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(54) **LED LIGHTING DEVICE**

LED-BELEUCHTUNGSVORRICHTUNG

DISPOSITIF D'ÉCLAIRAGE À DEL

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Description

TECHNICAL FIELD

[0001] The present invention relates to a lighting device, and particularly to a LED lighting device.

BACKGROUND

[0002] In the current global background of energy shortage, LED is widely used in the field of lighting devices as a new solid-state light source for its advantages of energy saving, high efficiency, environmental protection, flexible control, safety, reliability, and good orientation.

[0003] LED downlight is a lighting device which has been improved and developed based on traditional downlights combined with LED lighting technology. At present, most of the LED downlights in the market use a direct-lit structure of a LED light source matched with a one-staged reflector or multi-staged reflectors or use an edge-lit attached structure of a LED light source matched with a light guide plate, which usually involves product defects such as low luminous efficiency, high glare, large size and high cost. Only high-end products of a few brands possess technical advantages such as high luminous efficiency, low glare and compact structure, which, however, are higher in price and hence are difficult to meet the market demand for large-scale applications.

[0004] Therefore, in order to overcome the above drawbacks, it is necessary to provide an improved LED lighting device.

[0005] In DE 10 2012 007 206 A1, an LED lighting device with a housing, a lighting source component, a diffuser element located above the light source component and a reflector is disclosed. The LED lighting device comprises a number of LED light source particles located on a light source base plate.

[0006] In addition, in WO 2011/120410 A1, CA 2 883 617 A1, CN 203 464 067 U, CN 202 647 387 U, CN 105 202 394 A and CN 205 037 138 U different LED lighting devices are described.

SUMMARY

[0007] In order to solve the above-mentioned problem, an LED lighting device according to independent claim 1 is suggested. Further preferred embodiments of the present invention are defined in the dependent claims. An objective of the present invention is to provide a LED lighting device in order to solve the above technical problems.

[0008] In order to achieve the above objective, the present invention adopts the following technical solution: a LED lighting device, including: a housing, a light source component, an optical lens located above the light source component and configured to distribute light for the light source component, a reflector in contact with the optical

lens, and a surface ring assembled on the reflector. The housing, the light source component, the optical lens, the reflector and the surface ring are sequentially arranged; the surface ring is fixed on the housing to delimit a receiving chamber, the light source component, the optical lens and the reflector are all located in the receiving chamber; the LED lighting device has a light exit; the light source component includes a light source base plate and LED light source particles located on the light source base plate; light of the LED light source particles sequentially passes through the optical lens and the reflector and then emits through the light exit.

[0009] Preferably, the light source component is snap-fitted with the optical lens.

[0010] Preferably, the reflector is sandwiched between the surface ring and the optical lens.

[0011] Preferably, a height of the reflector is greater than two times of a height of the optical lens.

[0012] Preferably, a height of the reflector is greater than three times of a height of the optical lens.

[0013] Preferably, the optical lens is one selected from or a combination of more than one selected from the group consisting of a ring lens, a single lens, and a lens array.

[0014] Preferably, a diameter of the reflector is gradually increased from an end of the reflector connected to the optical lens to the other end of the optical lens.

[0015] Preferably, the reflector and the optical lens are fixed between the surface ring and the housing by being connected to and pressed by the surface ring.

[0016] Preferably, in the case where the light source component directly faces the light exit, a portion of the light emitted from the LED light source particles is directly emitted through the light exit, and another portion of the light emitted from the LED light source particles is reflected by the reflector and then emitted through the light exit; the light emitted from the LED light source particles, upon passing through the optical lens, is reflected by the reflector firstly and then emitted through the light exit of the LED lighting device.

[0017] Preferably, the light source component includes three portions corresponding to a first lens, a second lens and a third lens of the optical lens, respectively.

[0018] According to the invention, the first lens, the second lens, and the third lens are disposed on the light source component and each cover a corresponding light source; or the first lens, the second lens, and the third lens are connected to have an integral structure.

[0019] According to the invention, the first lens that is centrally located is a dot lens and corresponds to at least one LED light source particle.

[0020] According to the invention, the second lens and the third lens are both annular lenses surrounding the first lens, and wherein a height of the first lens is greater than a height of the second lens and is greater than a height of the third lens, and the second lens and the third lens have a same height.

[0021] Preferably, the LED lighting device further in-

cludes a snap spring component disposed at a periphery of the housing.

[0022] Preferably, the LED lighting device is a down-light.

[0023] Compared with the prior art, the LED lighting device of the present invention has the following advantages: it has no need of providing a diffusing plate to homogenize light, which increases the luminous efficiency and meanwhile preventing from glare, so as to achieve a good lighting effect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] In order to more clearly explain the technical solutions of the present disclosure or in the existing technology, the drawings necessary for the description of the embodiments or the existing technology will be briefly described below. Apparently, the described drawings are just a part but not all of the embodiments of the present disclosure. Based on the described figures herein, those skilled in the art can obtain other figures, without any inventive work.

FIG. 1 is a stereographic view of a first preferred embodiment of a LED lighting device of the present invention;

FIG. 2 is an exploded stereographic view of the first preferred embodiment of the LED lighting device of the present invention;

FIG. 3 is a lateral perspective view of the LED lighting device of the present invention; and

FIG. 4 is a stereographic view of a second preferred embodiment of a LED lighting device of the present invention, not claimed.

DETAILED DESCRIPTION

[0025] In order to make objectives, technical solutions and advantages of the present disclosure more apparent, the technical solutions of the present disclosure will be described clearly and completely in connection with the particular embodiments and the corresponding drawings of the present disclosure. Apparently, the described embodiments are just a part but not all of the embodiments of the present disclosure. Based on the embodiments in the present disclosure, those skilled in the art can obtain other embodiment(s), without any inventive work, which should be within the scope of the present disclosure.

[0026] Referring to FIG. 1 to FIG. 3, a LED lighting device 1 according to a first preferred embodiment of the present invention includes a housing 10, a light source component 20, an optical lens 30 located above the light source component 20 and configured to distribute light for the light source component 20, a reflector 40 in contact with the optical lens 30, and a surface ring 50 assembled on the reflector 40. The housing 10, the light source component 20, the optical lens 30, the reflector 40 and the surface ring 50 are sequentially arranged. The surface

ring 50 is fixed to the housing 10 to delimit a receiving chamber 70. The light source component 20, the optical lens 30 and the reflector 40 are all located in the receiving chamber 70. The LED lighting device 1 has a light exit 60. The light source component 20 includes a light source base plate 201 and LED light source particles 202 located on the light source base plate 201. Light of the LED light source particles 202 sequentially passes through the optical lens 30 and the reflector 40, and then emits through the light exit 60. The LED lighting device 1 provided by the present invention enables light emitted from the LED lighting device 1 to be uniform and have no glare, so as to effectively improve the luminous effect without using a diffusing plate to homogenize light.

[0027] In an alternative embodiment of the present invention, the light source component 20 may be snap-fitted with the optical lens 30.

[0028] In an alternative embodiment of the present invention, the reflector 40 is sandwiched between the surface ring 50 and the optical lens 30.

[0029] The optical lens 30 may be in the form of one selected from or a combination of more than one selected from the group consisting of a ring lens, a single lens, and a lens array. In this embodiment, as illustrated in FIG. 2, the light source component 20 may be divided into three portions, which respectively correspond to a first lens 301, a second lens 302, and a third lens 303 of the optical lens 30. The first lens 301, the second lens 302, and the third lens 303 are disposed on the light source component 20 to respectively cover a corresponding light source; or, the first lens 301, the second lens 302, and the third lens 303 are connected to have an integral structure. The centrally located first lens 301 is a dot times and corresponds to at least one LED source particle; in FIG. 2, the first lens 301 corresponds to four LED source particles. The second lens 302 and the third lens 303 are both annular lenses surrounding the first lens 301; a height of the first lens 301 is greater than a height of the second lens 302 and greater than a height of the third lens 303; and the second lens 302 and the third lens 303 have the same height. In the second preferred embodiment of the present invention as illustrated in FIG. 4, the optical lens 31 is a lens array.

[0030] In this embodiment, the height of the reflector 40 is greater than three times of the height of the optical lens 30. Such a configuration enables the LED lighting device 1 to ensure that all the light emitted from the optical lens 30 can be completely reflected by the reflector 40 and then emit through the light exit 60. In other embodiments, the height of the reflector 40 may not necessary be greater than three times of the height of the optical lens 30 but may be adjustable as needed; for example, the height of the reflector 40 may be only greater than two times of the height of the optical lens 30, and the like.

[0031] In an alternative embodiment of the present invention, a diameter of the reflector 40 is gradually increased from one end of the reflector connected to the optical lens 30 to the other end of the reflector 40.

[0032] In an alternative embodiment of the present invention, the reflector 40 and the optical lens 30 are fixed between the surface ring 50 and the housing 10 by being connected to and pressed by the surface ring 50.

[0033] In an alternative embodiment of the present invention, when the light source component 20 directly faces the light exit 60, a portion of the light emitted from the LED light source particles 202 is directly emitted through the light exit 60, and another portion of the light emitted from the LED light source particles 202 is reflected by the reflector 40 and then is emitted through the light exit 60. The light emitted from the light source particles 202, upon passing through the optical lens 30, is reflected by the reflector 40 firstly and then emitted through the light exit 60 of the LED lighting device 1.

[0034] In an alternative embodiment of the present invention, the LED lighting device 1 may further include a snap spring component 80 disposed at a periphery of the housing 10. By using the snap spring component 80 in cooperation with the housing 10, the LED lighting device 1 may be mounted to a region, for example, a ceiling or a wall, or may be directly mounted into a lighting appliance to allow the LED lighting device 1 to face an area to be irradiated by the lighting device. The LED lighting device provided by the embodiment of the present invention may be a downlight or the like, which is not particularly limited in the present invention.

[0035] The specific examples described above further describe the objectives, technical solutions and beneficial effects of the present invention in detail. It should be understood that the above descriptions are merely specific embodiments of the present invention and are not intended to limit the present invention.

Claims

1. A LED lighting device (1), comprising: a housing (10), a light source component (20), an optical lens (30) located above the light source component (20) and configured to distribute light for the light source component (20), a reflector (40) in contact with the optical lens (30), and a surface ring (50) assembled on the reflector (40);

the housing (10), the light source component (20), the optical lens (30), the reflector (40) and the surface ring (50) being sequentially arranged;

the surface ring (50) being fixed on the housing (10) to delimit a receiving chamber (70), the light source component (20), the optical lens (30) and the reflector (40) being all located in the receiving chamber (70);

the LED lighting device (1) having a light exit (60), the light source component (20) comprising a light source base plate (201) and LED light source particles (202) located on the light source

base plate (201), light of the LED light source particles (202) sequentially passing through the optical lens (30) and the reflector (40) and then emitting through the light exit (60),

wherein

the light source component (20) comprises three portions corresponding to a first lens (301), a second lens (302) and a third lens (303) of the optical lens (30), respectively,

the first lens (301) that is centrally located is a dot lens and corresponds to at least one LED light source particle (202),

the second lens (302) and the third lens (303) are both annular lenses surrounding the first lens (301), and

a height of the first lens (301) is greater than a height of the second lens (302) and is greater than a height of the third lens (303), and the second lens (302) and the third lens (303) have a same height.

2. The LED lighting device (1) according to claim 1, wherein the light source component (20) is snap-fitted with the optical lens (30).
3. The LED lighting device (1) according to claim 1, wherein the reflector (40) is sandwiched between the surface ring (50) and the optical lens (30).
4. The LED lighting device (1) according to claim 1 wherein a height of the reflector (40) is greater than two times of a height of the optical lens (20).
5. The LED lighting device (1) according to claim 1, wherein a height of the reflector (40) is greater than three times of a height of the optical lens (20).
6. The LED lighting device (1) according to claim 1, wherein the optical lens (20) is one selected from or a combination of more than one selected from the group consisting of a ring lens, a single lens, and a lens array.
7. The LED lighting device (1) according to claim 1, wherein a diameter of the reflector (40) is gradually increased from an end of the reflector (40) connected to the optical lens (20) to the other end of the optical lens (20).
8. The LED lighting device (1) according to claim 1, wherein the reflector (40) and the optical lens (20) are fixed between the surface ring (50) and the housing (10) by being connected to and pressed by the surface ring (50).
9. The LED lighting device (1) according to claim 1, wherein in the case where the light source component (20) directly faces the light exit (60), a portion

of the light emitted from the LED light source particles (202) is directly emitted through the light exit (60), and another portion of the light emitted from the LED light source particles (202) is reflected by the reflector (40) and then emitted through the light exit (60); the light emitted from the LED light source particles (202), upon passing through the optical lens (20), is reflected by the reflector (40) firstly and then emitted through the light exit (60) of the LED lighting device (1).

10. The LED lighting device (1) according to claim 1, wherein the first lens (301), the second lens (302), and the third lens (303) are disposed on the light source component (20) and each cover a corresponding light source, or the first lens (301), the second lens (302), and the third lens (303) are connected to have an integral structure.
11. The LED lighting device (1) according to claim 1, further comprising a snap spring (80) component disposed at a periphery of the housing (10).
12. The LED lighting device (1) according to claim 1, wherein the LED lighting device is a downlight.

Patentansprüche

1. LED-Beleuchtungsanordnung (1) mit: einem Gehäuse (10), einem Lichtquellen-Bauteil (20), einer optischen Linse (30), die über dem Lichtquellen-Bauteil (20) angeordnet ist und dazu ausgebildet ist, Licht für das Lichtquellen-Bauteil (20) zu verteilen, einem Reflektor (40) in Kontakt mit der optischen Linse (30), und einem an dem Reflektor (40) angebrachten Oberflächenring (50);

wobei das Gehäuse (10), das Lichtquellen-Bauteil (20), die optische Linse (30), der Reflektor (40) und der Oberflächenring (50) nacheinander angeordnet sind;

wobei der Oberflächenring (50) an dem Gehäuse (10) befestigt ist, um eine Aufnahmekammer (70) zu begrenzen, wobei das Lichtquellen-Bauteil (20), die optische Linse (30) und der Reflektor (40) sämtlich in der Aufnahmekammer (70) angeordnet sind;

wobei die LED-Vorrichtung (1) einen Lichtauslass (60) aufweist, das Lichtquellen-Bauteil (20) eine Lichtquellenbasisplatte (201) und auf der Lichtquellenbasisplatte (201) angeordnete LED-Lichtquellenpartikel (202) aufweist, Licht der LED-Lichtquellenpartikel (202) sequentiell die optische Linse (30) und den Reflektor (40) passiert und danach durch den Lichtauslass (60) emittiert wird,

wobei

das Lichtquellen-Bauteil (20) drei Bereiche aufweist, die einer ersten Linse (301), einer zweiten Linse (302) und einer dritten Linse (303) der optischen Linse (30) entsprechen, die mittig angeordnete erste Linse (301) eine Punktlinse ist und mindestens einem LED-Lichtquellenpartikel (202) entspricht, die zweite Linse (302) und die dritte Linse (303) beide ringförmige Linsen sind, welche die erste Linse (301) umgeben, und eine Höhe der ersten Linse (301) größer ist als eine Höhe der zweiten Linse (302) und größer ist als eine Höhe der dritten Linse (303), und die zweite Linse (302) und die dritte Linse (303) dieselbe Höhe aufweisen.

2. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher das Lichtquellen-Bauteil (20) mit der optischen Linse (30) schnappend verbunden ist.
3. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher der Reflektor (40) zwischen dem Oberflächenring (50) und der optischen Linse (30) sandwichartig angeordnet ist.
4. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher eine Höhe des Reflektors (40) größer als das Doppelte einer Höhe der optischen Linse (20) ist.
5. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher eine Höhe des Reflektors (40) größer ist als das Dreifache einer Höhe der optischen Linse (20).
6. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher die optische Linse (20) aus der Gruppe bestehend aus einer Ringlinse, einer einzelnen Linse und einer Linsenanordnung gewählt ist oder eine Kombination von mehr als einem dieser aus der Gruppe gewählten Elemente ist.
7. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher ein Durchmesser des Reflektors (40) von einem mit der optischen Linse (20) verbundenen Ende des Reflektors (40) bis zum anderen Ende der optischen Linse (20) allmählich zunimmt.
8. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher der Reflektor (40) und die optische Linse (20) zwischen dem Oberflächenring (50) und dem Gehäuse (10) befestigt sind, indem sie mit dem Oberflächenring (50) verbunden und von diesem gedrückt werden.
9. LED-Beleuchtungsanordnung (1) nach Anspruch 1, bei welcher, wenn das Lichtquellen-Bauteil (20) dem

Lichtauslass (60) direkt zugewandt ist, ein Teil des von den LED-Lichtquellenpartikeln (202) direkt durch den Lichtauslass (60) emittiert wird, und ein anderer Teil des von den LED-Lichtquellenpartikeln (202) emittierten Lichts von dem Reflektor (40) reflektiert und danach durch den Lichtauslass (60) emittiert wird;
das von den LED-Lichtquellenpartikeln (202) emittierte Licht beim Passieren der optischen Linse (20) zuerst von dem Reflektor (40) reflektiert wird und danach durch den Lichtauslass (60) der LED-Beleuchtungsvorrichtung (1) emittiert wird.

10. LED-Beleuchtungsvorrichtung (1) nach Anspruch 1, bei welcher die erste Linse (301), die zweite Linse (302), und die dritte Linse (303) auf dem Lichtquellen-Bauteil (20) angeordnet sind und jeweils eine entsprechende Lichtquelle abdecken, oder die erste Linse (301), die zweite Linse (302), und die dritte Linse (303) zu einer einstückigen Struktur verbunden sind.
11. LED-Beleuchtungsvorrichtung (1) nach Anspruch 1, ferner mit einem Schnappfeder-Bauteil (80), das an einem Umfang des Gehäuses (10) angeordnet ist.
12. LED-Beleuchtungsvorrichtung (1) nach Anspruch 1, bei welcher die LED-Beleuchtungsvorrichtung eine Deckenleuchte ist.

Revendications

1. Dispositif d'éclairage à DEL (1), comprenant : un boîtier (10), un composant de source lumineuse (20), une lentille optique (30) située au-dessus du composant de source lumineuse (20) et configurée pour distribuer la lumière pour le composant de source lumineuse (20), un réflecteur (40) en contact avec la lentille optique (30), et un anneau de surface (50) assemblé sur le réflecteur (40) ;

le boîtier (10), le composant de source lumineuse (20), la lentille optique (30), le réflecteur (40) et l'anneau de surface (50) étant agencés de manière séquentielle ;
l'anneau de surface (50) étant fixé sur le boîtier (10) pour délimiter une chambre de réception (70), le composant de source lumineuse (20), la lentille optique (30) et le réflecteur (40) étant tous situés dans la chambre de réception (70) ;
le dispositif d'éclairage à DEL (1) ayant une sortie de lumière (60), le composant de source lumineuse (20) comprenant une plaque de base de source lumineuse (201) et des particules de source lumineuse à DEL (202) situées sur la plaque de base de source lumineuse (201), la lumière des particules de source lumineuse à DEL

(202) passant de manière séquentielle à travers la lentille optique (30) et le réflecteur (40) et émettant ensuite à travers la sortie de lumière (60),
dans lequel
le composant de source lumineuse (20) comprend trois parties correspondant à une première lentille (301), une deuxième lentille (302) et une troisième lentille (303) de la lentille optique (30), respectivement,
la première lentille (301) qui est située au centre est une lentille à point et correspond à au moins une particule de source lumineuse à DEL (202), la deuxième lentille (302) et la troisième lentille (303) sont toutes deux des lentilles annulaires entourant la première lentille (301), et une hauteur de la première lentille (301) est supérieure à une hauteur de la deuxième lentille (302) et est supérieure à une hauteur de la troisième lentille (303), et
la deuxième lentille (302) et la troisième lentille (303) ont une même hauteur.

2. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel le composant de source lumineuse (20) est encliqueté avec la lentille optique (30).
3. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel le réflecteur (40) est pris en sandwich entre l'anneau de surface (50) et la lentille optique (30).
4. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel une hauteur du réflecteur (40) est supérieure à deux fois une hauteur de la lentille optique (20).
5. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel une hauteur du réflecteur (40) est supérieure à trois fois une hauteur de la lentille optique (20).
6. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel la lentille optique (20) est une lentille sélectionnée parmi ou une combinaison de plusieurs lentilles sélectionnées dans le groupe constitué d'une lentille annulaire, d'une lentille unique et d'un réseau de lentilles.
7. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel un diamètre du réflecteur (40) est progressivement augmenté depuis une extrémité du réflecteur (40) reliée à la lentille optique (20) jusqu'à l'autre extrémité de la lentille optique (20).
8. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel le réflecteur (40) et la lentille optique (20) sont fixés entre l'anneau de surface (50)

et le boîtier (10) en étant reliés à l'anneau de surface et pressés par celle-ci (50).

9. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel, dans le cas où le composant de source lumineuse (20) fait directement face à la sortie de lumière (60), une partie de la lumière émise par les particules de source lumineuse à DEL (202) est directement émise à travers la sortie de lumière (60), et une autre partie de la lumière émise par les particules de source lumineuse à DEL (202) est réfléchiée par le réflecteur (40) puis émise à travers la sortie de lumière (60) ;
la lumière émise par les particules de source lumineuse à DEL (202), lors du passage à travers la lentille optique (20), est d'abord réfléchiée par le réflecteur (40) puis émise à travers la sortie de lumière (60) du dispositif d'éclairage à DEL (1). 5 10 15
10. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel la première lentille (301), la deuxième lentille (302) et la troisième lentille (303) sont disposées sur le composant de source lumineuse (20) et recouvrent chacune une source lumineuse correspondante, ou
la première lentille (301), la deuxième lentille (302) et la troisième lentille (303) sont connectées pour avoir une structure intégrale. 20 25
11. Dispositif d'éclairage à DEL (1) selon la revendication 1, comprenant en outre un composant de ressort à encliquetage (80) disposé à une périphérie du boîtier (10). 30
12. Dispositif d'éclairage à DEL (1) selon la revendication 1, dans lequel le dispositif d'éclairage à DEL est un plafonnier intensif. 35

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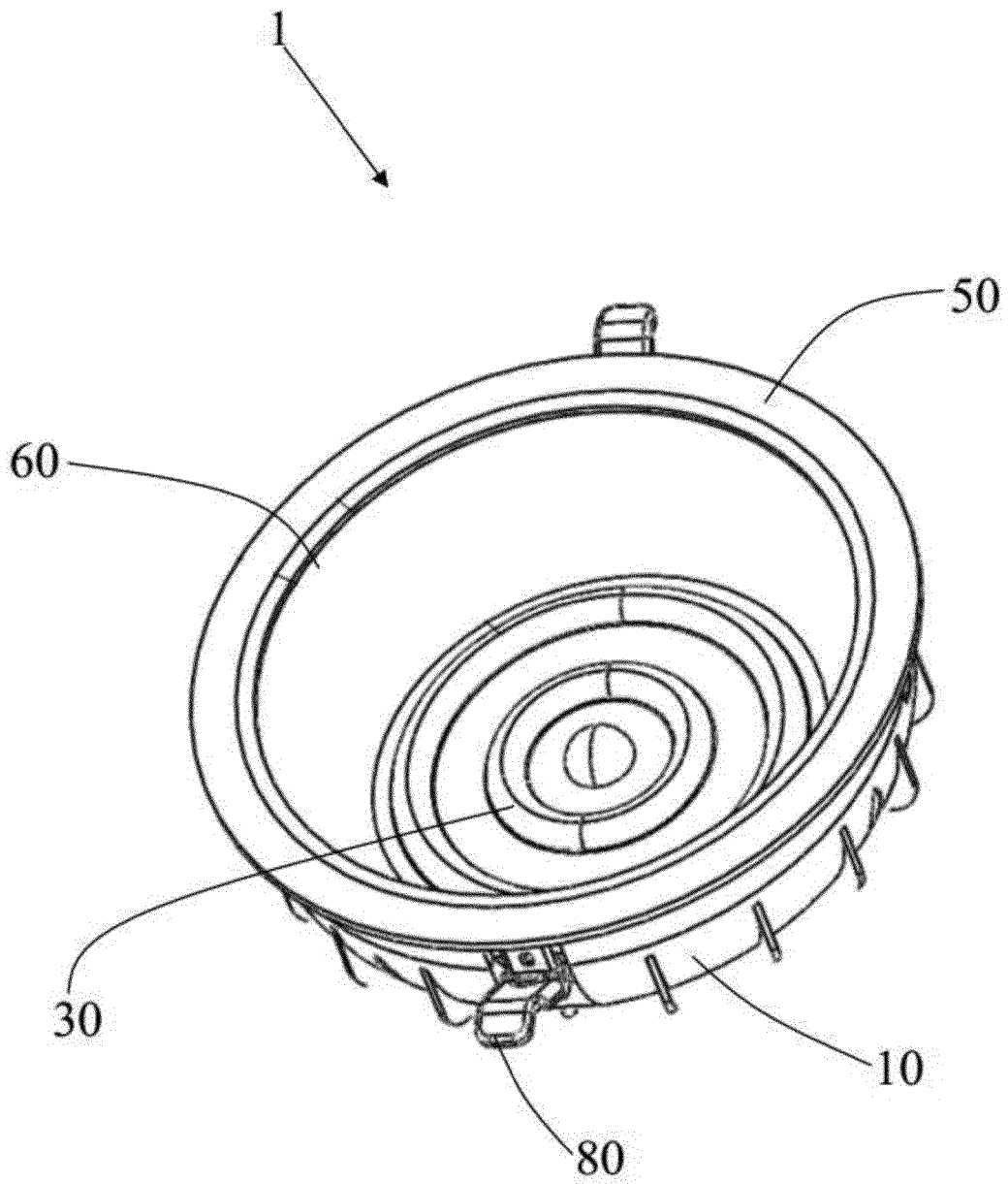


FIG. 1

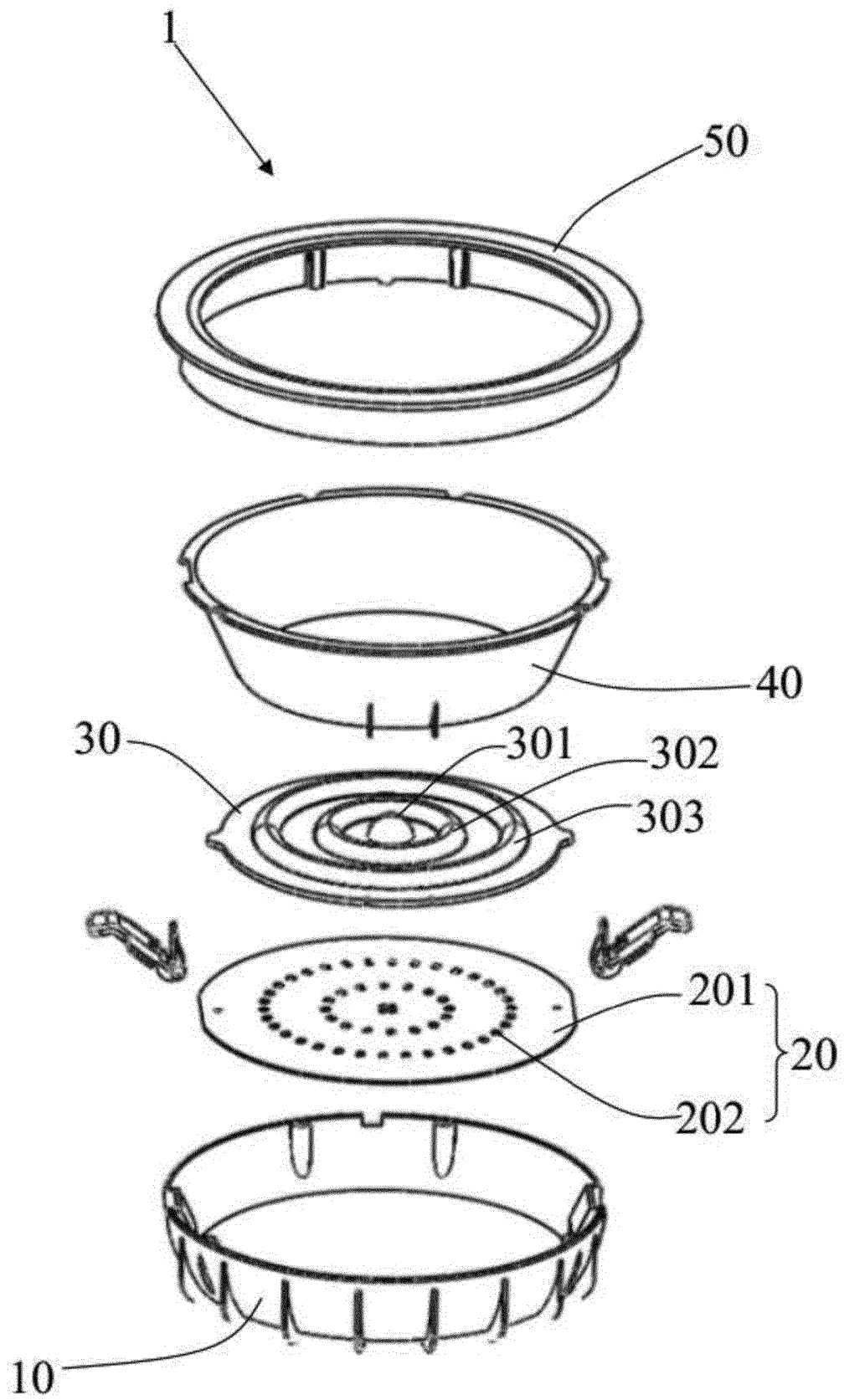


FIG. 2

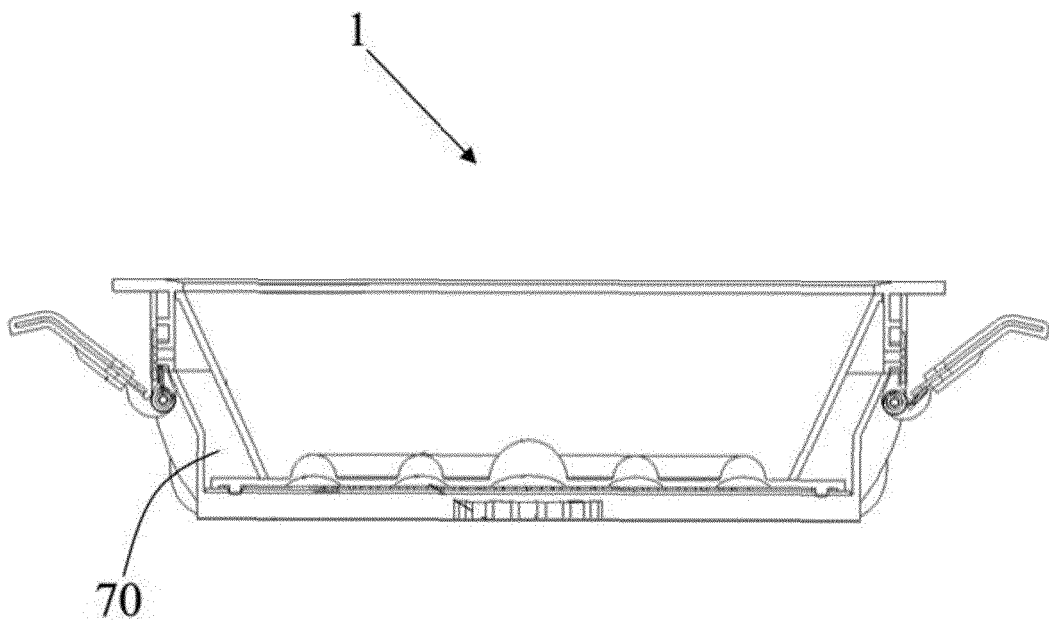


FIG. 3

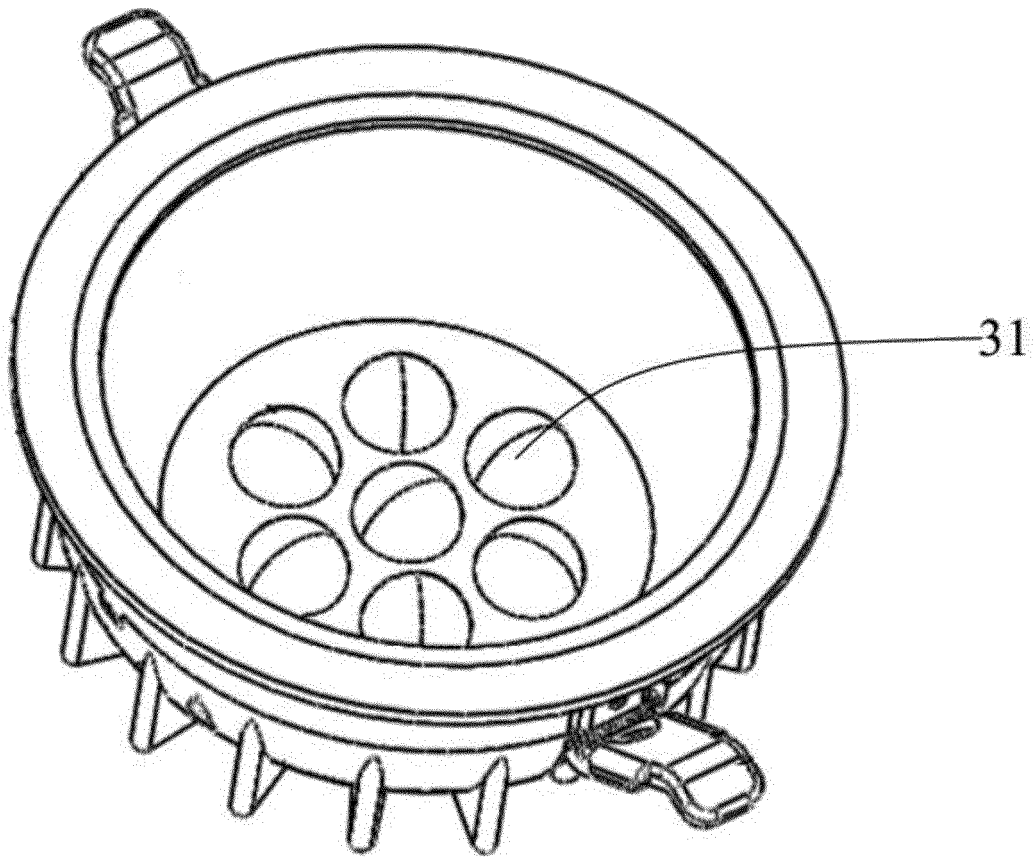


FIG. 4

REFERENCES CITED IN THE DESCRIPTION

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