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(71) Applicant: **Ginkgo Electric (Zhejiang) Limited**
Haining, Zhejiang 314419 (CN)

(72) Inventor: **ZHOU, Fang**
Haining
Zhejiang 314419 (CN)

(74) Representative: **Peters, Sebastian Martinus**
Octrooibureau Vriesendorp & Gaade B.V.
Koninginnegracht 19
2514 AB Den Haag (NL)

(54) LAMP UTILIZING BAR-SHAPED LIGHT SOURCES WITH UNSAFE VOLTAGE

(57) A lamp utilizing bar-shaped light source with unsafe voltage comprises a non-isolated power supply, a bar-shaped solid light source (22), and a housing (1) for fixing the bar-shaped solid light source. For a bar-shaped LED light source with an insulating substrate, the distance between a circuit for light source and the edge around the insulating substrate is larger than or equal to the creepage distance defined in safety regulation during manufacturing. For a bar-shaped LED light source with a non-insulating substrate, an insulation spacer (4) is disposed between the light source and the housing, so that the distance between the light source and two sides of the insulation space is larger than or equal to the creepage distance defined in safety regulation. Therefore, the insulativity of the lamp is ensured. By adopting the manners of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing, or by adopting a C-shaped fixing manner, the bar-shaped solid light source is fixed to the housing, thereby the security risk caused by falling of the bar-shaped solid light source from the housing or the insulation space can be avoided.

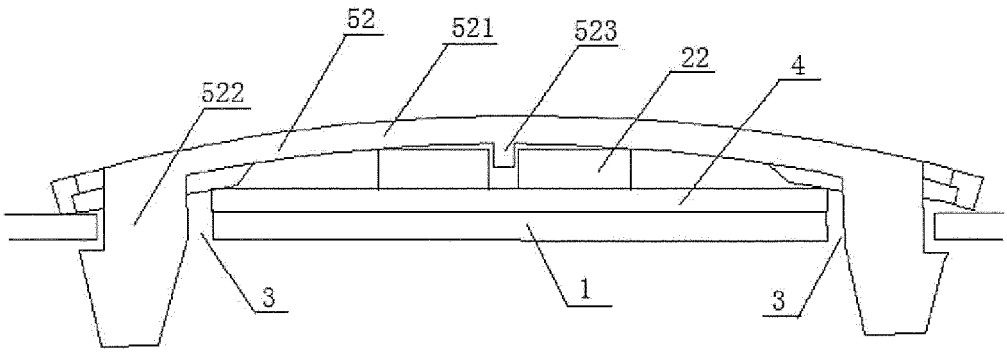


Fig. 8

EP 3 023 687 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a lamp, in particular to a lamp utilizing bar-shaped light source with unsafe voltage.

DESCRIPTION OF THE PRIOR ART

[0002] Currently, because of its long life, high efficiency, low radiation, low power consumption, small size, shockproof, etc., light emitting diode (LED) lamps are more and more widely used. In the lamp industry, the drive power supply for LED is divided into isolated power supply and non-isolated power supply.

[0003] Using a transformer, isolated power supply changes 220V voltage to a lower voltage by the transformer, and then rectify it into a DC output. Because the primary coil of the transformer withstands 220V voltage, the secondary coil only withstands low AC voltage, and there is not a direct connection between the primary and secondary coils, it's called isolated power supply.

[0004] Non-isolated power supply inputs 220V directly to the electronic circuit, then decrease the voltage by electronic components and output. Since inputting and outputting are directly connected by electronic components, it's called non-isolated power supply.

[0005] Isolated driver generally does not bring a threat to humans; it's safe but less efficient. Non-isolated driver is more efficient. In terms of circuit structure: current isolated solutions are mostly AC / DC fly back circuit solutions; hence the circuits are more complex and costly. The non-isolated type uses DC / DC increasing voltage (Boost) or decreasing voltage (Buck) circuit, so the circuit is relatively simple, thus the cost is relatively low. In LED lamps driven by low voltage power supply of, according to the principle of the priority of efficiency and cost, non-isolated solution is the best choice.

[0006] Based on safety principles, LED light source usually uses isolated power supply. The output voltage of the power supply is directly loaded onto the light source. Since the output voltage of the power supply is low-voltage safe voltage, the light source driven by the isolated power supply is a light source with safe voltage; and the lamp using a light source with safe voltage needn't taking safe insulting measures. In addition, when fixing the bar-shaped LED light source to the housing of the lamp, the bar-shaped light source, the insulation spacer and the housing of the lamp are fixed together by means of gluing generally. Even if the gluing layer fails, the bar-shaped LED light source falls off from the insulation spacer, which cannot cause a short circuit or electric shock hazard. The lamp using safe light source sometimes fixes bar-shaped light source(s) by means of drilling fixing holes on the bar-shaped light source and the insulation spacer.

[0007] Based on the principle of efficiency and cost priority, non-isolated solution is the best choice. At present, the LED bulb uses housing made of transcalent plastic or ceramic, and there is no safe isolating problem, hence the LED bulb has been widely used non-isolated power supply.

[0008] Because of the huge sizes of the LED grille lamp, the LED flat lamp and the bar LED lamp, considering cost and thermal dispersing, the housings use low-cost metal housings made of iron sheet or aluminum sheet, thus there is the problem of safe insulating. Since safe insulating between the light source and the housing has not been resolved, in the market, the LED grille lamp, the LED flat lamp and the bar LED lamp, which are able to pass safety regulations, use the isolated power supply. Since the high cost of isolated power supply leads to the high cost of such kind of lamps, the market penetration ratios of the LED grille lamp, the LED flat lamp and the bar LED lamp are far lower than the LED bulb.

[0009] Therefore, those skilled in the art try to solve the safe insulting problem between a light source and housing in the lamp using non-isolated power in a low-cost way.

SUMMARY OF THE INVENTION

[0010] The purpose of the present invention is to provide a lamp utilizing a bar-shaped light source with unsafe voltage, the lamp can conform the requirements of safe regulations, ensure that the lamp is used safely and eliminate safety risks, such as short circuit or an electric shock. The cost of the lamp is lower.

[0011] In the field of electrical or electronic products, safety is a basic requirement for the product. The standards of various types of electrical or electronic products also specify provisions for the safety of the products, such as the relevant provisions of the national standards, IEC or UL. In the design and manufacture process of products, it's necessary to consider insulating restrictions, in particular to consider the specific restrictions of electrical clearance and creepage distance. The creepage distance refers to the shortest space distance between the two conductors along insulating surface, usually the shortest distance between the two conductors along insulating material surface. Electrical clearance refers to the shortest space discharge distance between the two conductors.

[0012] Using a non-isolated power supply, the output voltage of the power supply is higher than the low-voltage safety voltage stipulated in safety regulations and it is an unsafe voltage power supply. In addition, some isolated power supply, the output voltage is higher than the low-voltage safety voltage stipulated in safety regulations; it also becomes an unsafe voltage power supply. If unsafe voltage is loaded on a light source, the light source is a light source with an unsafe voltage.

[0013] The light source adopting a non-isolated power supply is a light source with an unsafe voltage. Considering cost and thermal dispersing, the housing of the lamp

which is used for fixing the bar-shaped light source, is made of metal to ensure the strength of the housing. Thus, it is necessary to take appropriate safe insulating measures, so that ensure that the insulation of the lamp conforms the requirements of safety regulation. In addition, if the bar-shaped LED light source, the insulation spacer and the housing are fixed together by means of gluing, in case the glue layer fails, the bar LED light source will fall off from the insulation spacer, which can cause a short circuit or electric shock hazard. And if the means of drilling fixing holes in the bar-shaped LED light source and the insulation spacer is adopted, the insulation spacer will be destroyed and safety risk will be induced.

[0014] It is necessary to take appropriate safety insulation measures, so that the lamp utilizing a bar-shaped light source with unsafe voltage can conform the requirements of safe regulations, to ensure that the lamp is used safely and eliminate safety risks, such as short circuit or an electric shock.

[0015] The lamp utilizing a bar-shaped light source with unsafe voltage provided in the present invention, comprising an unsafe voltage power supply, a bar-shaped solid light source and a non-insulating housing for fixing the bar-shaped solid light source, characterized in that:

when the bar-shaped solid light source is a bar-shaped light source with a substrate of insulating material, the distance between a circuit for the light source with a substrate of insulating material and the edge around the substrate of insulating material is larger than or equal to the creepage distance defined in safety regulation;

when the bar-shaped solid light source is a bar-shaped light source with a substrate of non-insulating material, an insulation spacer is disposed between the bar-shaped light source with a substrate of non-insulating material and the housing, and the distance between the bar-shaped light source with a substrate of non-insulating material and the edge around the insulation space is larger than or equal to the creepage distance defined in safety regulation; and

by adopting a manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing, or by adopting a C-shaped fixing manner, the bar-shaped solid light source is fixed to the housing.

[0016] In the lamp utilizing a bar-shaped light source with unsafe voltage provided by the present invention, the distance between the housing and the bar-shaped solid light source meets the requirement of creepage distance defined in safety regulation, so it complies with the insulating restrictions and can be used safely. In the meantime, by adopting a manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing, or by adopting a C-shaped fixing manner, the bar-shaped light source is tightly fixed to the housing, thereby the security risk caused by falling of the bar-shaped solid light source from the housing or the insulation space can be avoided.

[0017] Further, the bar-shaped light source with a substrate of insulating material is a bar-shaped LED light source with a substrate of insulating material.

[0018] Further, the bar-shaped LED light source with a substrate of insulating material is a bar-shaped LED light source with a substrate of glass fiber.

[0019] Further, the bar-shaped light source with a substrate of insulating material and the housing are fixed together by means of gluing.

[0020] Further, the bar-shaped light source with a substrate of non-insulating material is a bar-shaped LED light source with a substrate of non-insulating material.

[0021] Further, the bar-shaped LED light source with a substrate of non-insulating material is a bar-shaped LED light source with a substrate of aluminum.

[0022] Further, the bar-shaped light source with a substrate of non-insulating material, the insulation spacer and the housing are fixed together by means of gluing.

[0023] Further, the number of the bar-shaped solid light source is one or more.

[0024] Further, the housing is made of metal material.

[0025] Further, the manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing is by means of opening fixing holes in pairs in the housing on both sides of the bar-shaped light source with a substrate of insulating material or on both sides of the insulation spacer, and passing a fixing member through the fixing holes, to cross and fix or to surround and fix the bar-shaped light source with a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material.

[0026] Further, the fixing member is an insulating fixing member.

[0027] Further, the insulating fixing member is a bridge-shaped snap, an annular snap, an ultrasonic riveting member or an ultrasonic welding member.

[0028] Further, the insulating fixing member comprises one or more positioning teeth. The positioning tooth (teeth) prevents the bar-shaped solid light source from moving.

[0029] Further, the ultrasonic riveting member crosses the bar-shaped solid light source, after high temperature melting both ends of the ultrasonic riveting member, ends whose area are larger than the fixing holes are formed, and the ultrasonic riveting member crossing and fixing the bar-shaped light source with a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material is realized.

[0030] Further, the ultrasonic welding member crosses the bar-shaped solid light source, both ends of the ultrasonic welding member are riveted with back plate after high temperature melting, the ultrasonic welding member surrounding and fixing the bar-shaped light source with

a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material is realized.

[0031] Further, the distance between the bar-shaped solid light source and the edge of the fixing hole which is on the side toward the bar-shaped solid light source is greater than or equal to electric clearance stipulated in the safety regulations. The electric clearance refers to the shortest space discharge distance between the two conductors. When the distance between the bar-shaped solid light source and the edge of the fixing hole is greater than or equal to the electric clearance stipulated in the safety regulations, it can be ensured that using non-insulating fixing member at the fixing holes can ensure the insulation of the products.

[0032] Further, non-insulating fixing member is used to fix, and the non-insulating fixing member comprises a non-conductive jumper and non-insulating fasteners which pass through the fixing holes.

[0033] Further, the non-insulating fastener comprises a screw and a nut.

[0034] Further, the jumper comprises one or more positioning teeth.

[0035] Further, the C-shaped fixing manner is a fixing manner in which the bar-shaped solid light source is confined in a C-shaped or L-shaped housing.

[0036] Further, the manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing is by means of fixing the bar-shaped solid light source using an insulating pressing bar which is embedded into a slot.

[0037] Further, the bar-shaped solid light source is a bar-shaped OLED light source.

[0038] Further, the power supply with an unsafe voltage is a non-isolated power supply.

[0039] Further, the power supply with an unsafe voltage is an isolated power supply with an output voltage exceeding a low-voltage safe voltage defined in safety regulations.

[0040] Further, the lighting is a LED grille lamp, a LED flat lamp or a LED bar lamp.

[0041] Using the lamp utilizing a bar-shaped light source with unsafe voltage provided by the present invention, we can decrease the cost of power supply effectively and improve the system light efficiency of the lamps. We solve the insulating problem of light source with unsafe voltage in a low-cost way, the extra cost of insulating problem in mass production can be ignored. Because of lower cost, such kind of lamps is more competitive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042]

Figure 1 is a schematic diagram of a LED grille lamp in first embodiment of the present invention;
Figure 2 is a layout diagram of the bar-shaped LED light source of the LED grille lamp shown in Fig. 1;
Figure 3 is a perspective view of a first bridge-shaped snap;
Figure 4 is a front view of the first bridge-shaped snap;
Figure 5 is a sectional view of a bar-shaped solid light source which is a LED light source with a substrate of glass fiber fixed by the first bridge-shaped snap;
Figure 6 is a perspective view of a second bridge-shaped s snap;
Figure 7 is a front view of the second bridge-shaped snap;
Figure 8 is a sectional view of a bar-shaped solid light source which is a LED light source with a substrate of aluminum fixed by the second bridge-shaped snap;
Figure 9 is a perspective view of a third bridge-shaped snap;
Figure 10 is a front view of the third bridge-shaped snap;
Figure 11 is a sectional view of a bar-shaped solid light source which is a LED light source with a substrate of aluminum fixed by the third bridge-shaped snap;
Figure 12 is a fixing relationship diagram of the positioning teeth of the third bridge-shaped snap and a LED light source with a substrate of aluminum;
Figure 13 is a sectional view of a bar-shaped solid light source which is a LED light source with a substrate of aluminum fixed by the fifth cross snap;
Figure 14 is a sectional view of a bar-shape solid light source which is a LED light source with a substrate of aluminum fixed by ultrasonic riveting;
Figure 15 is a sectional view of a bar-shaped solid light source which is a LED light source with a substrate of aluminum fixed by ultrasonic welding;
Figure 16 is a schematic diagram of a LED flat lamp in a fourth embodiment of the present invention;
Figure 17 is a rear view of the LED flat lamp shown in Fig. 16;
Figure 18 is a sectional view along the AA direction shown in Fig. 17;
Figure 19 is a rear view of another LED flat lamp in a fourth embodiment of the present invention;
Figure 20 is a sectional view along the AA direction shown in Fig.19;
Figure 21 is a side view of a LED flat lamp shown in Fig. 19;
Figure 22 is a sectional view of a LED bar-shaped lamp in a fifth embodiment of the present invention;
Figure 23 is a sectional view of another LED bar-shaped lamp in a fifth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0043] Below with reference to the idea of the present invention, the specific structure and technical effect produced is further described in order to fully understand the objects, features and advantages of the present invention.

[0044] Figure 1 is a schematic diagram of a LED grille lamp utilizing light source with unsafe voltage in first embodiment of the present invention. The LED grille lamp comprises a housing 1 and a soft light plate 6. Figure 2 is a layout diagram of the bar-shaped LED light source of the LED grille lamp shown in Figure. 1. As shown in the figure, the LED grille lamp comprises the housing 1, a plurality of bar-shaped LED light sources 2 fixed to the housing 1 and fixing holes 3 on both sides of the bar-shaped LED light source 2. The LED grille lamp is driven by a non-isolated power supply. The housing 1 is made of iron sheet. Three pairs of fixing holes are arranged on both sides of each of the bar-shaped LED light sources.

[0045] Because it uses the non-isolated power supply, the bar-shaped LED light source 2 in this embodiment is therefore a light source with an unsafe voltage.

[0046] In order to ensure the safe use of the lamp in this embodiment, the lamp shall comply with the provisions on the creepage distance stipulated in the safety regulations. The substrate of the bar-shaped LED light source 21 is a substrate of glass fiber. The insulation of a substrate of glass fiber is recognized according to the safety regulations, therefore only the circuit for the bar-shaped LED light source 21 with a substrate of glass fiber is charged. The circuit for the bar-shaped LED light source 21 with a substrate of glass fiber comprises copper layer and elements. During the manufacturing process of bar-shaped LED light source with a substrate of glass fiber, it should be ensured that the distances between the circuit for the bar-shaped LED light source and the edges around the substrate of glass fiber are individually greater than or equal to the creepage distance stipulated in the safety regulations., Thus the insulation of the lamp utilizing light source with an unsafe voltage is ensured, and then its safe usage is ensured.

[0047] The bar-shaped light source 21 with a substrate of glass fiber and the housing 1 are fixed together by means of gluing.

[0048] As shown in Figure 5, the bar-shaped LED light source 21 with a substrate of glass fiber is fixed to the housing 1 using a first bridge-shaped snap 51 shown in Figure 3 and Figure 4. The snap is a plastic snap, comprising jumper 511, and elastic pawls 512 connected to both ends of the jumper 511. Cover the jumper 511 on the bar-shaped LED light source 21 with a substrate of glass fiber, and individually pass the elastic pawls 512 through the fixing holes 3 at both ends of the jumper 511 on both sides of the bar-shaped light source 21 with a substrate of glass fiber. Using the elasticity of the snap, ensure the elastic pawls 512 to fix in the fixing holes 3 firmly and not to fall off. Using this fixing manner, the bar-shaped light source 21 with a substrate of glass fiber can be fixed to the housing 1 firmly, avoiding a short circuit or electric shock hazard caused by the bar-shaped light source 21 with a substrate of glass fiber falling off from the housing due to the failure of gluing layer between the bar-shaped light source 21 with a substrate of glass fiber and the housing 1.

[0049] In this embodiment, you can also use an annular snap, such as line snap, to surround and fix the bar-shaped light source 21 with a substrate of glass fiber. Put both ends of the line snap to cross the bar-shaped light source 21 with a substrate of glass fiber, pass them through the fixing holes 3 on both sides of the bar-shaped light source 21 with a substrate of glass fiber, and engage the two ends together at the other side of the housing. So that the bar-shaped light source 21 with a substrate of glass fiber can be fixed to the housing 1 of the lamp firmly.

[0050] A lamp utilizing a light source with unsafe voltage in a second embodiment of the present invention, is similar to the lamp in the first embodiment. As shown in Figure 8, the difference is that the bar-shape LED light source is the bar-shaped light source 22 with a substrate of aluminum, and that it uses a second bridge-shaped snap 52, as shown in Figures 6 and 7. For the bar-shaped light source 22 with a substrate of aluminum, the insulation of a substrate of aluminum is not recognized according to the safety regulations, therefore the whole bar-shaped LED light source 22 with a substrate of aluminum is charged. In order to ensure the insulation of the lamp in the second embodiment, an insulation spacer 4 is provided between the bar-shaped light source 22 with a substrate of aluminum and the housing 1. The distances between the bar-shaped light source 22 with a substrate of aluminum and the edges around the insulation spacer 4 are individually greater than or equal to the creepage distance stipulated in the safety regulations, so as to ensure the insulation of the lamp and its safe usage.

[0051] The bar-shaped LED light source 22 with a substrate of aluminum, the insulation spacer 4 and the housing 1 are fixed together by means of gluing.

[0052] As shown in Figure 6 and Figure 7, a second bridge-shaped snap 52 comprises jumper 521, elastic pawls 522 connected to both ends of the jumper 521 and a positioning tooth 523 arranged on the jumper 521. During the manufacturing process of the bar-shaped LED light source 22 with a substrate of aluminum, open positioning holes on the substrate of aluminum. As shown in Figure 8, cover the jumper 521 on the bar-shaped LED light source 22 with a substrate of aluminum, insert positioning tooth 523 into the positioning holes, and individually pass the elastic pawls 522 at both ends of the jumper 521 through the fixing holes 3 on both sides of the bar-shaped light source 22 with a substrate of aluminum. Using the elasticity of the snap, ensure the elastic pawls 522 to fix in the fixing holes 3 firmly and not to fall off. Using this fixing manner, the bar-shaped light source 22

with a substrate of aluminum can be fixed to the housing 1 firmly, avoiding a short circuit or electric shock hazard caused by the bar-shaped light source 22 with a substrate of aluminum falling off from the housing 1 due to the failure of gluing layer between the bar-shaped light source 22 with a substrate of aluminum and the housing 1. In addition, the positioning tooth 523 can prevent the bar-shaped light source 22 with a substrate of aluminum from moving.

[0053] As shown in Figure 11, in this embodiment, you can also use a third bridge-shaped snap 53 to fix the bar-shaped light source 22 with a substrate of aluminum, as shown in Figure 9 and Figure 10. The third bridge-shaped snap 53 comprises jumper 531, elastic pawls 532 connected to both ends of the jumper 531 and a pair of positioning teeth 533 arranged on the jumper 531. Cover the jumper 531 on the bar-shaped LED light source 22 with a substrate of aluminum. During the manufacturing process of the bar-shaped LED light source 22 with a substrate of aluminum, open positioning slots 221 in both sides of the substrate of aluminum. Embed the positioning teeth 533 into the positioning slots 221 to prevent the bar-shape light source 22 with a substrate of aluminum from moving. Positioning relationship is shown in Figure 12. Individually pass the elastic pawls 532 at both ends of the jumper 531 through the fixing holes 3 on both sides of the bar-shaped light source 22 with a substrate of aluminum. Using the elasticity of the snap, ensure the elastic pawls 532 to fix in the fixing holes 3 firmly and not to fall off.

[0054] As shown in Figure 13, in this embodiment, you can also use a fourth bridge-shaped snap 54 to fix the bar-shaped light source 22 with a substrate of aluminum. The fourth bridge-shaped snap 54 comprises jumper 541, elastic pawls 542 connected to both ends of the jumper 541 and a pair of positioning teeth 543 arranged on the jumper 541. Cover the jumper 541 on the bar-shaped LED light source 22 with a substrate of aluminum. During the manufacturing process of the bar-shaped LED light source 22 with a substrate of aluminum, open positioning slots 221 in both sides of the substrate of aluminum. Embed the positioning teeth 543 into the positioning slots 221 to prevent the bar-shaped light source 22 with a substrate of aluminum from moving. Positioning relationship is shown in Figure 12. Individually pass the elastic pawls 542 at both ends of the jumper 541 through the fixing holes 3 on both sides of the bar-shaped light source 22 with a substrate of aluminum. The elastic pawls 542 open toward two sides. Using the elasticity of the snap, ensure the elastic pawls 542 to fix in the fixing holes 3 firmly and not to fall off.

[0055] In this embodiment, you can also use ultrasonic riveting member to fix the bar-shaped light source 22 with a substrate of aluminum, as shown in Figure 14, the ultrasonic riveting member comprises a pair of positioning teeth 553. The positioning teeth 553 is engaged on the bar-shaped light source 22 with a substrate of aluminum, to prevent the bar-shaped light source 22 with a substrate of aluminum from moving. Pass both ends 552 of the ultrasonic riveting member 55 through the fixing holes 3 on both sides of the bar-shaped light source 22 with a substrate of aluminum, and melt both ends 552 of the ultrasonic riveting member 55 with high temperature by means of ultrasonic riveting to form two ends whose area are larger than the fixing holes 3, to ensure the ultrasonic riveting member 55 not to fall off from the fixing holes 3, so that the bar-shaped light source 22 with a substrate of aluminum can be fixed to the housing 1 of the lamp firmly, avoiding safe risks caused by the bar-shaped light source falling off from the housing or the insulation spacer.

[0056] In this embodiment, you can also use ultrasonic welding member to fix the bar-shaped light source 22 with a substrate of aluminum. Ultrasonic welding rivets plastic products to plastic products by means of heat molding, as shown in Figure 15, using the elastic deformation of ultrasonic welding member 56, pass both ends of the ultrasonic welding member 56 through the fixing holes 3 on both sides of the bar-shaped light source 22 with a substrate of aluminum, and weld both ends 562 of the ultrasonic welding member 56 with high temperature by means of ultrasonic welding to rivet them with the back plate, so that the bar-shaped light source 22 with a substrate of aluminum can be fixed to the housing 1 of the lamp firmly, avoiding safe risks caused by the bar-shaped light source falling off from the housing or the insulation spacer.

[0057] A lamp utilizing a light source with unsafe voltage in a third embodiment of the present invention is similar to the lamp in the second embodiment. The difference is that the bar-shaped light source 22 with a substrate of aluminum is fixed by using a plastic jumper, screw and nut. As the screw and nut are non-insulating, in order to ensure safety, the insulting problem should be considered. Electric clearance of insulating restrictions stipulated in the safety regulations refers to the shortest space discharge distance between two conductors.

[0058] In this embodiment, the electric clearance is 6mm, as stipulated in IEC, the distance between the bar-shaped light source 22 with a substrate of aluminum and the edge of the fixing hole 3 which is on the side toward the bar-shaped light source 22 with a substrate of aluminum, is greater than or equal to the electric clearance stipulated in the safety regulations. When the distance is greater than or equal to the electrical clearance stipulated in the safety regulations, it can be ensured that using non-insulating fixing member such as a screw and a nut in the fixing holes is still able to ensure insulation of the products. Using plastic jumpers, screws and nuts, the bar-shaped light source 22 with a substrate of aluminum can be fixed to the housing 1 of the lamp firmly, so that avoiding safe risks caused by the bar-shaped light source falling off from the housing or the insulation spacer.

[0059] In this embodiment, non-insulating fixing member is used to fix. The non-insulating fixing member com-

prises non-conductive jumpers and non-insulating fasteners which pass through the fixing holes.

[0060] The lamp utilizing a light source with unsafe voltage in a fourth embodiment of the present invention is a LED flat lamp, shown in Figure 16. Generally it's rectangular or square, comprising a housing 1 and a soft light plate 6. The bar-shaped LED light sources are installed at the four sides of the rectangle, or at opposite sides of the rectangle. The LED flat lamp uses the bar-shaped light source 22 with a substrate of aluminum, as shown in Figure 18, the housing 12 is C-shaped. An insulation spacer 4 is provided between the housing 12 and the bar-shaped light source 22 with a substrate of aluminum, and arranged as C-shaped along the housing 12. The distances between the bar-shaped light source 22 with a substrate of aluminum and the edges around the insulation spacer 4 are greater than or equal to the creepage distance stipulated in the safety regulations, so as to ensure the insulation of the lamp and its safe usage.

[0061] Use a first C-shaped fixing manner to fix the bar-shaped light source 22 with a substrate of aluminum. The first C-shaped fixing manner is installing the bar-shaped light source 22 with a substrate of aluminum on the bottom of a C-shaped housing. The bar-shaped light source 22 with a substrate of aluminum is pressed by stacked soft light plate 6, light guide plate 7, reflection layer 8 and back plate 9 of the LED flat lamp at the opening part of the C-shaped housing 12. As shown in Figure 17, four C-shaped housings 12 are fixed at four corners by means of L-shaped fixing members and screws, so that the bar-shaped light source 22 with a substrate of aluminum is confined in the C-shaped housings 12, ensuring that the bar-shaped light source 22 with a substrate of aluminum is fixed firmly.

[0062] In the present embodiment, you can also use a second C-shaped fixing manner, as shown in Figures 19 and 20. The second C-shaped fixing manner is installing the bar-shaped light source 22 with a substrate of aluminum in L-shaped housings 13. The L-shaped housings 13 on four sides are welded together. The L-shaped housing 13 has fixing slices 57 extending from it. Usually there are two fixing slices 57 at each side. A soft light plate 6, a light guide plate 7, a reflection layer 8 and a back plate 9 of the LED flat lamp stack to confine the bar-shaped light source 22 with a substrate of aluminum in the L-shaped housings 13. Press the fixing slices 57 down, forming C-shaped fixing, which ensures the bar-shaped light source 22 with a substrate of aluminum be fixed firmly.

[0063] The C-shaped fixing manner is a fixing manner in which the bar-shaped solid light source(s) is confined in a C-shaped or L-shaped housing by using other members.

[0064] The lamp utilizing a light source with unsafe voltage in a fifth embodiment of the present invention is a LED bar-shaped lamp. The LED bar-shaped lamp is an integrated lamp which is an alternative of the fluorescent tube lamp. The lamp comprises light source(s), power supply and installing manner. As shown in Figure 22, it comprises special-shaped housing 14. A slot 141 is provided in the housing 14. Insulation spacer 4 is provided between the bar-shaped light source 22 with a substrate of aluminum and the housing 14. The distances between the bar-shaped light source 22 with a substrate of aluminum and the edges around the insulation spacer 4 are greater than or equal to the creepage distance stipulated in the safety regulations, so as to ensure the insulation of the lamp and its safe usage.

[0065] In this embodiment, you can use a pair of insulating pressing bar 58 embedded into the slot 141. Using the elasticity of the insulating pressing bar 58, the bar-shaped light source 22 with a substrate of aluminum is fixed firmly.

[0066] In this embodiment, as shown in Figure 23, you can also use an insulating pressing bar 59 embedded into the slot 151 in the housing 15, covering an insulating fixing housing 591 on the bar-shaped light source 22 with a substrate of aluminum. Because of the elasticity of the insulating pressing bar 59, the insulating fixing housing 591 is pressed, so that the bar-shaped light source 22 with a substrate of aluminum is fixed firmly. The insulating pressing bar 59 is fixed to the housing in a fixing manner of having one end fixed to the housing.

[0067] In this embodiment, a bar-shaped OLED light source, namely a bar-shaped organic LED light source, can also be used.

[0068] The specific embodiments of the present invention are described in details above. It should be understood that those ordinary technical staff in the art can make many modifications and variations according to the teachings of the present invention without creative work, Therefore, all those technical solutions which can be obtained by the skilled in the art under this inventive concept on the basis of prior art through logical analysis, reasoning or limited experiments, are within the scope of the claims defined.

Claims

1. A lamp utilizing a bar-shaped light source with unsafe voltage, comprising an unsafe voltage power supply, a bar-shaped solid light source and a non-insulating housing for fixing the bar-shaped solid light source, **characterized in that**:

   when the bar-shaped solid light source is a bar-shaped light source with a substrate of insulating material, the distance between a circuit for the light source with a substrate of insulating material and the edge around the substrate of insulating material is larger than or equal to the creepage distance defined in safety regulation; when the bar-shaped solid light source is a bar-shaped light source with a substrate of non-insulating material, an insulation spacer is dis-

posed between the bar-shaped light source with a substrate of non-insulating material and the housing, and the distance between the bar-shaped light source with a substrate of non-insulating material and the edge around the insulation space is larger than or equal to the creepage distance defined in safety regulation; and by adopting a manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing, or by adopting a C-shaped fixing manner, the bar-shaped solid light source is fixed to the housing.

2. The lamp according to claim 1, wherein the bar-shaped light source with a substrate of insulating material is a bar-shaped LED light source with a substrate of insulating material.

3. The lamp according to claim 2, wherein the bar-shaped LED light source with a substrate of insulating material is a bar-shaped LED light source with a substrate of glass fiber.

4. The lamp according to claim 1, wherein the bar-shaped light source with a substrate of insulating material and the housing are fixed together by means of gluing.

5. The lamp according to claim 1, wherein the bar-shaped light source with a substrate of non-insulating material is a bar-shaped LED light source with a substrate of non-insulating material.

6. The lamp according to claim 5, wherein the bar-shaped LED light source with a substrate of non-insulating material is a bar-shaped LED light source with a substrate of aluminum.

7. The lamp according to claim 1, wherein the bar-shaped light source with a substrate of non-insulating material, the insulation spacer and the housing are fixed together by means of gluing.

8. The lamp according to claim 1, wherein the number of the bar-shaped solid light source is one or more.

9. The lamp according to claim 1, wherein the housing is made of metal material.

10. The lamp according to claim 1, **characterized in that**: the manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing is by means of opening fixing holes in pairs in the housing on both sides of the bar-shaped light source with a substrate of insulating material or on both sides of the insulation spacer, and passing a fixing member through the fixing holes, to cross and fix or to surround and fix the bar-shaped light source with a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material.

11. The lamp according to claim 10, wherein the fixing member is an insulating fixing member.

12. The lamp according to claim 11, wherein the insulating fixing member is a bridge-shaped snap, an annular snap, an ultrasonic riveting member or an ultrasonic welding member.

13. The lamp according to claim 10, wherein the insulating fixing member comprises one or more positioning teeth.

14. The lamp according to claim 12, wherein the ultrasonic riveting member crosses the bar-shaped solid light source, after high temperature melting both ends of the ultrasonic riveting member, ends whose areas are larger than the fixing holes are formed, and the ultrasonic riveting member crossing and fixing the bar-shaped light source with a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material is realized.

15. The lamp according to claim 12, wherein the ultrasonic welding member crosses the bar-shaped solid light source, both ends of the ultrasonic welding member are riveted with back plate after high temperature melting, the ultrasonic welding member surrounding and fixing the bar-shaped light source with a substrate of insulating material or the bar-shaped light source with a substrate of non-insulating material is realized.

16. The lamp according to claim 10, wherein the distance between the bar-shaped solid light source and the edge of the fixing hole which is on the side toward the bar-shaped solid light source is greater than or equal to electric clearance stipulated in the safety regulations.

17. The lamp according to claim 16, wherein non-insulating fixing member is used to fix, and the non-insulating fixing member comprises a non-conductive jumper and non-insulating fasteners which pass through the fixing holes.

18. The lamp according to claim 16, wherein the non-insulating fastener comprises a screw and a nut.

19. The lamp according to claim 17, wherein the jumper comprises one or more positioning teeth.

20. The lamp according to claim 1, wherein the C-shaped fixing manner is a fixing manner in which the

bar-shaped solid light source is confined in a C-shaped or L-shaped housing.

21. The lamp according to claim 1, wherein the manner of pressing the bar-shaped solid light source to cross the creepage distance and fixing its one or more ends to the housing is by means of fixing the bar-shaped solid light source using an insulating pressing bar which is embedded into a slot.

22. The lamp according to claim 1, wherein the bar-shaped solid light source is a bar-shaped OLED light source.

23. The lamp according to claim 1, wherein the power supply with an unsafe voltage is a non-isolated power supply.

24. The lamp according to claim 1, wherein the power supply with an unsafe voltage is an isolated power supply with an output voltage exceeding a low-voltage safe voltage defined in safety regulation.

25. The lamp according to claim 1, wherein the lamp is a LED grille lamp, a LED flat lamp or a LED bar lamp.

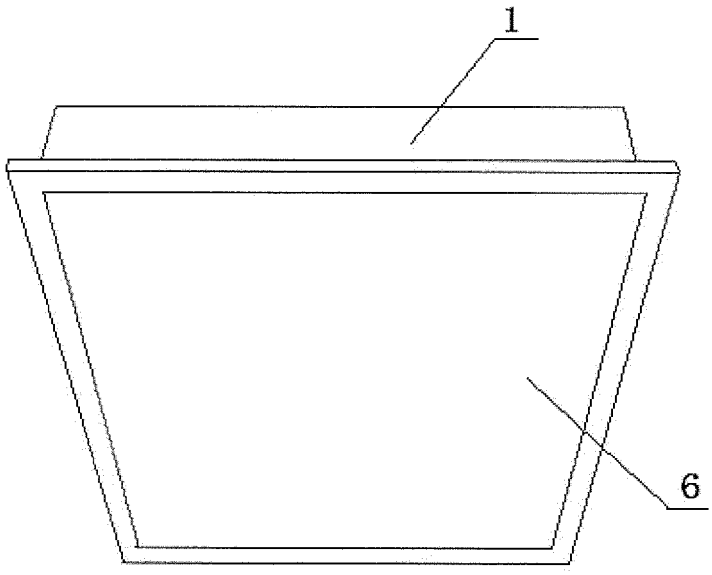


Fig. 1

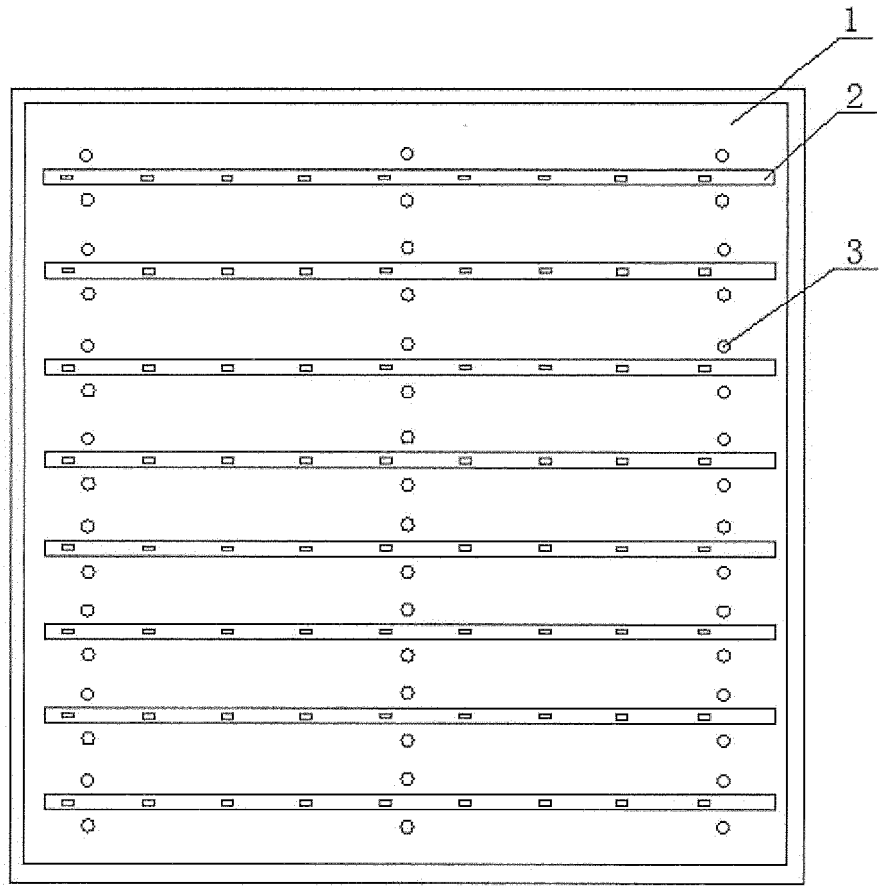


Fig. 2

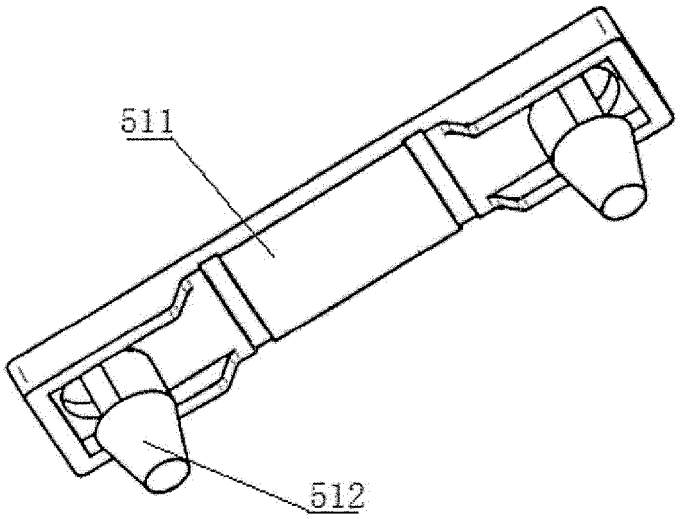


Fig. 3

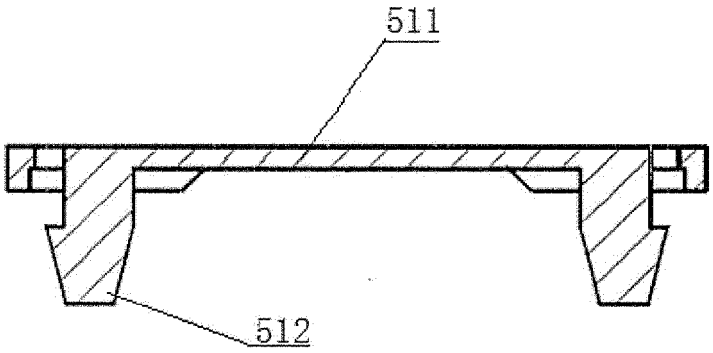


Fig. 4

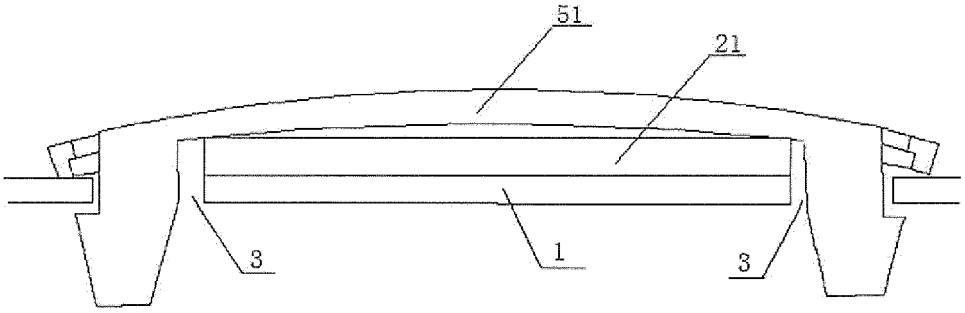


Fig. 5

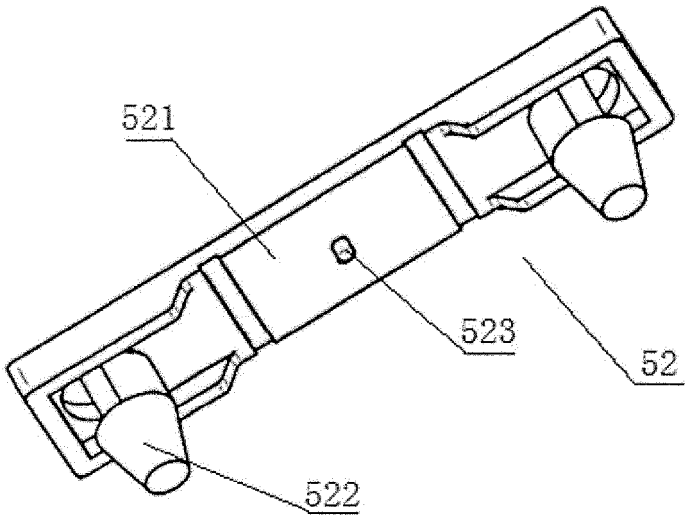


Fig. 6

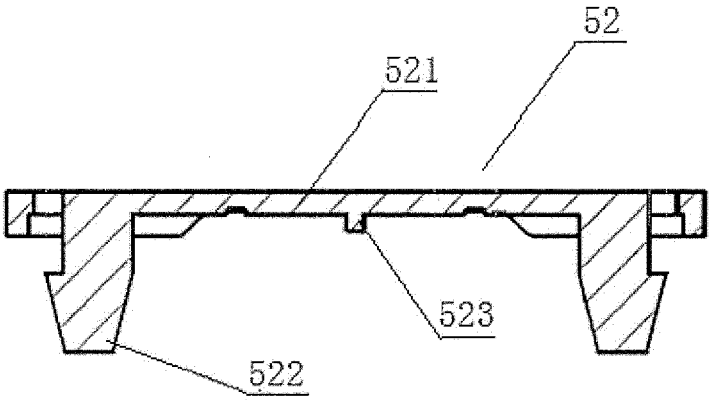
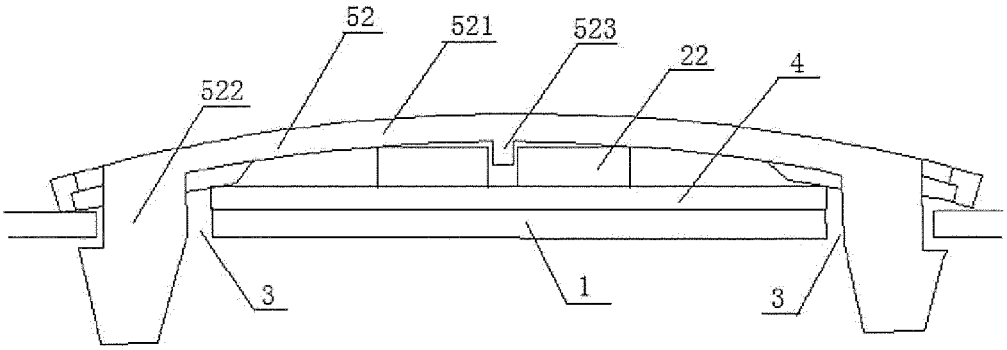


Fig. 7



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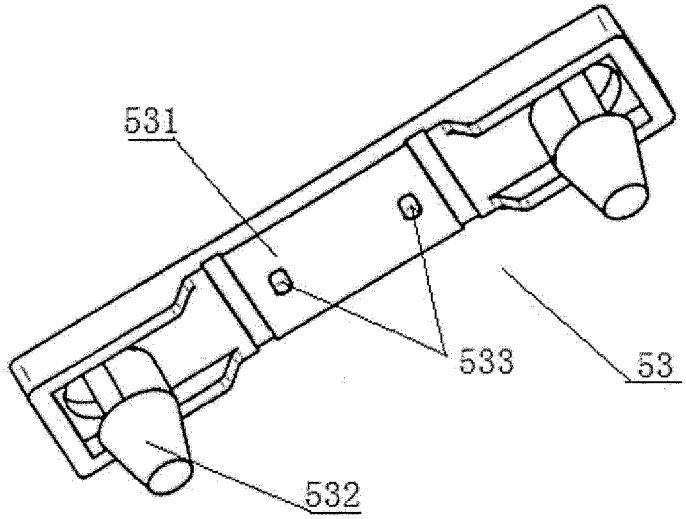

Fig. 9

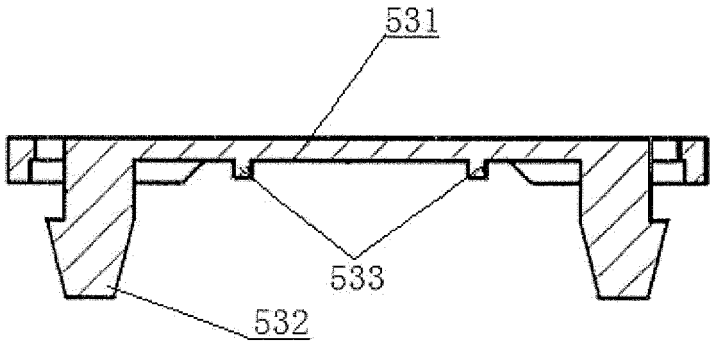

Fig. 10

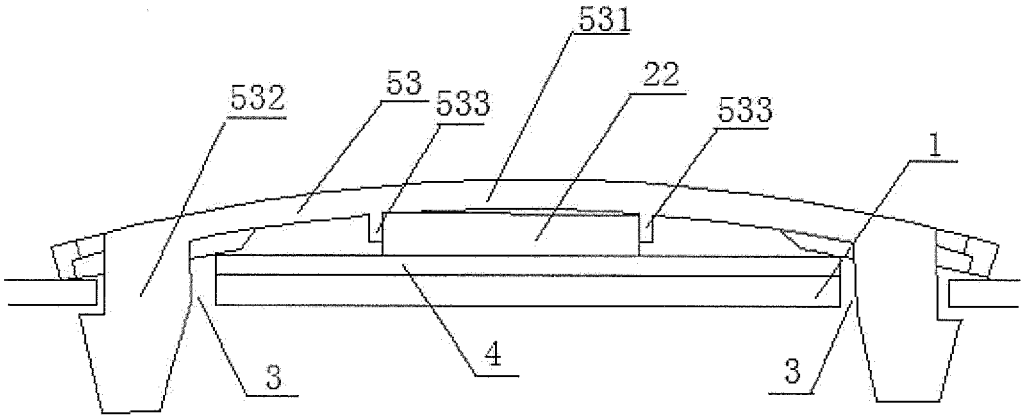

Fig. 11

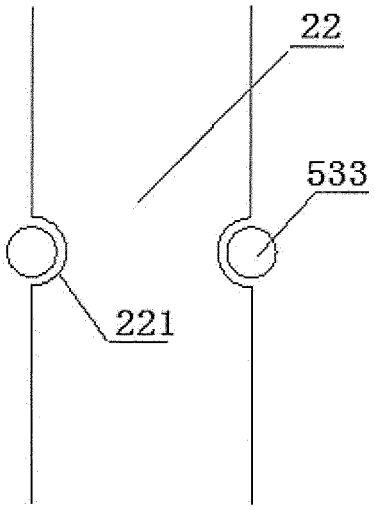

Fig. 12

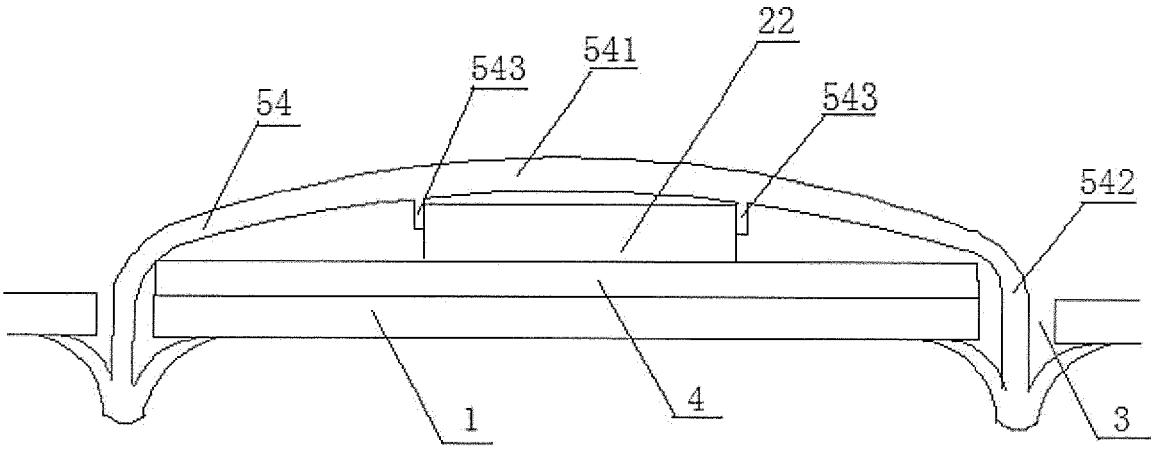

Fig. 13

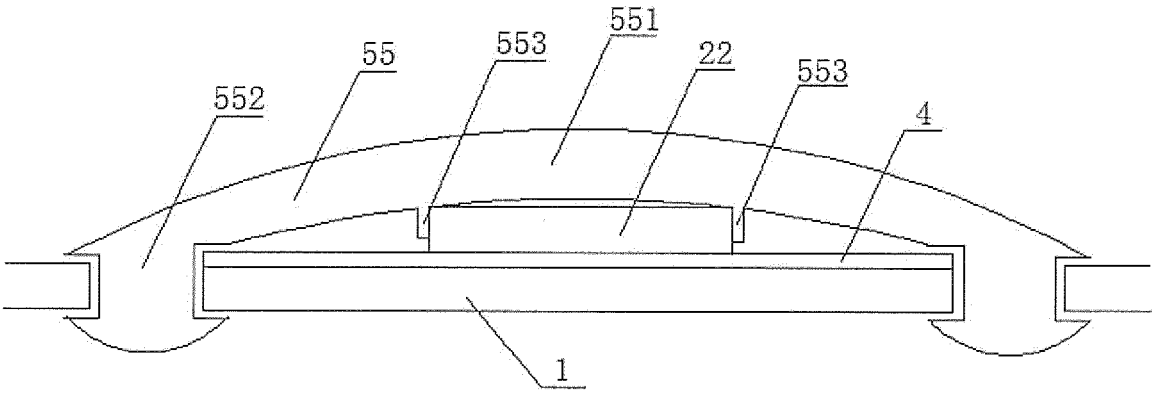

Fig. 14

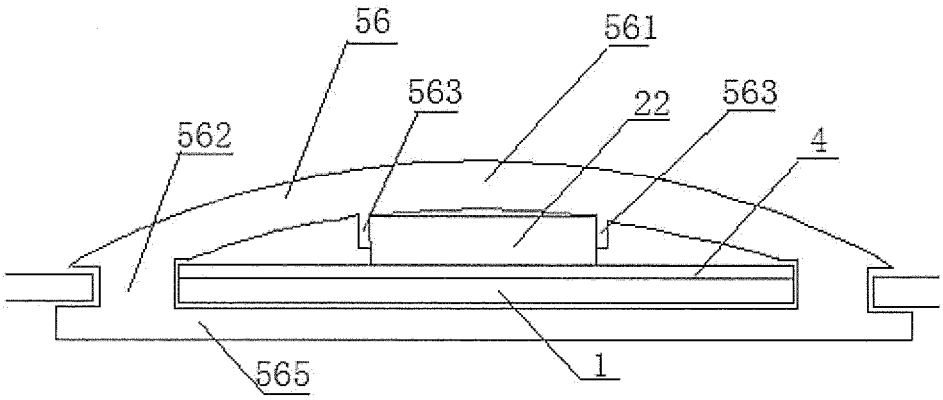

Fig. 15

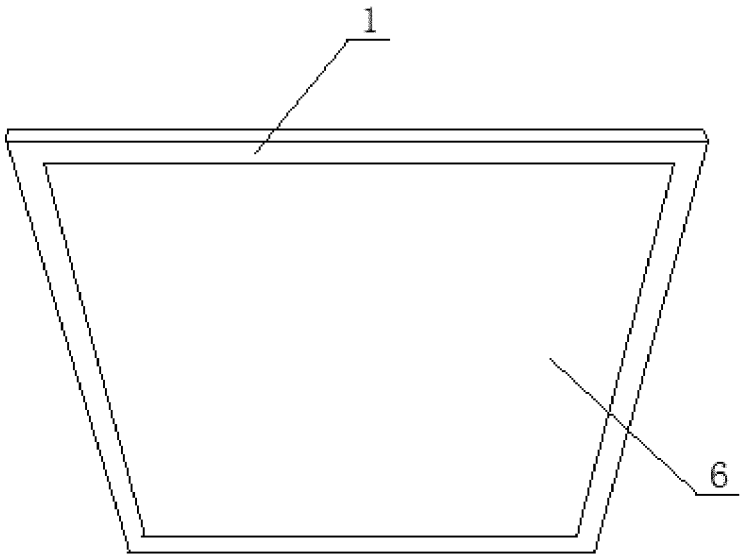

Fig. 16

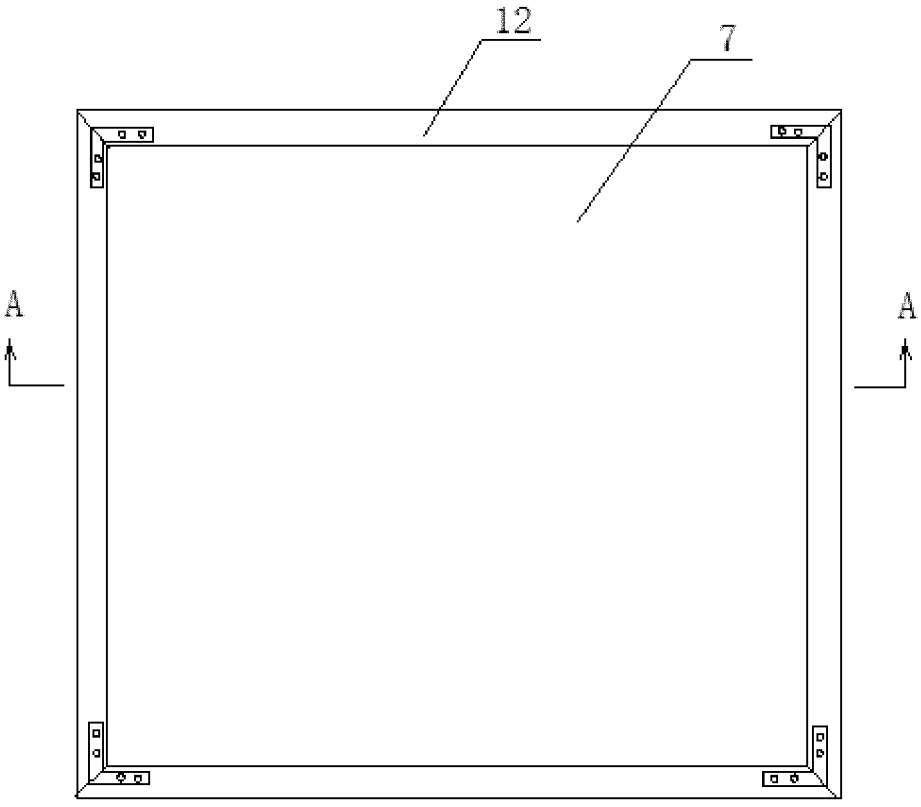

Fig. 17

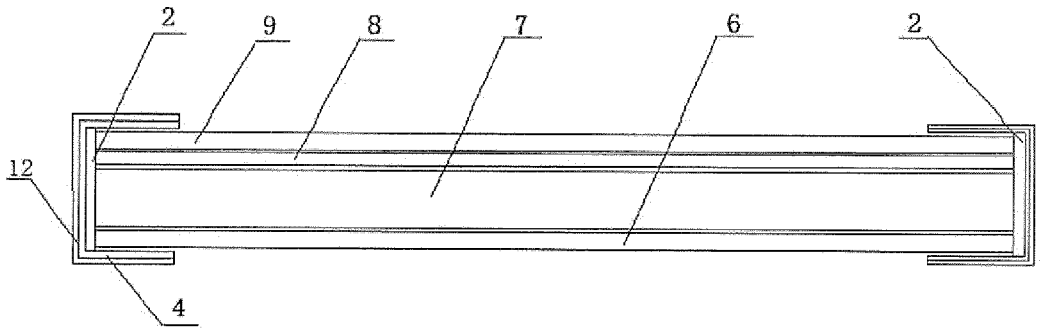

Fig. 18

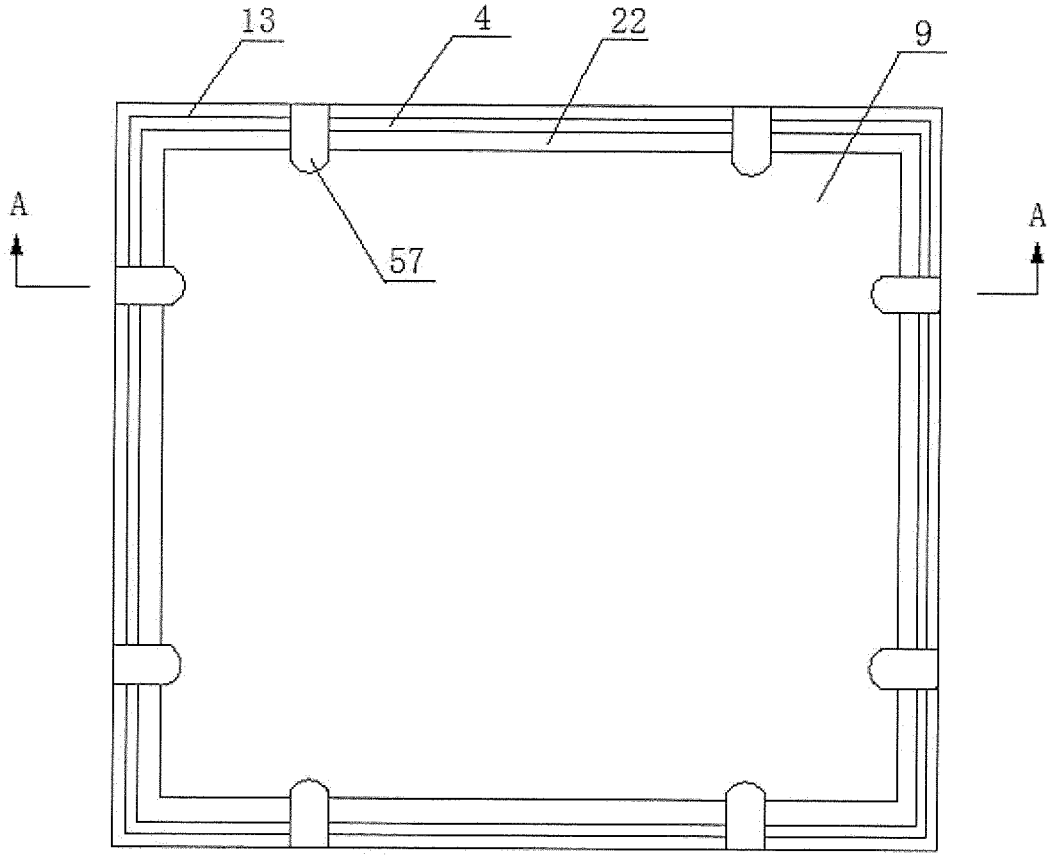

Fig. 19

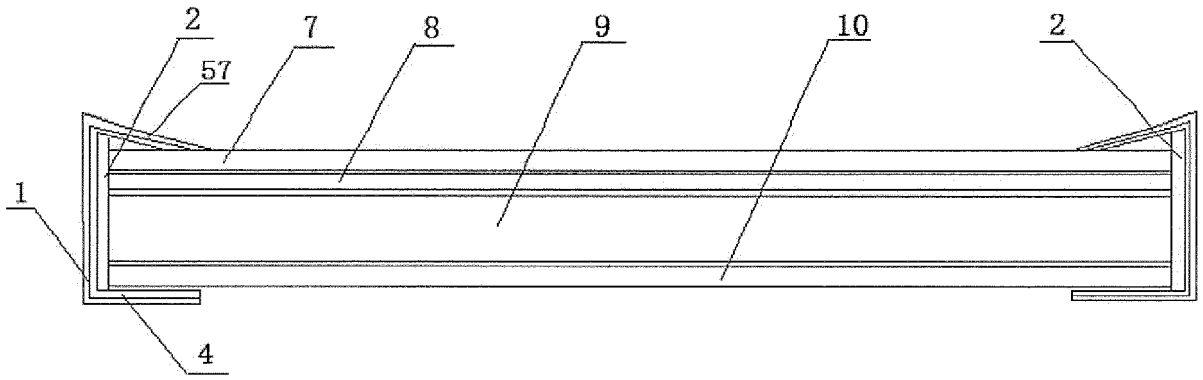

Fig. 20

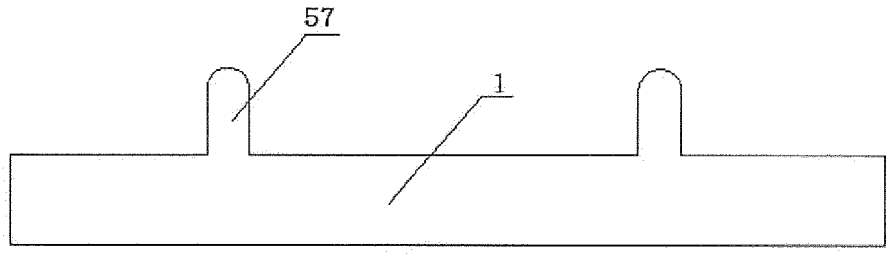

Fig. 21

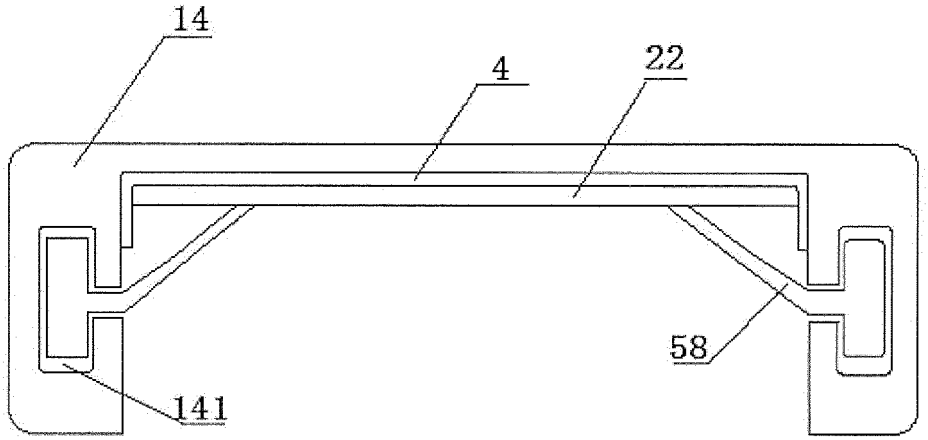

Fig. 22

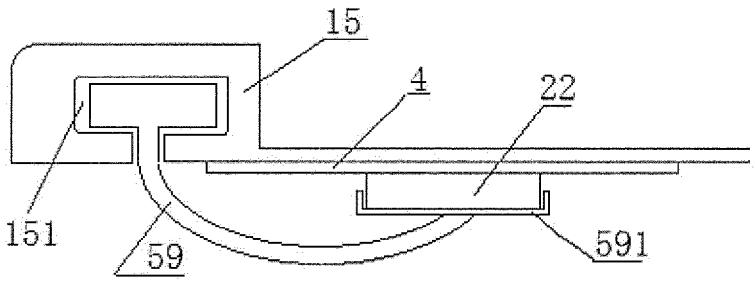

Fig. 23

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/088428

A. CLASSIFICATION OF SUBJECT MATTER

F21S 2/00 (2006.01) i; F21V 19/00 (2006.01) i; F21V 25/00 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F21/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CNPAT, CNKI: electric leakage, "C", creepage, security, safe

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	CN 203442509 U (GINKGO ELECTRIC (ZHEJIANG) LIMITED), 19 February 2014 (19.02.2014), claims	1-25
X	CN 202253230 U (XUCHANG AOSHIDA AUTOMATION EQUIPMENT CO., LTD. et al.), 30 May 2012 (30.05.2012), description, paragraphs [0005]-[0017], and figure 1	1-25
X	CN 202302875 U (LI, Dong), 04 July 2012 (04.07.2012), description, paragraphs [0019]-[0026], and figures 1-4	1-25
X	CN 202791419 U (ZHONGSHAN CITY HENGCHEN PHOTOELECTRIC ICS CO., LTD.), 13 March 2013 (13.03.2013), description, paragraph [0016], and figures 1-6	1-25
A	CN 201803177 U (FUJIANXIANGYUN PHOTOELECTRIC TECHNOLOGY CO., LTD.), 20 April 2011 (20.04.2011), the whole document	1-25
A	WO 2010124379 A1 (SHAN, Xinxin), 04 November 2010 (04.11.2010), the whole document	1-25

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 April 2014 (16.04.2014)	**23 April 2014 (23.04.2014)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **XU, Min** Telephone No.: (86-10) **62085763**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/088428

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 203442509 U	19 February 2014	None	
CN 202253230 U	30 May 2012	None	
CN 202302875 U	04 July 2012	None	
CN 202791419 U	13 March 2013	None	
CN 201803177 U	20 April 2011	None	
WO 2010124379 A1	04 November 2010	US 2010277917 A1	04 November 2010
		CA 2701931 A1	01 November 2010

Form PCT/ISA/210 (patent family annex) (July 2009)