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

(54) **PANEL LIGHT**

(57) The present application relates to the technical field of illumination devices, and more particularly to a panel light. In the panel light, ribs (12) are arranged on the annular retaining rim (11) of the frame (10). During assembling, an edge portion of an outer surface (20a) of the diffuser plate (20) abuts against the ribs, and the annular flange (31) of the base plate (30) abuts against an edge portion of an inner surface (20b) of the diffuser plate (20) to fix an edge of the base plate (30) to the frame (10). Since the pressure of the annular flange (31) of the base plate (30) on the diffuser plate (20) and the pressure of the ribs (12) on the diffuser plate (20) are in opposite directions, the distance between a position where the annular flange (31) abuts on the diffuser plate (20) and a center of the diffuser plate (20) is smaller than the distance between a position where the rib abuts on the diffuser plate (20) and the center of the diffuser plate (20), so that the diffuser plate (20) will bulge outwards, thereby increasing the strength of the diffuser plate (20), such that the deformation of the diffuser plate (20) when the panel light being in a normal use state or being laid flat for display is relatively small, the sag phenomenon of the diffuser plate (20) by gravity is reduced, the distance between the light source assembly (40) and the diffuser plate (20) is within a predetermined range, thereby the output light pattern is relatively uniform when being in the normal use state or being laid flat for display, the differ-

ence is small, thus realizing the improvement of optical quality.

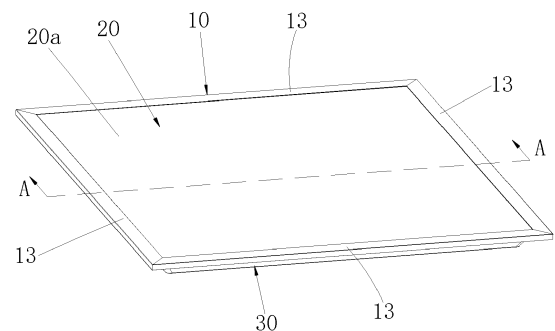


Fig.1

Description

TECHNICAL FIELD

[0001] The present invention relates to the technical field of illumination devices, and more particularly to a panel light.

BACKGROUND

[0002] Nowadays, the panel lights have changed from the traditional grid lamp panel with lamp tube to the light-emitting mode combining LED light source and diffuser plate. The height of the existed panel lights is usually between 50 and 100 mm, and there is a phenomenon of sagging due to the insufficient strength of the flat diffuser plate. The panel light when being in a normal use state, the diffuser plate is disposed downward, and the middle portion of the diffuser plate will be convex outward. The panel light when being laid flat for display, the diffuser plate is disposed upward, the middle portion of the diffuser plate will be concave inward, the diffuser plate will be close to the light source assembly, creating a light pattern in a Tic-Tac shape, and thus the quality of the optical cannot meet requirements. In this way, the light pattern output from the panel light may differ greatly when being in a normal use state or being laid flat for display.

SUMMARY OF INVENTION

[0003] A purpose according to embodiments of the present application is to provide a panel light to solve the technical problem that the light pattern output from the existing panel light differs greatly when being in a normal use state or being laid flat for display.

[0004] According to an embodiment of the application, a panel light is provided, which includes a frame, a diffuser plate, a base plate and a light source assembly; the frame has an annular retaining rim, and ribs are arranged on the annular retaining rim; the diffuser plate has an outer surface and an inner surface opposite to each other, and an edge portion of the outer surface of the diffuser plate is configured to abut against the ribs; the base plate has an annular flange, an edge portion of the base plate is fixed to the frame, and the annular flange is configured to abut on an edge portion of the inner surface of the diffuser plate, wherein the distance between a position where the annular flange abuts on the diffuser plate and a center of the diffuser plate is smaller than the distance between a position where the ribs abuts on the diffuser plate and the center of the diffuser plate; the light source assembly is installed on the base plate, and a light-emitting side of the light source assembly face towards the diffuser plate.

[0005] Optionally, the frame includes a plurality of profiles which are arranged arranged in an annular manner; or the frame is configured to be an integrally formed structure.

[0006] Optionally, an outer edge of the frame has an annular boss, and an annular limiting groove is formed between an inner wall of the annular boss and the annular retaining rim, the annular flange is accommodated in the annular limiting groove; the edge portion of the base plate is fixed to the annular boss.

[0007] Optionally, the edge portion of the base plate and the frame are connected through fasteners.

[0008] Optionally, a cross-section of the ribs is square, triangular, trapezoidal or semicircular.

[0009] Optionally, the ribs are arranged in a circle around the inner edge of the frame. Alternatively, the ribs are arranged in multiple sections, and the multiple sections of the ribs are distributed on the frame in an annular manner.

[0010] Optionally, the base plate has a plurality of positioning grooves, the number of the light source assembly is multiple, and the light source assembly are respectively arranged in different positioning grooves.

[0011] Optionally, the light source assembly includes a substrate and LED lamp beads arranged on the substrate, the substrate is arranged on the base plate, and the LED lamp beads are arranged toward the diffuser plate.

[0012] Optionally, the panel light further includes a driving assembly, and the driving assembly is electrically connected with the light source assembly.

[0013] Optionally, the frame is square, circular, oval or triangular.

[0014] The above-mentioned one or more technical solutions provided by the embodiments of the present application have at least one of the following technical effects: in the panel light, ribs are provided on the annular retaining rim of the frame which increases the strength of the frame. During assembling, the edge portion of the outer surface of the diffuser plate abuts against the ribs, and the annular flange of the base plate abuts against the edge of the inner surface of the diffuser plate to fix the edge of the base plate to the frame. Since the pressure of the annular flange of the base plate on the diffuser plate and the pressure of the ribs on the diffuser plate are in opposite directions, the distance between a position where the annular flange abuts on the diffuser plate and a center of the diffuser plate is smaller than the distance between a position where the rib abuts on the diffuser plate and the center of the diffuser plate. In this way, the diffuser plate will bulge outwards, thereby increasing the strength of the diffuser plate, the deformation of the diffuser plate when the panel light being in a normal use state or being laid flat for display is relatively small, and the sag phenomenon of the diffuser plate by gravity is reduced, such that the distance between the light source assembly and the diffuser plate is within a predetermined range, thereby the output light pattern is relatively uniform when being in the normal use state or being laid flat for display, the difference is small, and the optical quality is improved.

BRIEF DESCRIPTION OF DRAWINGS

[0015] In order to illustrate the technical solutions in the embodiments of the present application more clearly, the drawings needed in the description of the embodiments or the prior art will be briefly described hereinbelow. Obviously, the drawings in the following description are only some embodiments of the present application, and for those of ordinary skill in the art, other drawings may be obtained based on these drawings without paying any creative work.

Fig.1 is an assembled perspective view of a panel light provided by an embodiment of the application when being laid flat for display;

Fig.2 is an assembled perspective view of the panel light of Fig.1 when being in a normal use state;

Fig.3 is an exploded perspective view of the panel light of Fig.2;

Fig.4 is an enlarged view of part B in Fig.3;

Fig.5 is a perspective structural view of the base plate in the panel light of Fig.3;

Fig.6 is a partial cross-sectional view along line A-A in Fig.1; and

Fig.7 is a schematic view showing the deformation of the diffuser plate in the panel light of Fig.1.

DETAILED DESCRIPTION

[0016] In order to make the technical problems to be solved, technical solutions and beneficial effects of this application more comprehensible, the present disclosure is further described in detail below with reference to the accompanying drawings and embodiments. It is understood that the specific embodiments described herein are merely illustrative of the present application and are not intended to limit the present application.

[0017] In the description of the embodiments of the present application, it should be understood that the terms "length", "width", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer" and other directions or positional relationships are based on the directions or positional relationships shown in the drawings, which are merely used for facilitating description of embodiments and simplifying the description, without indicating or implying that the referred device or element must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation to the embodiments of the present application. In the description of the present application, "a plurality of" means two or more than two, unless specifically defined otherwise.

[0018] In the embodiments of the present application, unless clearly specified and defined otherwise, the terms "install", "connection", "connect", "fix" and so on should be understood in a broad sense. For example, it may be a fixed connection, a detachable connection, or an integrated connection; it may be mechanical connection or electrical connection; it may be directly connected or indirectly connected through an intermediate medium, and it may be an internal communication of two components or an interaction relationship between two components. For those of ordinary skill in the art, the specific meanings of the above-mentioned terms in the embodiments of the present application can be understood according to specific circumstances.

[0019] In a conventional panel light, a frame is used to fix a diffuser plate and a base plate, and the diffuser plate is clamped between the frame and the base plate. The conventional panel light when being laid flat for display, the diffuser plate is disposed upward, and the diffuser plate has a sag phenomenon by gravity. The closer the diffuser plate sags to the light source, the closer it gets to the light source assembly, then the panel light may create a light pattern in Tic-Tac-shaped, and thus the optical quality cannot meet the requirements.

[0020] Please refer to FIGS. 1 to 3, an embodiment of the present application provides a panel light, which includes a frame 10, a diffuser plate 20, a base plate 30 and a light source assembly 40. With reference to Fig.4, the frame 10 has an annular retaining rim 11, and ribs 12 are provided on the annular retaining rim 11. With reference to Fig.6, the diffuser plate 20 has an outer surface 20a and an inner surface 20b opposite to each other, and an edge portion of the outer surface 20a of the diffuser plate 20 abuts against the rib 12. The base plate 30 has an annular flange 31, an edge portion of the base plate 30 is fixed to the frame 10, and the annular flange 31 abuts on an edge portion of the inner surface 20b of the diffuser plate 20, and the distance between a position where the annular flange 31 abuts on the diffuser plate 20 and a center of the diffuser plate 20 is smaller than the distance between a position where the rib 12 abuts on the diffuser plate 20 and the center of the diffuser plate 20. The center of the diffuser plate 20 can be understood as a center line passing through the outer surface 20a and the inner surface 20b of the diffuser plate 20. With reference to Fig.3, the light source assembly 40 is installed on the base plate 30, and a light-emitting side of the light source assembly 40 face towards the diffuser plate 20.

[0021] Compared with the related arts, in the panel light provided by the present application, the ribs 12 are provided on the annular retaining rim 11 of the frame 10 that can increase the strength of the frame 10. As shown in Figs. 6 and 7, during assembling, the edge portion of the outer surface 20a of the diffuser plate 20 abuts against the rib 12, the annular flange 31 of the base plate 30 abuts against the edge portion of the inner surface 20b of the diffuser plate 20, and the edge portion of the base

plate 30 is fixed to the frame 10. Since the pressure F1 of the annular flange 31 of the base plate 30 on the diffuser plate 20 and the pressure F2 of the rib 12 on the diffuser plate 20 are in opposite directions, the distance between a position where the annular flange 31 abuts on the diffuser plate 20 and a center of the diffuser plate 20 is smaller than the distance between a position where the rib 12 abuts on the diffuser plate 20 and the center of the diffuser plate 20, so that the diffuser plate 20 may bulge outwards. In Figs. 6 and 7, shown as bulge upwards, thereby increasing the strength of the diffuser plate 20, the deformation of the diffuser plate 20 when the panel light being in a normal use state or being laid flat for display is relatively small, and the sag phenomenon of the diffuser plate 20 by gravity is reduced, such that the distance between the light source assembly 40 and the diffuser plate 20 is within a predetermined range, thereby the output light pattern can be relatively uniform when being in the normal use state or being laid flat for display, the difference is small, and the optical quality is improved

[0022] Among them, the diffuser plate 20 may be made of PC (polycarbonate), PS (polystyrene) or PP (polypropylene). The base plate 30 may be formed by a process of sheet metal stamping and spraying, which is easy to manufacture and is beneficial to increase the strength of the base plate 30. The base plate 30 has an inner cavity 33, and the light source assembly 40 may be disposed on an inner bottom surface of the base plate 30.

[0023] Exemplarily, with the ribs 12 being provided on the annular retaining rim 11 of the frame 10, the edge portion of the outer surface 20a of the diffuser plate 20 abuts against the ribs 12 during assembly, and the annular flange 31 of the base plate 30 abuts against the edge portion of the inner surface 20b of the diffuser plate 20, such that the middle portion of the diffuser plate 20 bulges outwards, and the sag of the diffuser plate 20 can be reduced by about 5mm, this improves light emitting angles of the light source, reduces the overall height of the lamp, and the output light pattern of the panel light is relatively uniform.

[0024] In conventional panel lights, for diffuser plates of different thicknesses, the thinner diffuser plates have lower strength and there may be more obvious sagging. For diffuser plates of different materials, the diffuser plates made of PP and PC will sag more obviously than the diffuser plates made of PS. For diffuser plates of different sizes, the larger the length to width ratio of the diffuser plate, the more obvious the sagging.

[0025] The panel light of this embodiment can adapt to diffuser plates 20 of different sizes, thicknesses, materials and length-to-width ratios, so that the middle portion of the diffuser plate 20 assembled between the frame 10 and the base plate 30 will bulge outward, thereby realizing an adjustment to the shape of the diffuser plate 20. In this way, the material and thickness of the diffuser plate 20 can be changed, there may be more choices and thus the material cost can be reduced.

[0026] Please refer to Fig.2 and Fig.3, in another embodiment of the present application, the frame 10 has a square, circular, elliptical or triangular shape or other shapes, which can be specifically set as required. The annular retaining rim 11 of the frame 10 and the annular flange 31 of the base plate 30 may be a circular, elliptical, square, rounded square structure or other annular structures, which can be specifically set as required. Exemplarily, the frame 10 is square, and the annular retaining rim 11 is also square, correspondingly, the outer edges of the diffuser plate 20 and the base plate 30 are also square.

[0027] Referring to Fig.3, in another embodiment of the present application, the frame 10 includes a plurality of profiles 13, which are arranged in a ring shape, which facilitates the production of a plurality of profiles 13, and then form one profile 13 by an assembly. The frame 10 can be made of aluminum profiles or other metal profiles. Exemplarily, the frame 10 has a square shape, four profiles 13 are provided, and the four profiles 13 enclose together to form a square frame 10. It is understandable that the frame 10 may also be an integrally formed structure.

[0028] Please refer to Figures 4 and 6, in another embodiment of the present application, the outer edge of the frame 10 has an annular boss 14, and an annular limiting groove 15 may be formed between an inner wall of the annular boss 14 and the annular retaining rim 11, The annular flange 31 may be accommodated in the annular limiting groove 15; the edge portion of the base plate 30 may be fixed to the annular boss 14. The annular boss 14 is provided to facilitate the assembly of the base plate 30. During assembling, the annular flange 31 of the base plate 30 is disposed in the annular limiting groove 15, and the edge portion of the base plate 30 will be aligned with the annular boss 14 of the frame 10, such that the assembly efficiency can be improved.

[0029] Please refer to Fig.6. In another embodiment of the present application, the edge portion of the base plate 30 and the frame 10 are connected through a fastener 50. The base plate 30 can be securely attached to the frame 10 with the fastener 50. Exemplarily, the fastener 50 may be a screw, the screw passes through the edge portion of the base plate 30 and is threaded to the frame 10, thereby achieving the assembly.

[0030] Please refer to Fig.4 and Fig.6. In another embodiment of the present application, the cross section of the ribs 12 may be square, triangular, trapezoidal, semicircular or other shapes, which can be specifically set as required. When the rib 12 is provided with a triangular cross-sectional structure, a triangular slope of the ribs 12 is close to the inner edge of the frame 10. When the diffuser plate 20 is assembled to the frame 10, the slope surface of the ribs 12 abuts against the edge portion of the outer surface 20a of the diffuser plate 20, such that the stress can be evenly distributed on the diffuser plate 20, the diffuser plate 20 has better strength, and the amount of deformation of the diffuser plate 20 is smaller

when it is displayed flat or in a normal use state.

[0031] Please refer to Figs.4 and 6, in another embodiment of the present application, the ribs 12 are arranged in a circle around the inner edge of the frame 10. When the ribs 12 abut against the edge portion of the outer surface 20a of the diffuser plate 20, with the annular flange 31 of the base plate 30 abuts against the inner surface 20b of the diffuser plate 20, the diffuser plate 20 can be deformed, and the middle portion of the diffuser plate 20 protrudes outward.

[0032] It should be understood that the ribs 12 can also be arranged in multiple sections, and the ribs 12 with multiple sections are distributed on the frame 10 in an annular manner. When the ribs 12 abut on the edge portion of the outer surface 20a of the diffuser plate 20, with the annular flange 31 of the base plate 30 abuts against the inner surface 20b of the diffuser plate 20, the diffuser plate 20 can also be deformed to a certain extent, and the middle portion of the diffuser plate 20 protrudes outward.

[0033] Please refer to Figs.3 and 5, in another embodiment of the present application, the base plate 30 has a plurality of positioning grooves 32, the number of light source assembly 40 is multiple, and the light source assembly 40 are respectively arranged in different positioning grooves 32, this facilitates the positioning and installation of the light source assembly 40. Exemplarily, the positioning grooves 32 are strip-shaped and arranged at intervals, and the light source assemblies 40 are strip-shaped that facilitates the installation of the light source assembly 40 at different positions, so as to dissipate heat from the multiple light source assemblies 40 and improve the heat dissipation effect.

[0034] Please refer to Fig.3, in another embodiment of the present application, the light source assembly 40 includes a substrate 41 and LED lamp beads 42 disposed on the substrate 41. The substrate 41 is disposed on the base plate 30, and the LED lamp beads 42 are disposed toward the diffuser plate 20. In this way, it is easy to manufacture the light source assembly 40, thereby facilitating the heat generated by the light source assembly 40 to diffuse from the base plate 30 to the external environment.

[0035] Please refer to Fig.3, in another embodiment of the present application, the panel light further includes a driving assembly (not shown) being electrically connected with the light source assembly 40. The driving assembly is used to convert the external power source into the power required by the light source assembly 40 and drive the light source assembly 40 to work. The driving assembly is arranged outside the base plate 30 to reduce the possibility of the heat generated by the light source assembly 40 being diffused to the driving assembly, and to improve the reliability of the lamp.

[0036] The above are merely preferred embodiments of this application and are not intended to limit this application. Any modification, equivalent replacement and improvement made within the spirit and principle of this ap-

plication shall be included within the protection scope of this application.

5 Claims

1. A panel light, comprising:

a frame (10),
a diffuser plate (20) having an outer surface (20a) and an inner surface (20b) opposite to each other,
a base plate (30), and
a light source assembly (40) configured to be installed on the base plate (30), and a light-emitting side of the light source assembly (40) face towards the diffuser plate (20);

characterized in that,

the frame (10) has an annular retaining rim (11), and ribs (12) are provided on the annular retaining rim (11);, and an edge portion of the outer surface (20a) of the diffuser plate (20) is configured to abut against the ribs;

the base plate (30) has an annular flange (31), an edge portion of the base plate (30) is fixed to the frame (10), and the annular flange (31) is configured to abut on an edge portion of the inner surface (20b) of the diffuser plate (20), wherein the distance between a position where the annular flange (31) abuts on the diffuser plate (20) and a center of the diffuser plate (20) is smaller than the distance between a position where the ribs (12) abuts on the diffuser plate (20) and the center of the diffuser plate (20).

2. The panel light according to claim 1, **characterized in that**, the frame (10) comprises a plurality of profiles (13), and the profiles (13) are arranged in an annular manner; or the frame (10) is configured to be an integrally formed structure.

3. The panel light according to any one of claim 1 to 2, **characterized in that**, an outer edge of the frame (10) has an annular boss (14), and an annular limiting groove (15) is formed between an inner wall of the annular boss (14) and the annular retaining rim (11), the annular flange (31) is accommodated in the annular limiting groove (15); the edge portion of the base plate (30) is fixed to the annular boss (14).

4. The panel light according to any one of claim 1 to 3, **characterized in that**, the edge portion of the base plate (30) and the frame (10) are connected through fasteners (50).

5. The panel light according to any one of claim 1 to 4, **characterized in that**, a cross-section of the ribs (12) is square, triangular, trapezoidal or semicircular.

6. The panel light according to any one of claims 1 to 5, **characterized in that**, the ribs (12) are arranged in a circle around an inner edge of the frame (10); or the ribs (12) are arranged in multiple sections, and the multiple sections of the ribs (12) are distributed on the frame (10) in an annular manner. 5
7. The panel light according to any one of claims 1 to 5, **characterized in that**, the base plate (30) has a plurality of positioning grooves (32), the number of the light source assembly (40) is multiple, and the light source assembly (40) are respectively arranged in different positioning grooves (32). 10
8. The panel light according to any one of claims 1 to 5, **characterized in that**, the light source assembly (40) comprises a substrate (41) and LED lamp beads (42) arranged on the substrate (41), the substrate (41) is arranged on the base plate (30), and the LED lamp beads (42) are arranged toward the diffuser plate (20). 20
9. The panel light according to any one of claims 1 to 5, **characterized in that**, the panel light further comprises a driving assembly, and the driving assembly is electrically connected with the light source assembly (40). 25
10. The panel light according to any one of claims 1 to 5, **characterized in that**, the frame (10) is square, circular, oval or triangular. 30

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

1. A panel light, comprising: 35
 - a frame (10),
 - a diffuser plate (20) having an outer surface (20a) and an inner surface (20b) opposite to each other, 40
 - a base plate (30), and
 - a light source assembly (40) configured to be installed on the base plate (30), and a light-emitting side of the light source assembly (40) face towards the diffuser plate (20); 45
 - characterized in that**,
 - the frame (10) has an annular retaining rim (11), and ribs (12) are provided on the annular retaining rim (11); and an edge portion of the outer surface (20a) of the diffuser plate (20) is configured to abut against the ribs (12); 50
 - the base plate (30) has an annular flange (31), an edge portion of the base plate (30) is fixed to the frame (10), and the annular flange (31) is configured to abut on an edge portion of the inner surface (20b) of the diffuser plate (20), wherein the distance between a position where the annular flange (31) abuts on the diffuser plate (20) 55

and a center of the diffuser plate (20) is smaller than the distance between a position where the ribs (12) abuts on the diffuser plate (20) and the center of the diffuser plate (20);
the ribs (10) are arranged in multiple sections, and the ribs (10) with multiple sections are distributed on the frame (10) in an annular manner; the edge portion of the base plate (30) and the frame (10) are connected through fasteners (50).

2. The panel light according to claim 1, **characterized in that**, the frame (10) comprises a plurality of profiles (13), and the profiles (13) are arranged in an annular manner; or the frame (10) is configured to be an integrally formed structure.
3. The panel light according to any one of claim 1 to 2, **characterized in that**, an outer edge of the frame (10) has an annular boss (14), and an annular limiting groove (15) is formed between an inner wall of the annular boss (14) and the annular retaining rim (11), the annular flange (31) is accommodated in the annular limiting groove (15); the edge portion of the base plate (30) is fixed to the annular boss (14).
4. The panel light according to any one of claim 1 to 3, **characterized in that**, a cross-section of the ribs (12) is square, triangular, trapezoidal or semicircular.
5. The panel light according to any one of claims 1 to 4, **characterized in that**, the ribs (12) are arranged in a circle around an inner edge of the frame (10); or the ribs (12) are arranged in multiple sections, and the multiple sections of the ribs (12) are distributed on the frame (10) in an annular manner.
6. The panel light according to any one of claims 1 to 4, **characterized in that**, the base plate (30) has a plurality of positioning grooves (32), the number of the light source assembly (40) is multiple, and the light source assembly (40) are respectively arranged in different positioning grooves (32).
7. The panel light according to any one of claims 1 to 4, **characterized in that**, the light source assembly (40) comprises a substrate (41) and LED lamp beads (42) arranged on the substrate (41), the substrate (41) is arranged on the base plate (30), and the LED lamp beads (42) are arranged toward the diffuser plate (20).
8. The panel light according to any one of claims 1 to 4, **characterized in that**, the panel light further comprises a driving assembly, and the driving assembly is electrically connected with the light source assembly (40).

9. The panel light according to any one of claims 1 to 4, **characterized in that**, the frame (10) is square, circular, oval or triangular.

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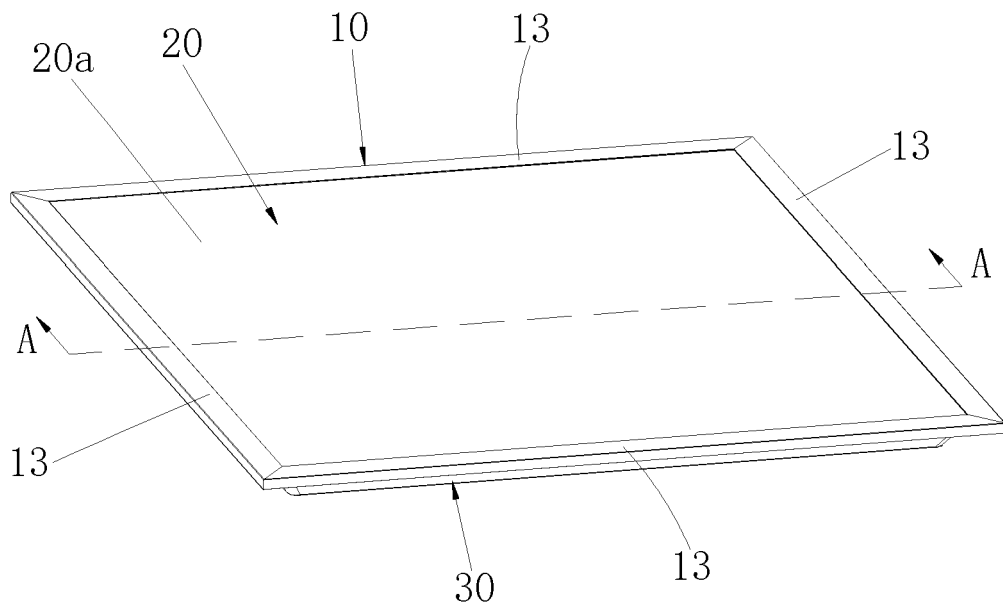


Fig.1

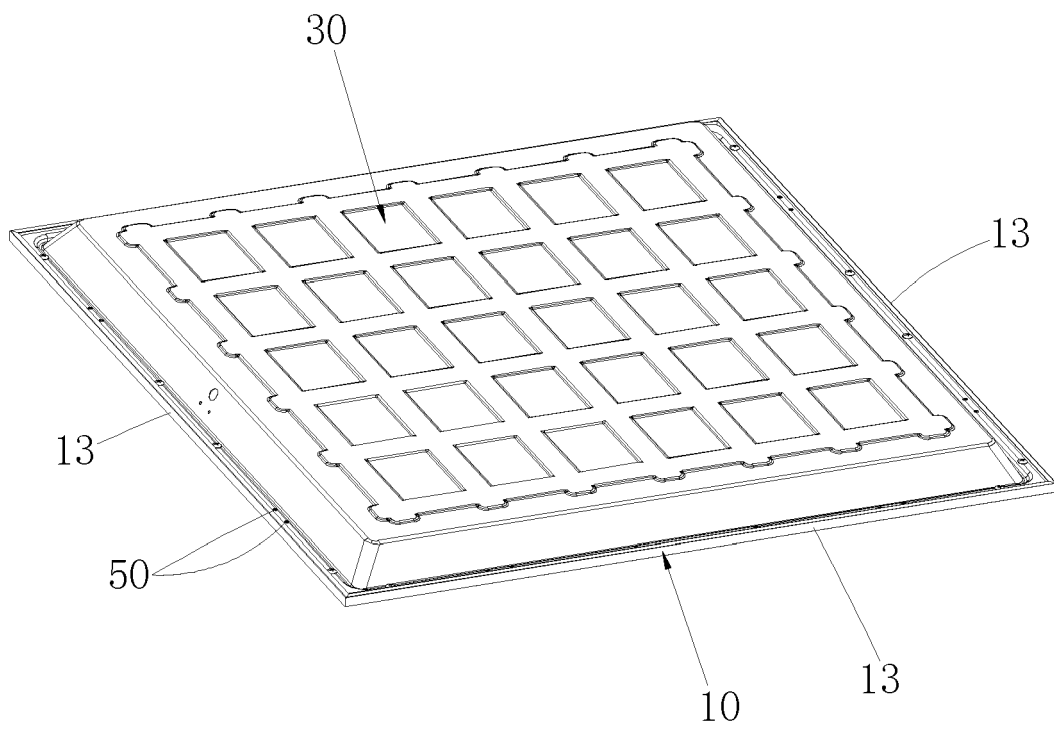


Fig.2

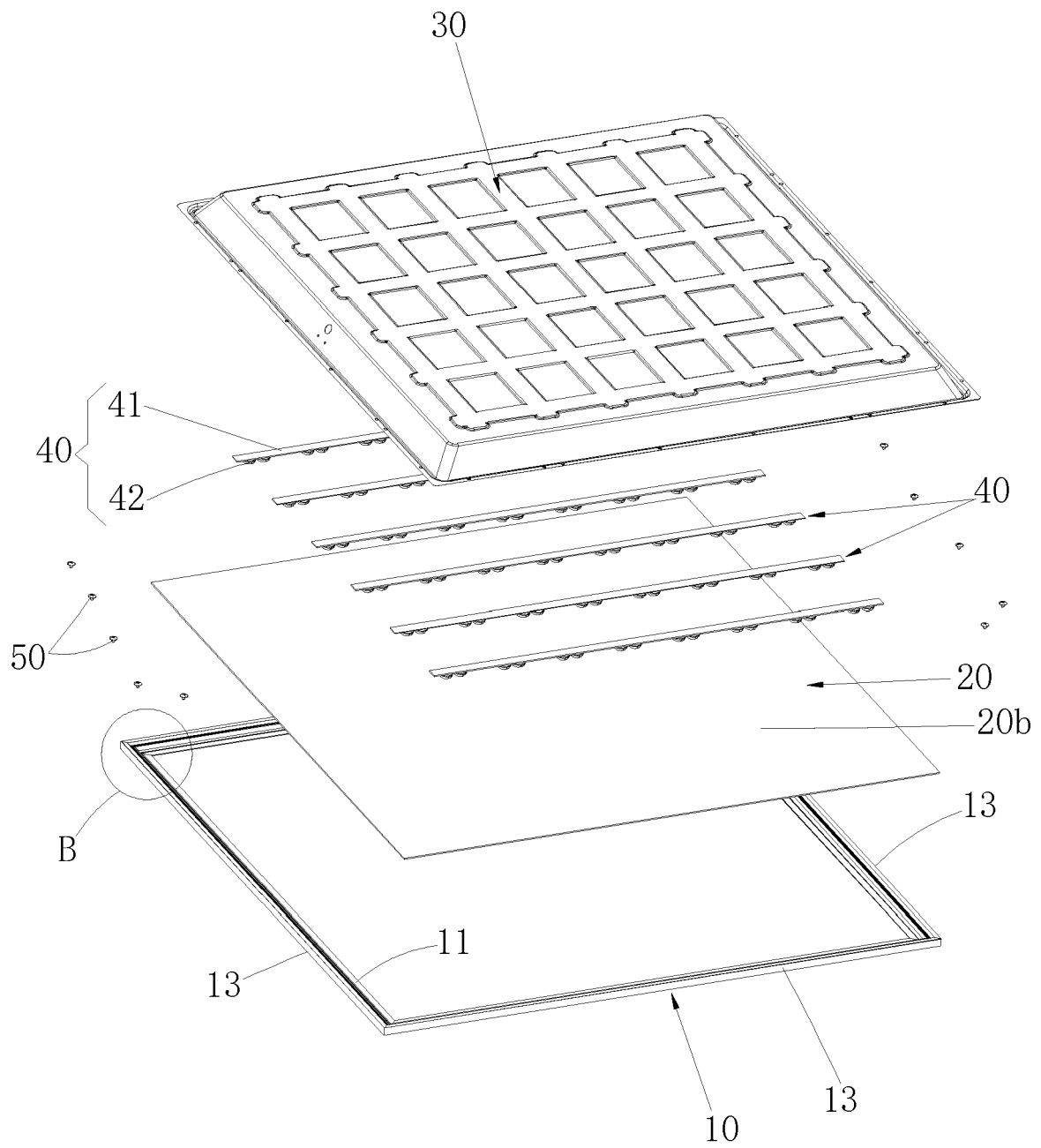


Fig.3

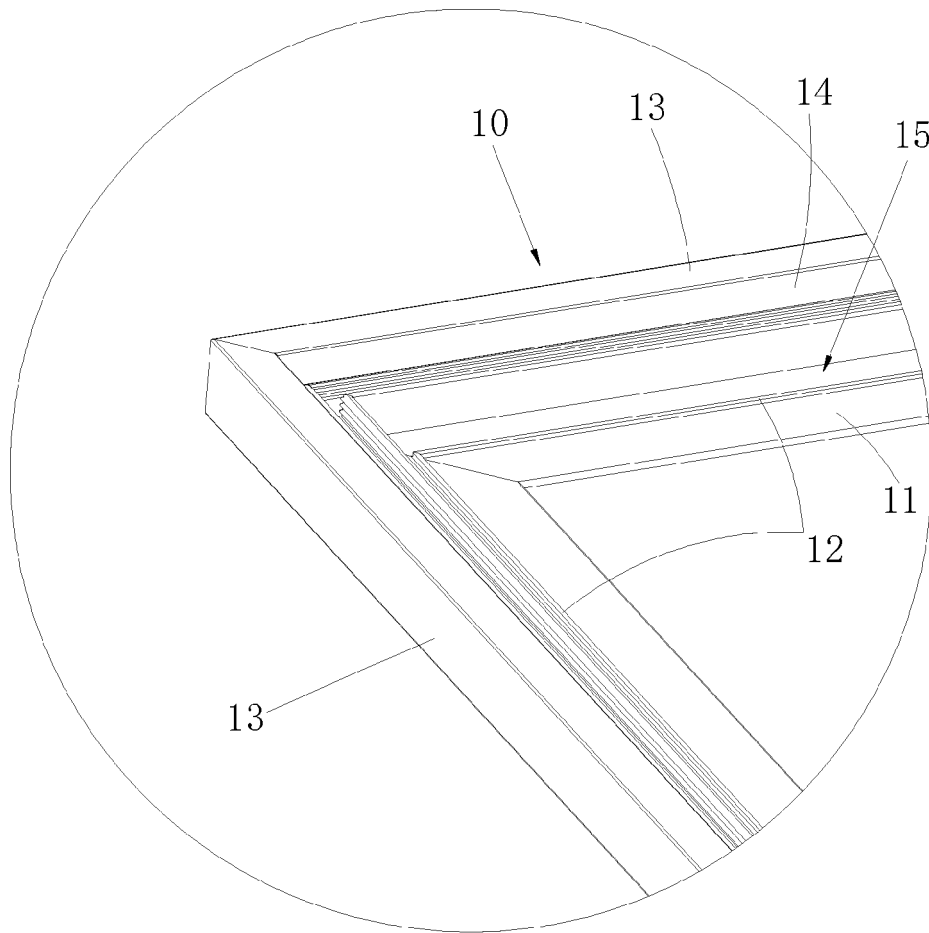


Fig.4

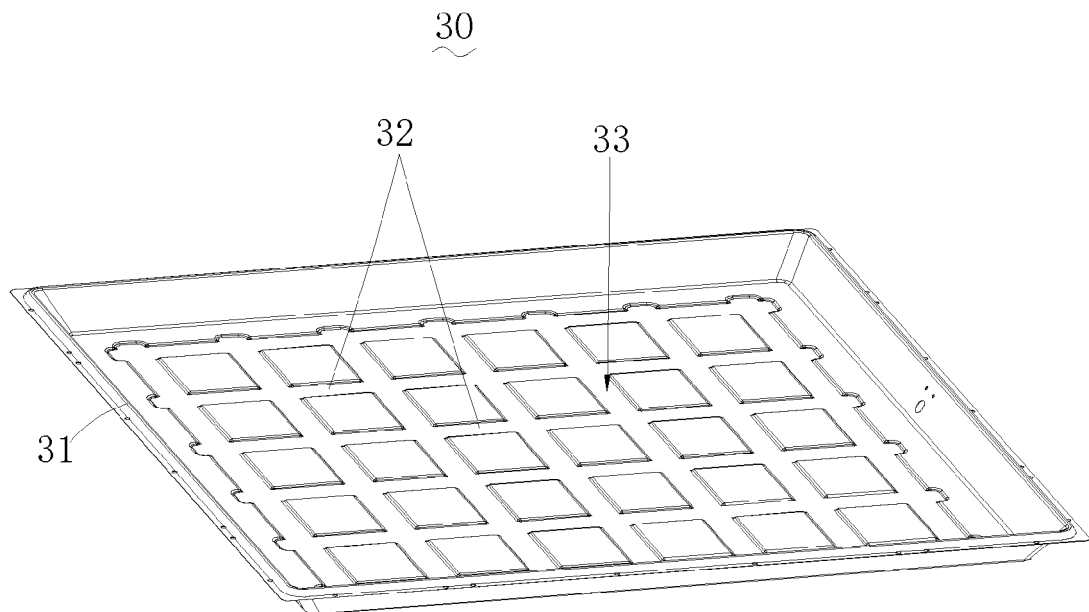


Fig.5

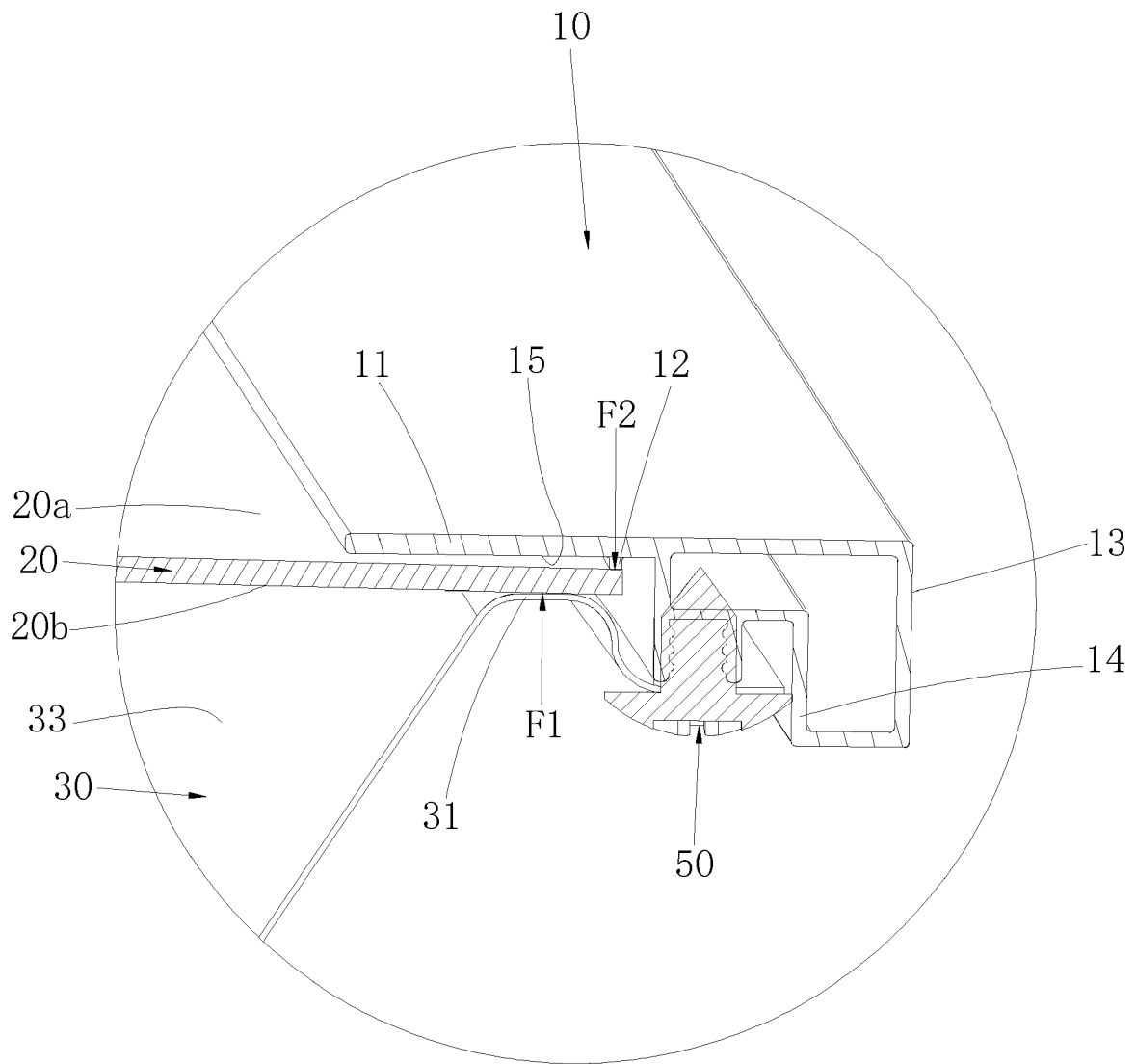


Fig.6

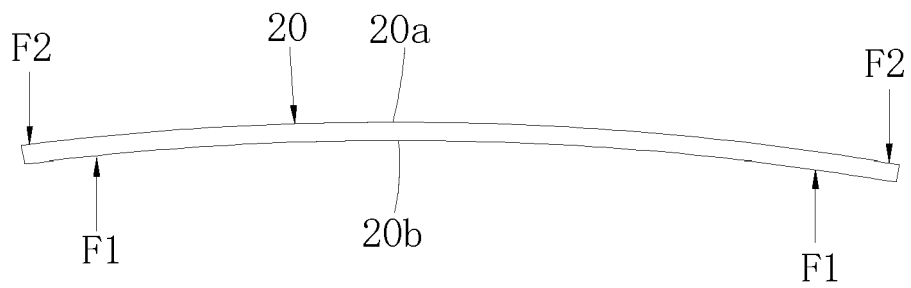


Fig.7



EUROPEAN SEARCH REPORT

Application Number
EP 20 19 4116

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 205 807 313 U (ZHONGSHAN HUAYI LIGHTING CO LTD) 14 December 2016 (2016-12-14)	1-3,5-10	INV. F21V3/06 F21V15/01 F21V17/12 ADD. F21Y103/10 F21Y115/10 F21Y105/00
Y	* the whole document *	4	
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Y	* paragraphs [0018] - [0027]; figures 2-3 *	4,7-9	
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Y	* the whole document *	1-10	
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