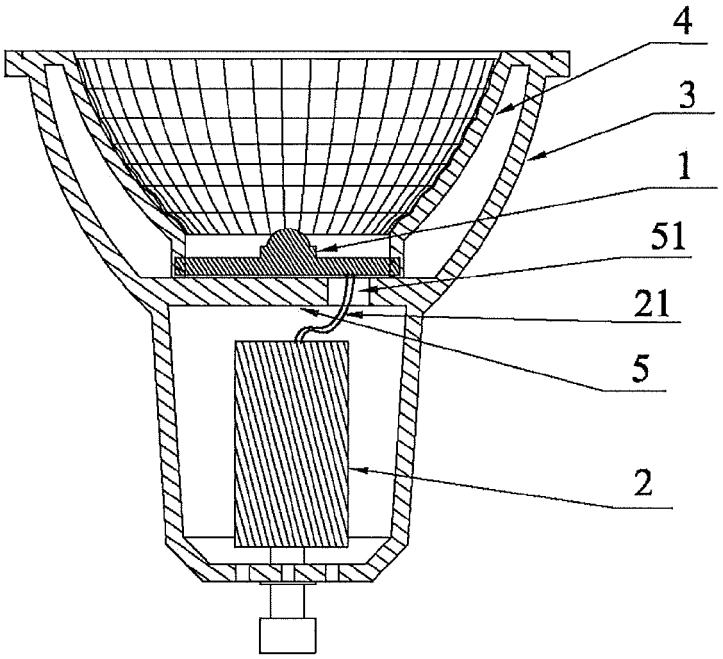

Fig. 3

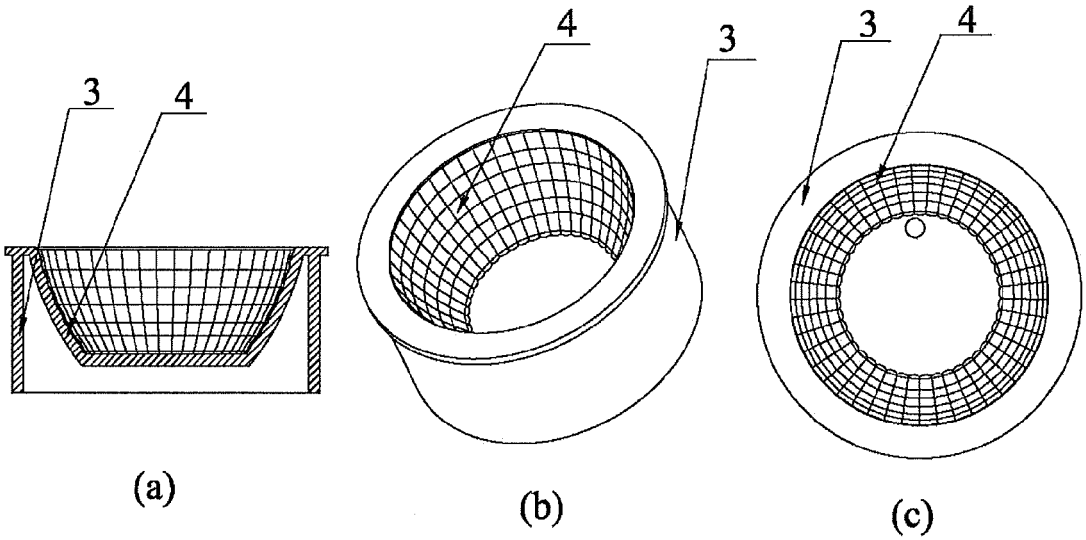

Fig. 4

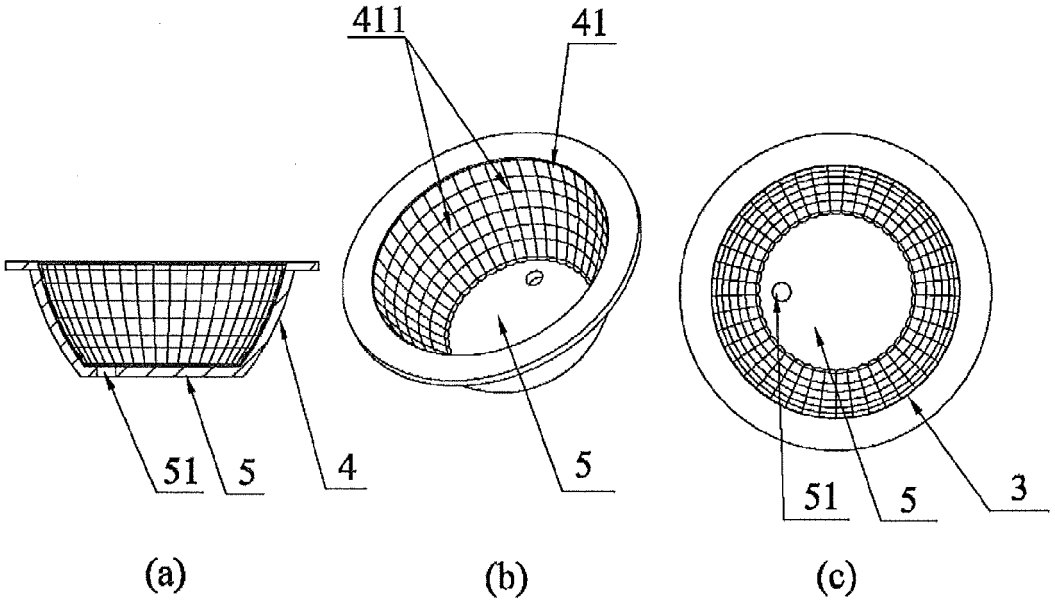

Fig. 5

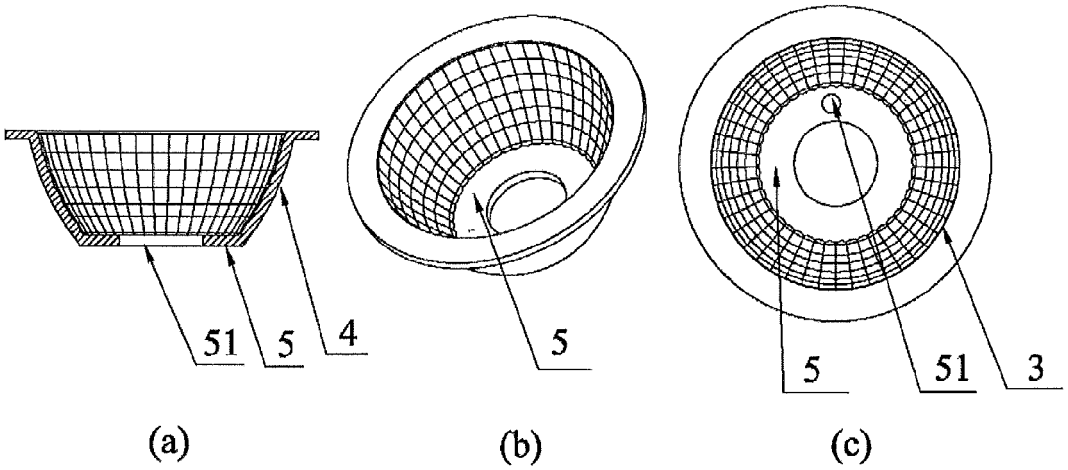

Fig. 6

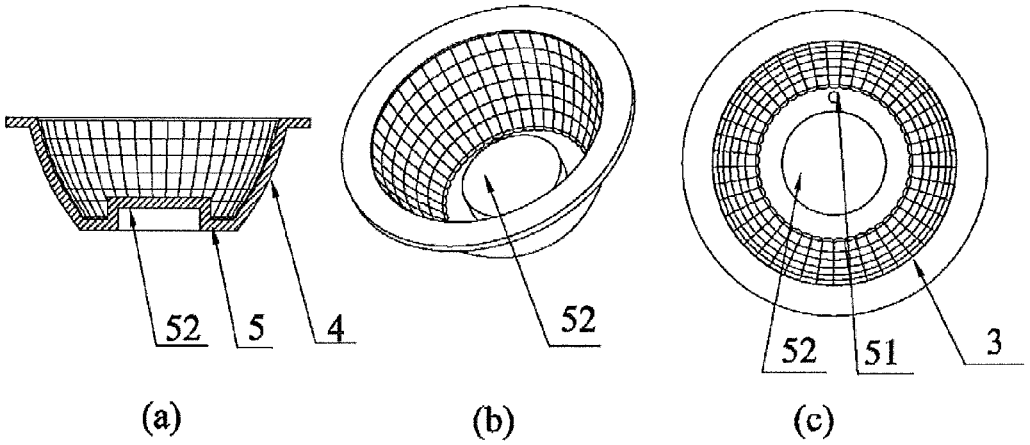

Fig. 7

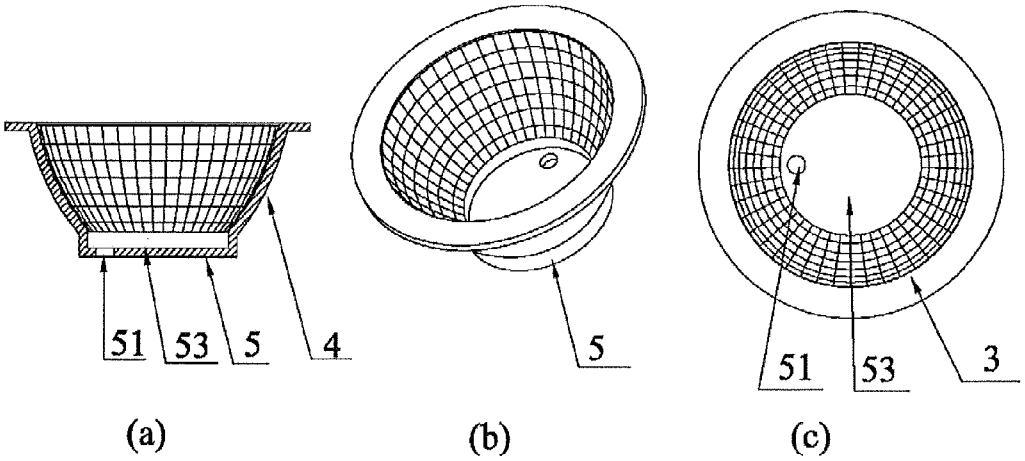

Fig. 8

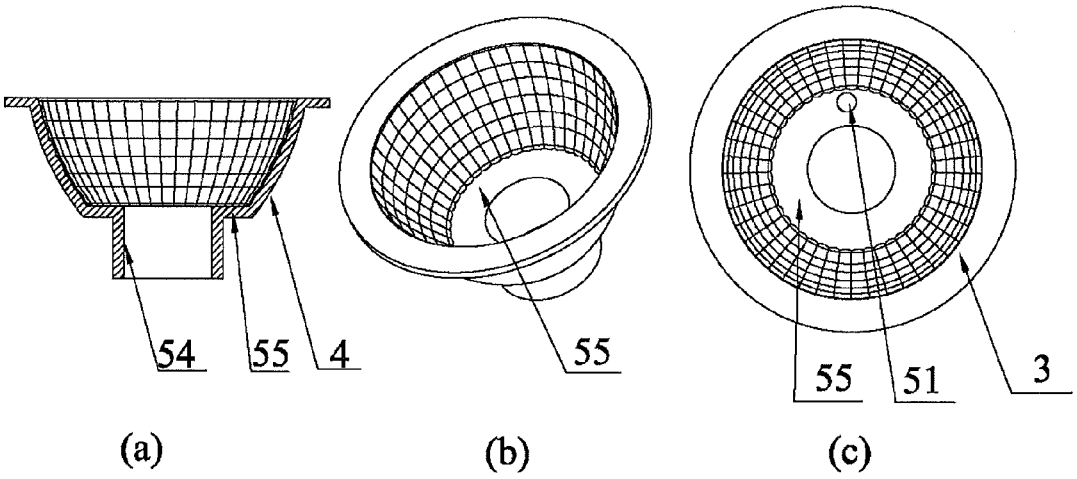

Fig. 9