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- QIN, Shuyi
201203 Shanghai (CN)
- GAO, Honglei
201203 Shanghai (CN)
- FANG, Min
201203 Shanghai (CN)
- SHUAI, Junwei
201203 Shanghai (CN)

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(71) Applicant: **GE Lighting Solutions, LLC**
East Cleveland, OH 44112 (US)

(72) Inventors:
• **LONG, Qi**
201203 Shanghai (CN)

(74) Representative: **Cleary, Fidelma**
GPO Europe
GE International Inc.
The Ark
201 Talgarth Road
Hammersmith
London W6 8BJ (GB)

(54) **LED LIGHTING APPARATUS**

(57) The present invention relates to an LED lighting apparatus. The apparatus comprises a shell (11), an LED light emitting unit (12), a driving circuit module (13), and a protecting device (14). The protecting device (14) covers over the driving circuit module (13) and forms an enclosed space together with the shell (11). The LED light emitting unit (12) and the driving circuit module (13) are fixed on a bottom pad (111) of the shell (11). The LED light emitting unit (12) is positioned on one side or two sides of the driving circuit module (13). The protecting device (14) covers the driving circuit module (13) and an electrical connecting portion (123) of the LED light emitting unit (12). The protecting device (14) of the present invention may cover the driving circuit module (13) and the electrical connecting portion (123) of the LED light emitting unit (12) simultaneously, playing a role of protection. Thus, components inside the lighting are reduced and the cost is lowered, thus making an interior of the lighting more concise, reducing shelters, and improving an illumination efficiency of the LED lighting apparatus.

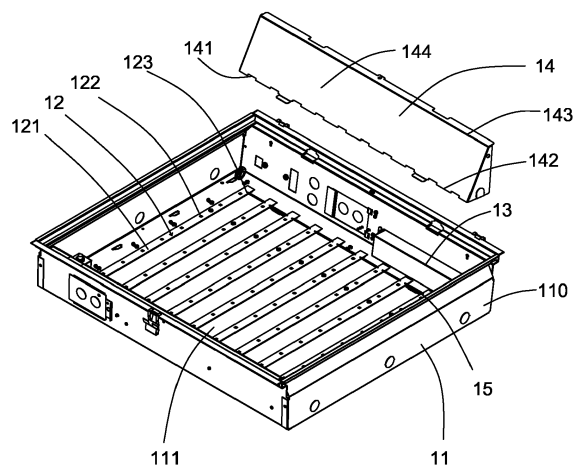


Fig.3a

Description

FIELD

[0001] The present invention relates to an LED lighting apparatus, particularly to a protecting device within an LED lighting apparatus.

BACKGROUND

[0002] As a new light source, an LED light source has developed rapidly in recent years. Various kinds of LED lighting apparatuses have emerged on the market, however, the prices of the LED lighting apparatuses are still higher compared with common lightings, which affects its popularization. Inside an LED lighting apparatus, there are a plurality of LEDs fixed on a circuit board, which are driven via a connection with a driving circuit module. The power lines, the driving circuit module and the circuit board of the LED make up a circuit portion of the LED lighting apparatus. For sake of safety, for lightings above type CLASS1, the electrical conductive portion of the LED light emitting unit and the driving circuit module both need to be covered by a protecting device, for avoiding contact from misoperation and for leakage protection. In the prior art, the two parts are always covered by protecting devices respectively, however, the cost will be increased in this way, and meanwhile excessive components inside the lighting will affect its appearance and influence the illumination efficiency.

SUMMARY

[0003] The present invention is to provide an LED lighting apparatus with a simple structure and a relatively lower cost.

[0004] The LED lighting apparatus of the present invention comprises a shell, an LED light emitting unit, a driving circuit module and a protecting device. The shell comprises a bottom pad and a frame. The LED light emitting unit has an electrical connecting portion at an end thereof. The driving circuit module is connected to the electrical connecting portion of the LED light emitting unit to drive the LED light emitting unit. The protecting device is mounted within the shell and covers the driving circuit module and the electrical connecting portion of the LED light emitting unit.

[0005] Furthermore, the LED light emitting unit in the present invention comprises a strip-shaped circuit board and at least one LED mounted on the circuit board, and electrical connecting portions of the LED light emitting units are connected by welding wires or connecting circuit boards, plugging connectors and the like.

[0006] Furthermore, the driving circuit module in the present invention supplies an output voltage of 150V to said LED light emitting units.

[0007] Furthermore, the material of the protecting device in the present invention is electrical conductive metal

material. Said device is connected with a protecting wire (generally ground wire). In case of leakage, the current will be directed to the ground through the protecting device, which ensures safety of human and lighting.

[0008] According to one embodiment of the present invention, the shell in the present invention comprises a bottom pad and a frame, the LED light emitting units being mounted on the bottom pad of the shell. The protecting device is cover-shaped, which comprises a pad-shaped main body, a first side and a second side. The first side of the protecting device is connected with the bottom pad of the shell, and the second side of the protecting device is connected with an inside of the frame of the shell. The protecting device together with the shell form an enclosed space having a polygon or sector cross-section, and the driving circuit module is enclosed within said enclosed space.

[0009] Furthermore, in the present invention, the first side of the main body of the protecting device is provided with several openings, each opening having a size corresponding to widths of the LED light emitting units such that the opening engages with a corresponding light emitting unit when the protecting device is mounted on the shell.

[0010] According to another embodiment of the present invention, the shell in the present invention comprises a bottom pad and a frame. Said protecting device comprises a main body, a first side and a second side. The first side and the second side of the protecting device are both connected with the bottom pad of the shell. The protecting device together with the shell form an enclosed space having a polygon or sector cross-section, and the driving circuit module is enclosed within said enclosed space.

[0011] Moreover, in the present invention, the LED light emitting units and the driving circuit module are mounted on the bottom pad of the shell. The LED light emitting units are divided into two groups, the driving circuit module being mounted between the two groups of LED light emitting units. The electrical connecting portions of the LED light emitting units and the driving circuit module are all enclosed in said enclosed space.

[0012] The protecting device in the present invention also covers an emergency power supply module mounted within the shell close to the driving circuit module, and the emergency power supply module comprises a battery.

[0013] The present invention combines the protecting device inside the LED lighting apparatus and the protecting device of the electrical connecting portion of the LED light emitting unit into one, allowing both of them being protected while achieving the objective of fixing the LED light emitting unit. In this way, components inside the lighting are reduced and the cost is lowered, thus making an interior of the lighting more concise and reducing shelters, improving an illumination efficiency of the LED lighting apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The present disclosure can be better understood in light of description of embodiments of the present disclosure with reference to the accompanying drawings, in which:

Fig. 1 illustrates a perspective view of an LED lighting apparatus of Embodiment 1 of the present invention;

Fig. 2 illustrates another perspective view of the LED lighting apparatus shown in Fig. 1, in which the lampshade is opened to show the internal structure of the LED lighting apparatus;

Fig. 3a illustrates another perspective view of the LED lighting apparatus shown in Fig. 1, in which the protecting device is moved out of the shell;

Fig. 3b illustrates another angle view of the LED lighting apparatus shown in Fig. 3a;

Fig. 4 illustrates a perspective view of Embodiment 2 of the present invention.

DETAILED DESCRIPTION

[0015] Unless defined otherwise, the technical or scientific terms used herein should have the same meanings as commonly understood by one of ordinary skilled in the art to which the present invention belongs. The terms "a", "an" and the like used in the Description and Claims of the present application for invention do not denote a limitation of quantity either, but denote the existence of at least one. The terms "comprises", "comprising", "includes", "including" and the like mean that the element or object in front of the "comprises", "comprising", "includes" and "including" covers the elements or objects and their equivalents illustrated following the "comprises", "comprising", "includes" and "including", but do not exclude other elements or objects. The term "coupled" or "connected" or the like is not limited to being connected physically or mechanically, but may comprise electric connection, no matter directly or indirectly.

Embodiment 1

[0016] The LED lighting apparatus of the present embodiment is an LED flat lighting, which may be embedded into a ceiling for indoor and outdoor illustration and decoration. Referring to Fig. 1 to Fig. 3b, the LED lighting apparatus of Embodiment 1 comprises a shell 11 with an opening on one surface, one flat-plate-shaped lampshade 10 mounted to the opening of the shell 11, and light emitting units 12, a protecting device 14 and a driving device 13 mounted within the shell 11.

[0017] Referring to Fig. 2, the material of the shell 11 is aluminum alloy, whose rectangular frame 110 is

formed by connecting four wallboards, and whose bottom is a flat bottom pad 111, with screw holes being reserved that may be used to fixedly mount the LED light emitting units 12.

[0018] The lampshade 10 is composed of a translucent flat plate and a frame. The frame of the lampshade 10 have four slots that may be fixed on the opening side of the shell.

[0019] Referring to Fig. 3a, the LED light emitting unit 12 is bar-shaped, comprising a strip-shaped circuit board 121 and a plurality of independent LEDs mounted on the circuit board 121. There is an electrical connecting portion 123 on an end of the circuit board 121. The electrical connecting portion 123 may be a pad, a contact, a connector or other conductive member. Ten bar-shaped LED light emitting units 12 are fixed on the bottom pad 111 of the shell by screws side by side. The electrical connecting portions 123 of the LED light emitting units 12 are connected with each other by welding wires 124, and may also be connected by a printed circuit board or a flexible circuit board or connectors. An output terminal of the driving circuit module 13 is connected with the wires or the circuit board or the connectors, to ensure connectivity of the driving circuit.

[0020] The voltage input to an input terminal of the driving circuit module 13 is 220V AC mains, with the output being 150V DC, which belongs to lighting of type Class1. For the lighting of type Class1, for sake of safety, a protecting device made of metal material is needed to cover the charged parts thereof. The LED light emitting units 12 and the driving circuit module 13 are both charged parts, which thus must be covered by a protecting device made of metal material.

[0021] Referring to Fig. 3b, the protecting device 14 made of iron is cover-shaped, which comprises a pad-shaped main body 144, a first side 142, and a second side 143. There are ten openings 141 on the first side 142. The width of the opening 141 may allow the end of the LED light emitting unit 12 to pass. Referring to Fig. 2, the protecting device 14 covers over the driving circuit module 13. The first side 142 of the protecting device is connected to the bottom pad 111 of the shell, and the second side 143 of the protecting device is connected to an inside of the frame of the shell. The protecting device together with the shell form an enclosed space having a triangle cross-section, and the driving circuit module is enclosed within said enclosed space. The protecting device 14 fastens the end of the LED light emitting unit 12 such that the electrical connecting portion at the end (i.e., portion having pads) and wires that are connected with each other are located within the enclosed space composed of the protecting device 14 and the shell 11, so that the charged parts cannot be touched externally, which can achieve the function of isolation protection. The opening 141 of the protecting device 14 just engages with one end of the LED light emitting unit 12, achieving the function of fixing the LED light emitting unit 12.

[0022] Furthermore, an emergency power supply mod-

ule may be mounted on another side of the shell 11, the emergency power supply module comprising a battery and a driving circuit. The protecting device 14 also together with the shell 11 form an enclosed space for covering the emergency power supply module, to satisfy the requirement of safety.

Embodiment 2

[0023] Fig. 4 is another exemplary embodiment of the present invention. Another kind of flat LED lighting apparatus is concerned. The LED light emitting units 12 and the driving circuit 13 of the lighting are fixed on the bottom pad 111 of the shell. The LED light emitting units 12 are divided into two groups, which are fixed on the two sides of the driving circuit module 13 respectively. The protecting device comprises a main body 144, a first side 142 and a second side 143. The first side 142 and the second side 143 are also fixed on the bottom pad 111 of the shell. the first side 142 and the second side 143 of the protecting device 14 each have ten openings. The protecting device 14 and the shell 11 form an enclosed space that covers the driving circuit module 13 and the electrical connecting portions 123 of the LED light emitting units 12 and the wires 124 that are connected with each other, which plays a role of protecting the driving circuit module 13 and the LED light emitting units 12, as well as fixing the LED light emitting units 12.

[0024] Although the present invention has been set forth in combination with specific embodiments, the person skilled in the art shall be understood that many modifications and variations may be made to the present invention. Therefore, it should be recognized that the intention of the claims is to cover all these modifications and variations within the real concept and range of the present invention.

Claims

1. An LED lighting apparatus, comprising: a shell (11); at least one LED light emitting unit (12) shaped in a bar, said LED light emitting unit (12) comprising an electrical connecting portion (123); a driving circuit module (13) being connected to said electrical connecting portion (123) for providing electrical power to said LED light emitting unit (12); a protecting device (14) being mounted inside the shell (11), the protecting device (14) covering the driving circuit module (13) and the electrical connecting portion (123) of the LED light emitting unit (12).
2. The LED lighting apparatus of Claim 1, wherein said LED light emitting unit (12) comprises a strip-shaped circuit board (121) and at least one LED mounted on said circuit board (121), said electrical connecting portion (123) being arranged on an end of the circuit

board (121).

3. The LED lighting apparatus of Claim 2, wherein said LED light emitting units (12) comprise a plurality of LED light emitting units (12), the electrical connecting portions (123) of the LED light emitting units (12) being connected through wires (124) or connectors or connecting circuit boards.
4. The LED lighting apparatus of Claim 3, wherein said driving circuit module (13) supplies an output voltage of 150V to said LED light emitting units (12).
5. The LED lighting apparatus of Claim 4, wherein said protecting device (14) is made of electrical conductive metal material.
6. The LED lighting apparatus of Claim 5, wherein said shell (11) comprises a bottom pad (111) and a frame (110), the LED light emitting units (12) being mounted on the bottom pad of the shell (11), wherein said protecting device (14) is cover-shaped, which comprises a pad-shaped main body (144), a first side (142), and a second side (143), the first side (142) of the protecting device (14) being connected with the bottom pad (111) of the shell (11), the second side (143) of the protecting device (14) being connected with an inside of the frame (110) of the shell (11), the protecting device (14) together with the shell (11) forming an enclosed space having a polygon or sector cross-section, the driving circuit module (13) being enclosed within said enclosed space.
7. The LED lighting apparatus of Claim 6, wherein the first side (142) of the main body (144) of said protecting device (14) is provided with several openings (141), each opening (141) having a size corresponding to widths of the LED light emitting units (12) such that the opening (141) engages with a corresponding light emitting unit (12) when the protecting device (14) is mounted on the shell (11).
8. The LED lighting apparatus of Claim 5, wherein said shell (11) comprises a bottom pad (111) and a frame (110), said protecting device (14) comprises a main body (144), a first side (142), and a second side (143), the first side (142) and the second side (143) of the protecting device (14) being both connected with the bottom pad (111) of the shell (11), the protecting device (14) together with the shell (11) forming an enclosed space having a polygon or sector cross-section, the driving circuit module (13) being enclosed within said enclosed space.
9. The LED lighting apparatus of Claim 8, wherein the LED light emitting units (12) and the driving circuit module (13) are mounted on the bottom pad (111) of the shell (11), the LED light emitting units (12)

being divided into two groups, the driving circuit module (13) being mounted between the two groups of LED light emitting units (12), the electrical connecting portions of the LED light emitting units (12) and the driving circuit module (13) being all enclosed in said enclosed space. 5

10. The LED lighting apparatus of anyone of Claims 1 to 9, wherein said protecting device (14) covers an emergency power supply module mounted within the shell (11) close to the driving circuit module (13), the emergency power supply module comprising a battery. 10

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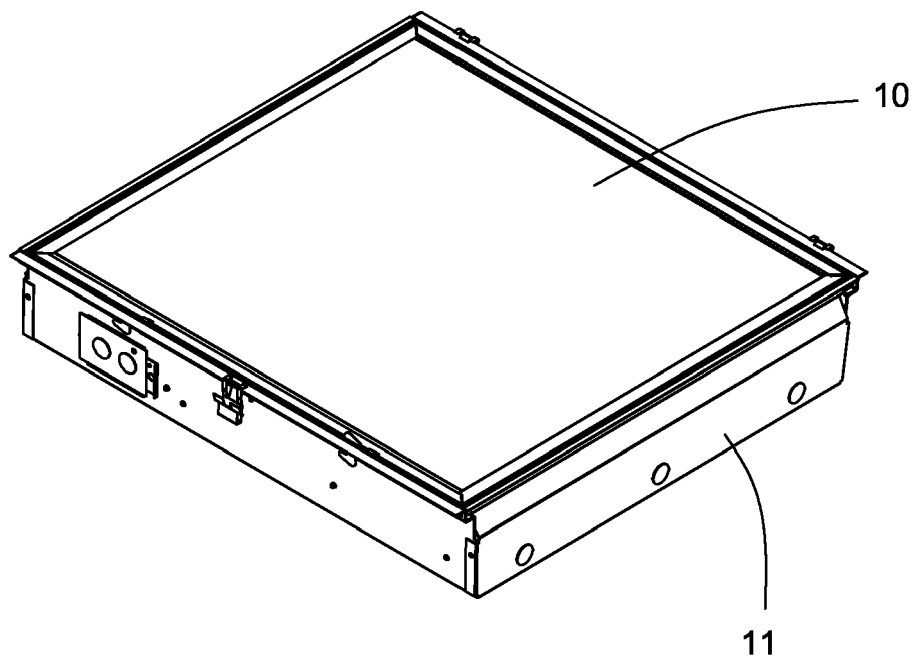


Fig.1

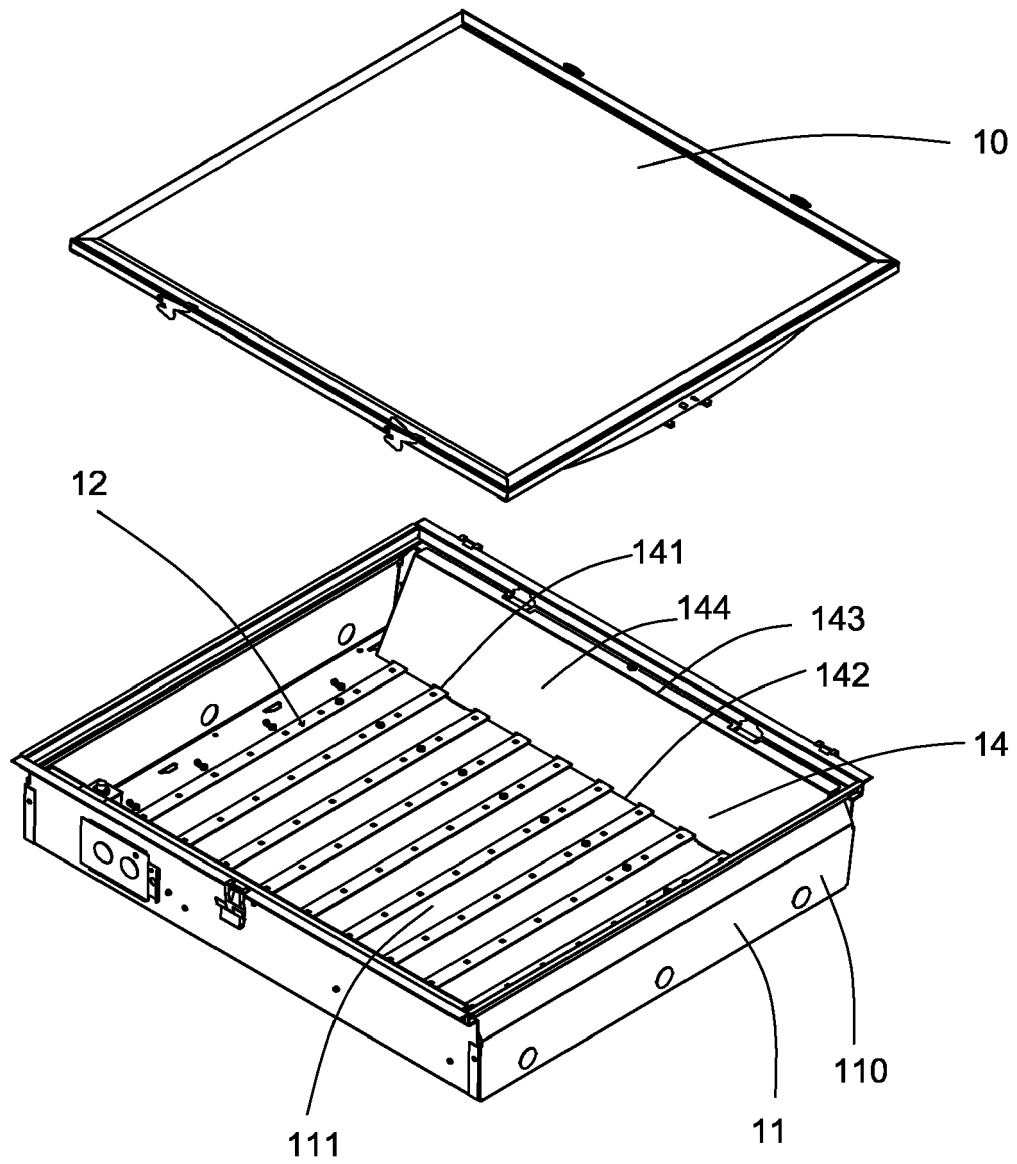


Fig.2

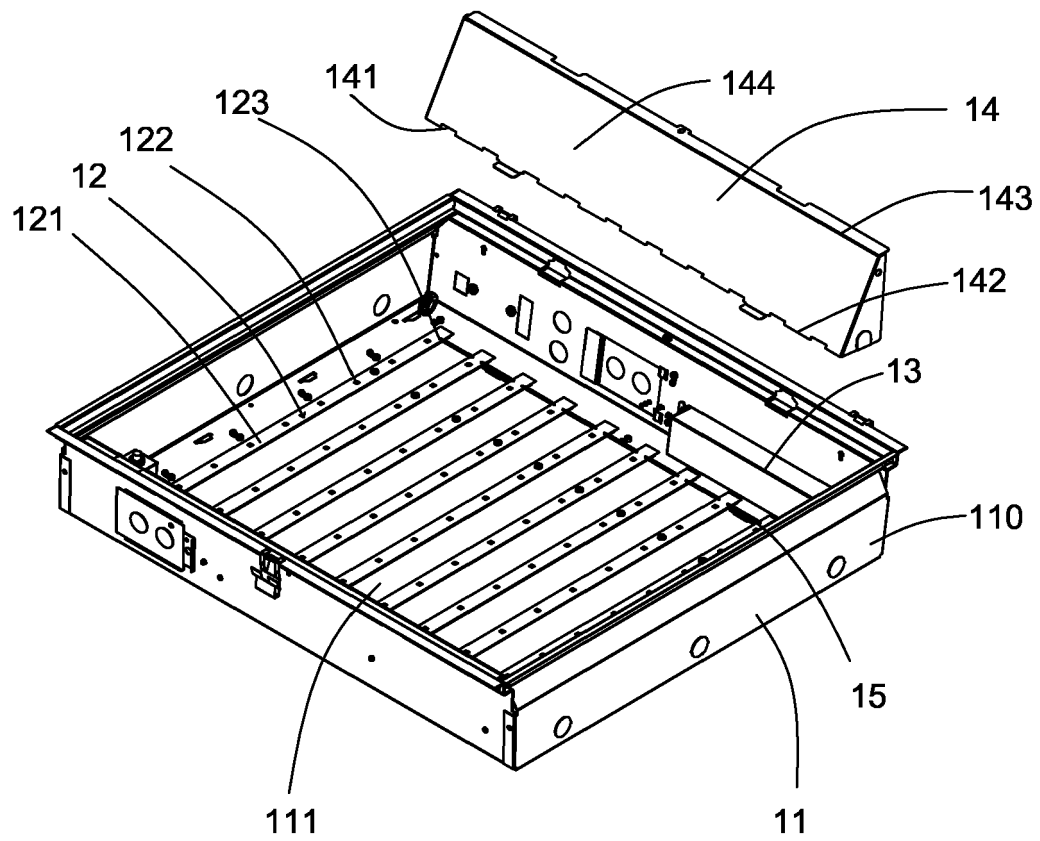


Fig.3a

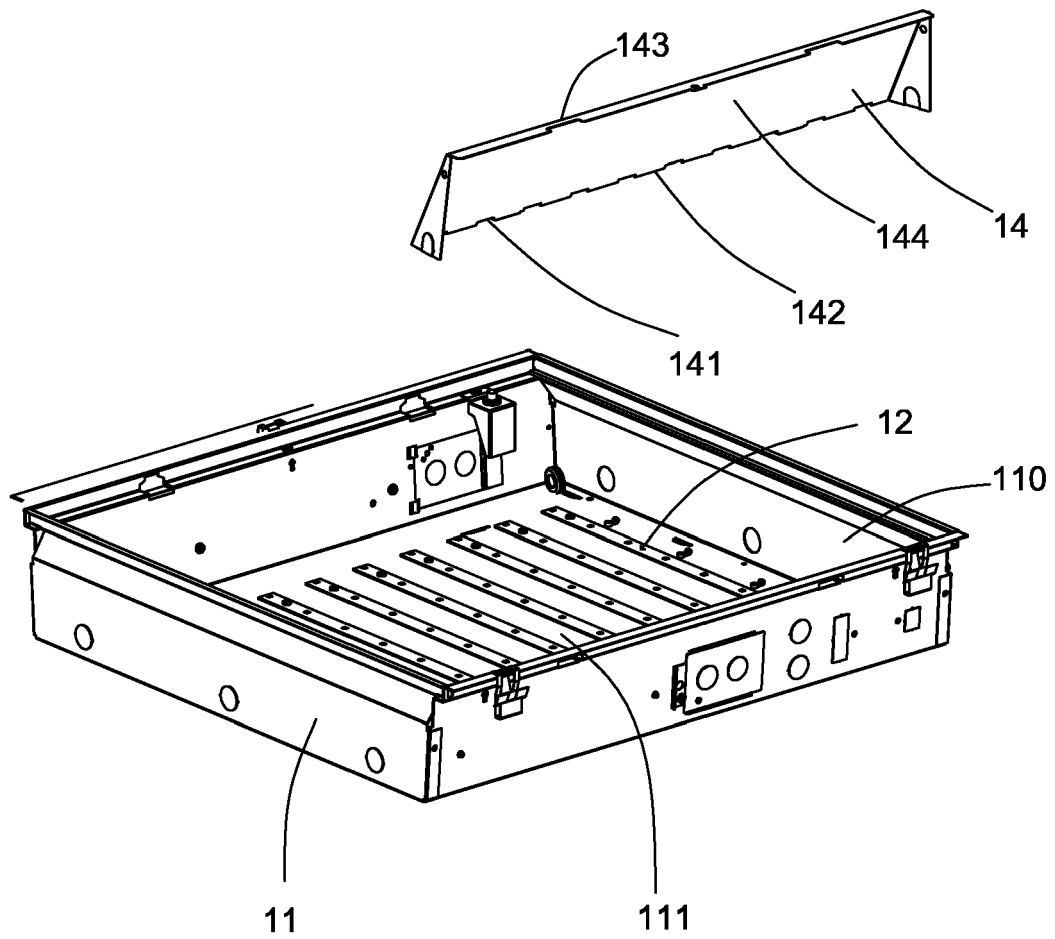


Fig.3b

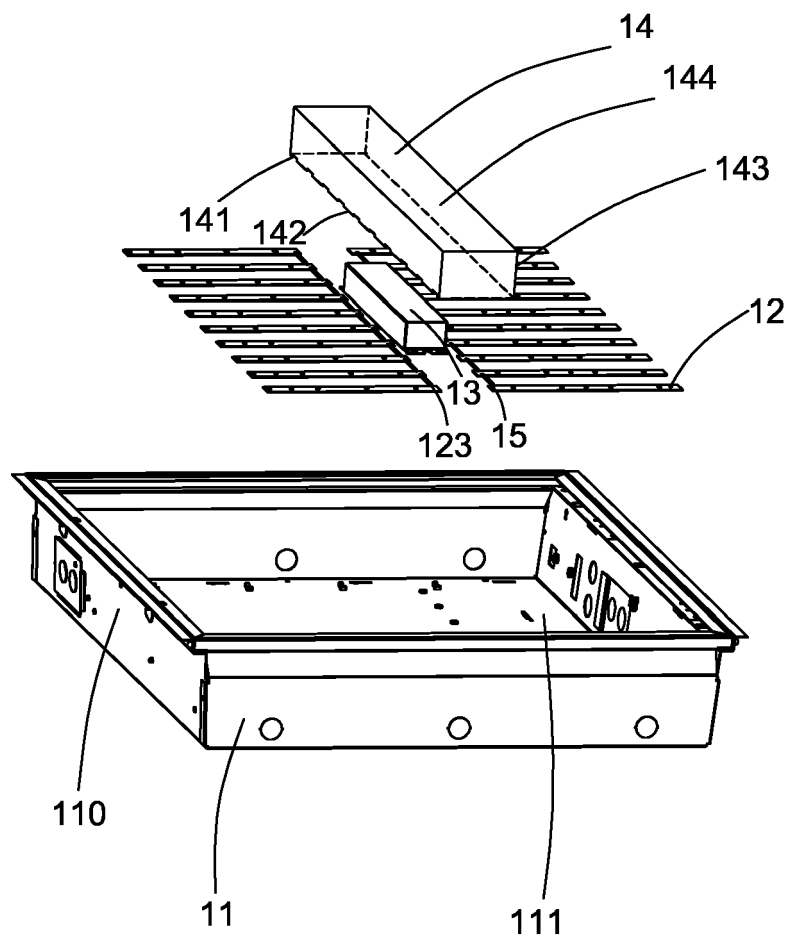


Fig.4



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Application Number
EP 15 19 8191

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