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## LED lighting device


### Abstract

An LED lighting device includes a seat (**1**), a first optical member (**3**), a first light source (**21**) and a second light source (**22**). The seat (**1**) includes a bottom portion (**11**) and a side portion (**12**). The first optical member (**3**) is disposed on the seat (**1**) and covers the bottom portion (**11**). The first light source (**21**) is disposed between the bottom portion (**11**) of the seat (**1**) and the first optical member (**3**). The second light source (**22**) is disposed on the side portion (**12**) of the seat (**1**).



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## Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

(1) This application is a U.S. 371 national stage of prior application number PCT/CN2022/132758, filed on 2022 Nov. 18, which claims foreign priority to the following Chinese Patent Applications Nos.: CN 202111375095.1 filed on 2021 Nov. 18; CN 202210065030.5 filed on 2022 Jan. 20, and CN 202211432560.5 filed on 2022 Nov. 16, the disclosures of which are incorporated herein in their entirety by reference.

FIELD OF THE INVENTION

(2) The disclosure relates to LED lighting technology, particularly to an LED lighting device.

BACKGROUND OF THE INVENTION

(3) LED lighting is widely used because of its advantages such as energy saving and long life. LED lamps in the prior art commonly include panel lamps and grille lamps.
(4) A panel lamp in the prior art usually includes a light strip, a bottom frame, a light guide plate and a diffusion plate. The light strip is arranged on a side portion of the bottom frame to provide lateral light emission. The light emitted by the light strip passes through the light guide plate and then is emitted out of the diffusion plate. Such a panel lamp has the following shortcomings: after the light emitted by the light strip passes through the light guide plate and the diffusion plate, the light loss is large, resulting in low light emission efficiency of the panel lamp; the cost of the light guide plate is high, which is disadvantageous to the cost of the panel lamp; and glare control of the panel lamp is generally poor.
(5) A grille lamp in the prior art includes a bottom frame, a light source (the light source can be a light strip, a fluorescent tube or an LED light tube) and a grille. The light source is fixed on the bottom frame, and a grille is provided on the light-emitting side of the light source. Such a grille lamp has the following shortcomings: the way of setting the grille is disadvantageous to the height control of the grille lamp, which increases the packaging and transportation costs; the cost of the grille is high, which is disadvantageous to the cost control of the entire lamp; the light loss is large when disposing the grille; and dark zones are easily formed at the grille, which is disadvantageous to light emission.
(6) In summary, in view of the shortcomings and defects of LED lighting devices in the prior art, how to design an LED lighting device to solve the problem of glare is a technical problem that needs to be solved by those skilled in the art.

## SUMMARY OF THE INVENTION

(7) Many embodiments of the disclosure are briefly described herein. However, the phrases used here are only used to describe certain embodiments disclosed in this specification (whether or not included in the claims), and are not a complete description of all possible embodiments. Various features or aspects of certain embodiments of the disclosure may be combined in different ways to form an LED lighting device or a part thereof.
(8) Embodiments of the present invention provide a new LED lighting device and features in various aspects to solve the above problems.
(9) The disclosure provides an LED light source, which includes: a seat, comprising a bottom portion and a side portion; a first optical member, disposed on the seat, and covering the bottom portion; a first light source, disposed between the bottom portion of the seat and the first optical member; and a second light source, disposed on the side portion of the seat.
(10) In an embodiment of the disclosure, the first optical member includes a first area and a second area, and the first area corresponds to the seat to be disposed at an interval.
(11) In an embodiment of the disclosure, the first optical member at least emits part of light emitted by the first light source, and the first optical member at least reflects light emitted by the second light source.
(12) Embodiments of the present invention provide an LED lighting device, which includes: a seat, comprising a bottom portion and a side portion; a light source, comprising a first light source, disposed on the bottom portion of the seat and a second light source disposed on the side portion of the seat; a reflector; and a first optical member, disposed on the seat and covering the first light source; wherein the second light source is located on another side of the first optical member, which is opposite to the first light source, and the reflector reflects at least part of light emitted by the second light source.
(13) In an embodiment of the disclosure, the first optical member includes a first area and a second area, and the first area corresponds to the seat to be disposed at an interval.
(14) In an embodiment of the disclosure, the first optical member at least emits part of light emitted by the first light source, and the first optical member at least reflects light emitted by the second light source.

(15) An embodiment of the disclosure further includes a second optical member, wherein the second optical member is fixed by at least one of the first optical member and the reflector.
(16) In an embodiment of the disclosure, the second optical member and the first optical member are integratedly formed with one or more materials.
(17) In an embodiment of the disclosure, the second optical member and the reflector are integratedly formed with one or more materials.
(18) In an embodiment of the disclosure, the second optical member, the reflector and the first optical member are integratedly formed with one or more materials.
(19) In the embodiments of the disclosure, the second optical member, the reflector and the first optical member are integratedly formed with one or more materials. In comparison with the prior art, the present disclosure has the following advantageous technical effects: the light emission of the first light source and the second light source forms optical complementarity in the third area to avoid forming a dark zone. All the light generated from the working second light source is emitted from the LED lighting device after being reflected once or multiple times without direct light emission so that glare of the whole lamp can be better controlled.

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## Description

BRIEF DESCRIPTION OF DRAWINGS
(1) FIG. **1** is a perspective structural schematic view of an embodiment of the LED lighting device of the disclosure;
(2) FIG. **2** is a cross-sectional structural schematic view of an embodiment of the LED lighting device of the disclosure;
(3) FIG. **3** is an enlarged view of part A in FIG. **2**;
(4) FIG. **4** is an enlarged view of part B in FIG. **2**;
(5) FIG. **5** is a perspective structural schematic view of an embodiment of the LED lighting device of the disclosure without the first optical member;
(6) FIG. **6** is an enlarged view of part C in FIG. **5**;
(7) FIG. **7** is a perspective structural schematic view of FIG. **5** without the power cap;
(8) FIG. **8** is a perspective structural schematic view of an embodiment of the LED lighting device of the disclosure;
(9) FIG. **9** is another perspective structural schematic view of an embodiment of the LED lighting device of the disclosure;
(10) FIG. **10** is a cross-sectional structural schematic view of an embodiment of the LED lighting device of the disclosure;
(11) FIG. **11** is an enlarged view of part D in FIG. **10**; and
(12) FIG. **12** is a perspective structural schematic view of an embodiment of the power box of the disclosure.
DETAILED DESCRIPTION OF THE INVENTION
(13) In the following descriptions, please refer to the appended figures, the appended figures depict various embodiments of the disclosure. It should be understood that there still are other embodiments which can be implemented with changes of modules, units, electrics or operations and without violating the spirit and scope of the disclosure. The following descriptions should not be deemed to be limitative and the scope of the embodiments of the disclosure is limited by the claims only. The terms used here are used for purpose of illustrating specific embodiments only, but not for limiting the disclosure. The same labels in the figures indicate the same element.
(14) It will be understood that, although the terms first, second, third etc. may be used herein to describe various elements or parameters, and these elements or parameters should not be limited by these terms. Unless the context indicates otherwise, these terms are only used to distinguish one

element or parameter from another element or parameter. For example, a first element can be named as “second element”. Similarly, a second element can also be named as “first element”. This will not detach the scope of the described embodiments. When used in the description, the term “and/or” includes one or more arbitrary combinations in related described solutions.

(15) It will be understood that when an element is referred to as being “on” another element or extended “onto” another element, it can be directly on the other element or an intervening element may be present. In contrast, when an element is referred to as being “directly on” another element or “directly extended onto another element, there are no intervening element present. It will further be understood that when an element is referred to as being “connected” or “coupled” to or “on” another element, it can be directly connected or coupled to or on the other element or an intervening element may be present. In contrast, when an element is referred to as being “directly connected” or “directly coupled” to another element, there are no intervening element present.

(16) Relative terms, such as “under”, “over”, “upper”, “lower”, “horizontal”, “vertical” and the like, may be used herein for ease of description to describe one element's, layer's or area's relationship to another element, layer or area as illustrated in the figures. It will be understood that these terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. In the disclosure, the terms “horizontal”, “vertical” and “parallel” are defined to include a range of ±10% on the standard definitions. For example, “vertical” usually indicates 90 degrees relative to a reference line, but in the disclosure, “vertical” indicates to include from 80 degrees to 100 degrees.

(17) The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will also be understood that, when used herein, the terms “comprise”, “contain”, “include”, and “and/or” designate stated features, integers, steps, operations, elements, and/or parts, but do not exclude the presence or addition of one or more other features, integers, steps, operations, elements, parts and/or combinations thereof.

(18) Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will also be understood that the terms used herein shall be construed to have a meaning consistent with their meaning in the context of this specification and in the relevant fields, and shall not be construed in an idealized or overly formal sense, except being clearly limitedly used herein.

(19) Comparative quantitative terms such as “less than” and “greater than” are intended to encompass equal concepts unless expressly stated otherwise. As an example, “less than” can mean not only “less than” in the strictest mathematical sense, but also “less than or equal to.”

(20) As shown in FIGS. **1**-**7**, an embodiment of the disclosure provides an LED (light-emitting diode) lighting device, which includes a seat **1**, a light source **2**, a first optical member **3** and a power supply **4**. The light source **2** is electrically connected to the power supply **4**. The light source **2** is disposed on the seat **1**.

(21) In the embodiment, the seat **1** includes a bottom portion **11**, two side portions **12**, and two sidewalls **14**. In the first direction X, the two side portions **12** are located on two sides of the bottom portion **11**. In the second direction Y perpendicular to the first direction X, the two sidewalls **14** are located on two sides of the bottom portion **11**. The light source **2** includes a first light source **21** disposed on the bottom portion **11** of the seat **1**. The first optical member **3** is disposed on the seat **1** and covers the first light source **21**. A direction directed from the bottom portion **11** toward the first optical member **3** serves as the main light-emitting direction of the LED lighting device. A surface of the first optical member **3**, which is away from the bottom portion **11**, serves as the light-emitting surface. A surface of the first optical member **3**, which is close to the bottom portion **11**, serves as the incident surface. The first light source **21** emits light out from the

LED lighting device after passing through the first optical member **3**. In the embodiment, the first optical member **3** at least provides functions of light permeability and light diffusion.

(22) The light source **2** may further include a second light source **22** disposed on the side portions **12** of the seat **1**. In an embodiment, while the second light source **22** is working, at least 90% of its luminous flux is emitted out from the LED lighting device through the first optical member **3**. In an embodiment, while the second light source **22** is working, all of its luminous flux is emitted out from the LED lighting device through the first optical member **3**. In the luminous flux emitted by the working second light source **22**, a part thereof is reflected by the first optical member **3** to be emitted out from the LED lighting device, and another part thereof is emitted out from the first optical member **3** through the first optical member **3** and with being reflected by the seat **1**. The first light source **21** and the second light source **22** are substantially the same in structure, for example, they both include a circuit board and LED chips, so they will not be repeated herein. The first light source **21** and the second light source **22** are separately located on different sides of the first optical member **3**, and the first light source **21** and the second light source **22** separately utilize different properties of the first optical member **3** to emit light. For example, the first light source **21** mainly utilizes the light permeability of the first optical member **3** to emit light, and the second light source **22** mainly utilizes the light permeability and the reflection of the first optical member **3** to emit light.

(23) After the first optical member **3** is installed on the seat **1**, it has a first area **301** and a second area **302** in the first direction X. An interval is kept between the first area **301** and the bottom portion **11** of the seat **1** to provide an accommodating space **304**. The first light source **21** and/or the power supply **4** are accommodated in the accommodating space **304**. The region formed by the boundary of the light beam angle of the first light source **21** in the first direction X being projected onto the first optical member **3** can be regarded as the first are **301**.

(24) The luminous flux generated by the first light source **21** and the second light source **22** may be the same or different. In an embodiment, the luminous flux generated by the working second light source **22** is greater than the luminous flux generated by the working first light source **21**, and the second area **302** is greater than the first area **301** in area, so as to balance the illuminance difference between the surfaces of the first area **301** and the second area **302**.

(25) The minimum distance between the first area **301** and the bottom portion **11** of the seat **1** is greater than 5 mm to provide a sufficient space to the accommodating space **304**. The power supply **4** being placed in the accommodating space **304** must guarantee that the distance between the first area **21** and the bottom portion **11** is greater than the height of the power supply **4**.

(26) The second area **302** is a region which only or mainly receive the light directly emitted from the working second light source **22** to the first optical member **3** (the light which comes from the second light source **22** and is optically processed such as reflected to be emitted to the first optical member **3** can also be regarded as the light directly emitted from the working second light source **22** to the first optical member **3**), and it is not in the range of the light beam angle (as shown in FIG. **3**, a is the light beam angle) of the first light source **21**. In other words, the light directly emitted from or optically processed to a region of the first optical member **3**, and the region excluding a part in the range of the light beam angle of the first light source **21** constitutes the second area **302**. In the embodiment, the ratio of the average illuminance of surfaces of the first area **301** to the second area **302** is 1:0.5-2 to guarantee evenness of light emission of the first area **301** and the second area **302** so as to improve the light-emitting effect of the first optical member **3**. In an embodiment, the ratio of the average illuminance of surfaces of the first area **301** to the second area **302** is 1:0.5-1.2.

(27) In an embodiment, a third area **303** may be further disposed. In an embodiment, the third area **303** is an area between the first area **301**, and the second area **302** in the first direction X. In an embodiment, the third area **303** is an overlapping portion of the area formed by the boundary of the light beam angle of the first light source **21** in the first direction X being projected onto the first

optical member **3** and the area of the first optical member **3** to which the light generated from the working second light source **22** being directly emitted or optically processed.
(28) In an embodiment, the ratio of the average illuminance of surfaces of the third area **303** to the first area **301** is 1:0.6-1.5 to guarantee evenness of light emission of the third area **303** and the first area **301**. In an embodiment, the ratio of the average illuminance of surfaces of any two of the first area **301**, the second area **302**, and the third area **303** is 1:0.4-2.2, so that evenness of light emission of the surface of the first optical member **3** can be guaranteed to improve the light-emitting effect. In an embodiment, the ratio of the average illuminance of surfaces of any two of the first area **301**, the second area **302**, and the third area **303** is 1:0.5-2.
(29) In an embodiment, the light emission of the first area **21** and the second area **22** forms optical complementarity in the third area **303** to avoid forming a dark zone.
(30) All the light generated from the working second light source **22** is emitted out of the LED lighting device after being reflected once or multiple times without direct light emission so that the glare of the whole lamp can be better controlled.
(31) In an embodiment, after the light generated from the working first light source **21** is emitted out of the first area **301** or the second area **302**, at least part thereof is projected to the second area **302**, then reflected from the second area **302**, and finally emitted out of the LED lighting device, so that glare of the whole lamp can be better controlled.
(32) In the embodiment, the first optical member **3** adopts a diffuser which may be made of acrylic or plastic material to possess functions of diffusion, permeability and reflection.
(33) The second area **302** of the first optical member **3** is attached to the bottom portion **11** of the seat **1** or a certain interval is kept therebetween. Alternatively, part of the second area **302** is attached to the bottom portion **11** of the seat **1** and an interval is kept between another part thereof and the bottom portion **11** of the seat **1**. When at least part of the second area **302** is attached to the bottom portion **11** of the seat **1**, when the second light source **22** is attached to the part of the second area **302** attached to the bottom portion **11**, interfaces penetrated by light can be decreased to reduce light loss.
(34) The first optical member **3** forms both a first curved surface in the first area **301** and a second curved surface in the second area **302**. The first curved surface is a convex surface and the second curved surface is a concave surface. A smooth transition is intervened between the first curved surface and the second curved surface to avoid forming an angle or a tip. In the embodiment, the first optical member **3** is greater than the seat **1** in thermal expansion coefficient. When the LED lighting device is working, the light source **2** and the power supply **4** will generate a large amount of heat to possibly cause excessive expansion and deformation of the first optical member **3**. The arrangement of the first curved surface and the second curved surface can change the direction of thermal expansion of the first optical member **3** to reduce the influence resulting from the thermal expansion.
(35) In the embodiment, the LED lighting device may further include a reflector **6**. The reflector **6** is fixed on the side portion **12** of the seat **1** and corresponds to the second light source **22**. At least part of luminous flux generated by the working second light source **22** is reflected to the first optical member **3** by the reflector **6**. In an embodiment, at least part of luminous flux generated by the working second light source **22** is reflected to the first optical member **3** by the reflector **6**. The reflector **6** can prevent the LED lighting device from emitting light directly from the second light source **22**, so that glare can be effectively controlled to make the unified glare rating less than a specific value (for example, a unified glare rating (UGR) less than 20).
(36) In the embodiment, the LED lighting device may further include a power cap **5**. The power cap **5** is disposed in the accommodating space **304** and fixed to the bottom portion **11** of the seat **1**. A space accommodating the power supply **4** is formed between the power cap **5** and the bottom portion **11**. In comparison with disposing the power supply **5** on the back of the seat **1**, the power supply **4** disposed as the embodiment will not occupy the height space of the LED lighting device.

This is advantageous to size control which can reduce packaging and transportation costs.
(37) The power cap **5** has two sets of sidewalls **51**. The first light source **21** is disposed with two sets which are separately located on two sides of the power cap **5** and correspond to the two sets of sidewalls **51** of the power caps **5**. At least part of the light generated from the working first light source **21** is emitted to the first area **301** with being reflected by the sidewalls **51** of the power cap **5**. The power cap **5** can prevent the light emission of the first light source **21** from concentrating at the central zone of the first area **301** to form local bright light so as to be advantageous to the control of evenness of light emission of the first optical member **3**.
(38) The power cap **5** is disposed with an inserting wall **52**. The seat **1** is disposed with an inserting hole **13**. The power cap **5** can be fixed to the seat **1** by inserting the inserting wall **52** of the power cap **5** into the inserting hole **13** of the seat **1**. In some embodiments, the power cap **5** may also be fixed to the seat **1** by screws, rivets or glue, and they will not be further described.
(39) As shown in FIGS. **8**-**12**, in an embodiments, the power supply **4** is disposed on the back of the LED lighting device, namely, the other side opposite to the seat **1**. In other words, the power supply **21** and the light source (the first light source **21** and the second light source **22**) are separately located on different sides of the seat **1**. The power supply **4** disposed on the back of the seat **1** can eliminate a dark zone formed by the power supply disposed on the front to occupy the light-emittable area of the light-emitting surface.
(40) The power supply **4** is limited within the range in the thickness direction of the seat **1**. That is, the power supply **4** does not exceed the top or the bottom of the seat **1** in the thickness direction. Thus, the power supply **4** does not additionally occupy the height or thickness size of the LED lighting device to be advantageous to the control of height or thickness of the LED lighting device. In addition to thickness, the edge of the power supply **4** is configured to be substantially flush with the edge of the LED lighting device. The present embodiment as an example, the long side of the power supply **4** is flush with one lateral side of the LED lighting device or slightly inward moves toward the device center (with keeping a parallel relationship with the lateral side of the LED lighting device), so that users are hard to see the power supply **4** body from the light-emitting surface to maintain appearances.
(41) The power supply **4** includes a power box **41** fixed to the seat **1**. When the power box **41** is fixed to the seat **1**, a space accommodating electronic components of the power supply **4** is formed therebetween.
(42) The power box **41** includes a connecting portion **411** attached to the sidewall **14** of the seat **1**. In an embodiment, the connecting portion **411** is fixed to the sidewall **14** of the seat **1** by welding. In an embodiment, the connecting portion **411** is disposed with fixing holes. The power box **41** can be fixed to the sidewall **14** of the seat **1** by using bolts to pass through the fixing holes. In an embodiment, the connecting portion **411** is fixed to the sidewall **14** of the seat **1** by engagement.
(43) The length direction of the power box **41** is extended along the optical axis direction of the second light source **22** and accounts for at least 50% of the width size of the seat **1** to increase the structural strength of the seat **1** in the width direction.
(44) As shown in FIGS. **8**-**11**, in an embodiment, a second optical member **7** may be further included. The second optical member **7** is disposed outside the second light source **22** and approximately located on the light-emitting side of the second light source **22**. The second optical member **7** further limits the second light source **22** in a closed space **101** not to make the second light source **22** exposed so as to prevent bugs from entering and shade the light emission of the second light source **22** or form electric isolation to the second light source **22** to avoid electric shock.
(45) In detail, edges of two sides of the second optical member **7** in the thickness direction of the LED lighting device (i.e., two sides in the width direction of the second optical member **7**) separately contact or abut against the reflector **6** and the first optical member **3**. Two sides in the length direction of the second optical member **7** separately contact or abut against the sidewall **14**

of the seat **1**. That is, the closed space **101** is formed among the reflector **6**, the second optical member **7**, the first optical member **3**, the side portion **12** of the seat **1** and the sidewall **14** of the seat **1**.

(46) A side in the width direction of the second optical member **7** may be connected with the first optical member **3**, and the other side abuts against the reflector **6**. In an embodiment, the second optical member **7** and the first optical member **3** are adhered together by glue. In an embodiment, the second optical member **7** and the first optical member **3** are connected by fasteners. In an embodiment, the second optical member **7** and the first optical member **3** are integrated through composite connection.

(47) The second optical member **7** may be provided with one or more functions of permeability, diffusion, light redirection and focusing.

(48) In an embodiment, the second optical member **7** is made of sheet-shaped material and is provided with functions of diffusion and permeability.

(49) In an embodiment, the second optical member **7** has an incident surface **71** and an emitting surface **72**. The incident surface **71** corresponds to the second light source **22**. The emitting surface **72** may be configured into a substantially flat surface. In an embodiment, the emitting surface **72** is configured into a flat surface. In an embodiment, the emitting surface **72** is configured into an arcuate surface.

(50) The incident surface **71** is disposed with a redirecting unit **711** to redirect the light emission of the second light source **22**. In detail, the redirecting unit **711** projects the light emission of the second light source **22** onto a position of the first optical member **3**, which is away from the second light source **22**. A cross-section of the redirecting unit **711** is a triangle or a substantial triangle. The redirecting unit **711** are configured to be multiple in number and arranged on the second optical member **7** in a matrix. Furthermore, the incident surface **71** of the second optical member **7** may be configured into a Fresnel lens.

(51) In an embodiment, the reflector **6** and the second optical member **7** are integratedly formed with plastic or acrylic material. During the forming process, a flat plastic or acrylic plate is heatedly pressed with a shape of the incident surface **71** of the second optical member **7** first, and then different positions of the plate are heatedly pressed and bent to make it form a required shape.

(52) In an embodiment, the reflector **6** and the second optical member **7** are made of the same material.

(53) In an embodiment, the reflector **6** and the second optical member **7** are made of different materials, and the both are formed into a whole by welding.

(54) In an embodiment, the second optical member **7** and the first optical member **3** are integratedly formed. A section of the second optical member **7** along the width direction, which is away from the first optical member **1**, abuts against the reflector **6**. The reflector **6**, the second optical member **7**, the first optical member **3** and the side portion **12** of the seat **1** jointly form the closed space **101** to limit the second light source **22** therein so as to reduce the influence to the second light source **22** from outside environment and improve service life and reliability of the second light source **22**. Also, because the closed space **101** limits the second light source **22**, users cannot directly observe the second light source **22** no matter what angle and position the LED lighting device is installed at so as to reduce glare.

(55) In an embodiment, the first optical member **3**, the reflector **6** and the second optical member **7** are integratedly formed with one or more materials.

(56) The above embodiments only illustrate the principles and effects of the present disclosure, but are not intended to limit the present disclosure. Many embodiments and many applications beyond the shown examples provided will be apparent to those skilled in the art from reading the above description. The scope of the present teachings, therefore, should be determined, not with reference to the foregoing description, but rather with reference to the appended claims, along with the full scope of equivalents to which such claims are entitled. For purposes of comprehensiveness, the

disclosures of all articles and references, including patent applications and publications, are hereby incorporated by reference. The omission of any aspect of the subject matter disclosed herein from the claims is not intended to be a disclaimer of such subject matter, nor should it be deemed that the inventor failed to consider such subject matter to be part of the disclosed subject matter. In addition, the above-mentioned features of the disclosure can be arranged and combined in any manner and used to improve LED lighting devices.

## Claims

1. An LED lighting device, comprising: a seat comprising a bottom portion with four sides, two side portions and two sidewalls, the two side portions connected to two opposite sides of the bottom portion respectively and the two sidewalls connected to another two opposite sides of the bottom portion respectively; a power supply disposed on the bottom portion; a power cap disposed on the bottom portion and covering the power supply; a light source comprising a first light source and a second light source, the first light source disposed on the bottom portion and arranged at two sides of the power cap, the second light source disposed on the side portions; an optical member disposed on the seat, the optical member comprising a first portion and two second portions connected to the first portion, the first portion covered the first light source and the power cap, the two second portions attached to the two side portion of the seat respectively; and a reflector connected to an end of each of the side portions and covered the second light source, wherein a part of the light emitted from the first light source transmits through the first portion of the optical member and then goes out of the LED lighting device, a part of the light emitted from the second light source is reflected by the reflector and then goes to the second portions of the optical member.
2. The LED lighting device according to claim 1, wherein the first portion of the optical member comprises a convex surface and each of the second portions comprises a concave surface.
3. The LED lighting device according to claim 2, wherein the power cap is fixed to the bottom portion of the seat and forms a first space with the bottom portion, the power supply is disposed in the first space and electrically connects to the first light source and the second light source.
4. The LED lighting device according to claim 3, wherein the power cap comprises two connecting walls connected to the bottom portion, the first light source is disposed closed to the two connecting walls.
5. The LED lighting device according to claim 4, wherein a part of the light emitted from the first light source is reflected by the two connecting walls of the power cap and then transmits through the first portion of the optical member.
6. The LED lighting device according to claim 5, wherein further comprises a second optical member connected to the second portion of the optical member and the reflector.
7. The LED lighting device according to claim 6, wherein the second optical member, the second portion of the optical member and the reflector forms a second space, the second light source is disposed in the second space.
8. The LED lighting device according to claim 7, wherein the second optical member comprises a light incident surface and a light emitting surface, the second optical member further comprises a plurality of redirecting units arranged on the incident surface.
9. The LED lighting device according to claim 8, wherein the light emitting surface of the second optical member is a flat surface or an arcuate surface.
10. The LED lighting device according to claim 9, wherein a cross-section of the redirecting unit is a triangle structure.