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## (54) Modular lighting device

(57) The lighting device includes a support structure (100) and a plurality of lighting modules (200, 200'). The support structure (100) is a substantially U-shaped frame (110) whose open side is extended with a pair of rails (120, 130). Each of the lighting modules (200, 200') includes a heat dissipation base (210) connecting the rails (120, 130), an LED assembly (220) mounted on the heat dissipation base (210) and fins (230) fixed on the heat dissipation base (210). Each of the fins (230) is provided with an indent (231) for accommodating the rail (120, 130).

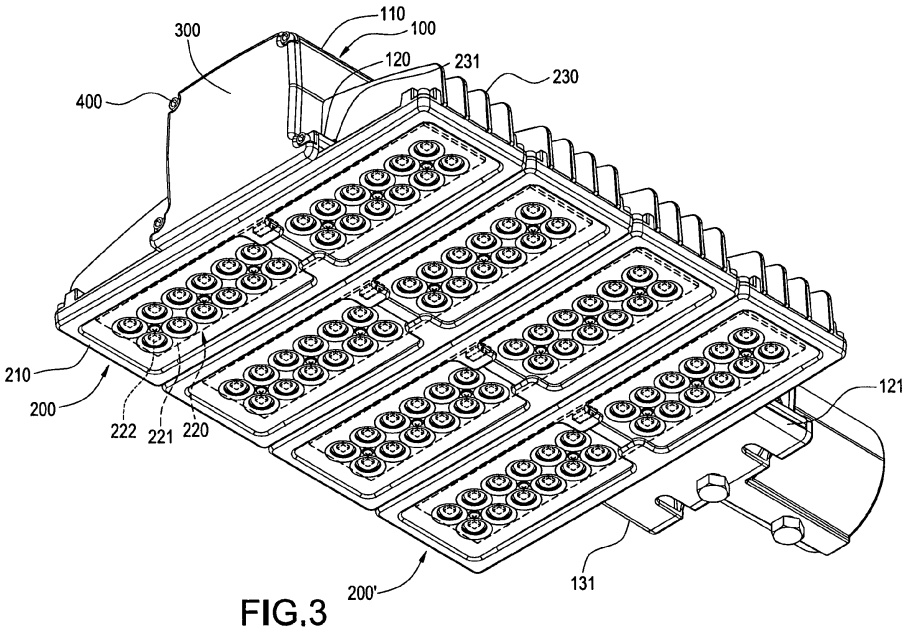


FIG.3

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## Description

### BACKGROUND OF THE INVENTION

#### Technical Field

**[0001]** The invention generally relates to lighting apparatuses, particularly to modularized lighting apparatuses.

#### Related art

**[0002]** Fluorescent lamps are popularly adopted as a light source. The fluorescent lamps use a current discharging in argon to generate ultraviolet rays. The ultraviolet rays are transformed into visible light by phosphorus coated on glass tube. When a fluorescent lamp becomes gradually decrepit, its intensity of illumination will fade away. Also, mercury contained in fluorescent lamps is harmful to our bodies and environment. Accordingly, light emitting diode (LED) lighting devices have been replacing conventional fluorescent lamps because of consideration of environmental protection and power-saving. The LEDs have many advantages such as small volume, low power consumption, low generation of heat, long durability and quick response.

**[0003]** A conventional LED lamp includes a casing, a transparent cover mounted on the casing, a separator board between the casing and transparent cover and an LED module disposed on the separator board. The LED module includes a circuit board a heat sink and a plurality of LEDs. However, the LED module is fixed in the casing so that quantity of the LED module cannot be changed. In other words, the conventional LED lamp cannot satisfy various requirements. Manufactures of the LED lamp must provide many different models of productions in the market. It is so uneconomical.

### SUMMARY OF THE INVENTION

**[0004]** An object of the invention is to provide a modularized lighting device which can be variably assembled according to practical necessity.

**[0005]** To accomplish the above object, the lighting device of the invention includes a support structure and a plurality of lighting modules. The support structure is a substantially U-shaped frame whose open side is extended with a pair of rails. Each of the lighting modules includes a heat dissipation base connecting the rails, an LED assembly mounted on the heat dissipation base and fins fixed on the heat dissipation base. Each of the fins is provided with an indent for accommodating the rail.

**[0006]** By the modularized arrangement, the quantity of the lighting modules can be varied to become different models of productions. The models with more lighting modules can provide higher intensity of illumination and the models with less lighting modules can reduce power-consumption. Besides, the lighting modules are modularized and interchangeable so that the manufacturing and inventory costs can be effectively reduced. The lighting modules mounted on the rails also can enhance overall strength of the lamp.

### BRIEF DESCRIPTION OF THE DRAWINGS

**[0007]**

FIG. 1 is an exploded perspective view of the invention;
FIG. 2 is an assembled perspective view of the invention;
FIG. 3 is FIG. 2 at another point of view;
FIG. 4 is a cross-sectional view of the invention;
FIG. 5 shows an embodiment with less lighting modules;
FIG. 6 shows an embodiment with more lighting modules;
FIG. 7 is an exploded perspective view of the second embodiment of the invention;
FIG. 8 is a cross-sectional view of the second embodiment shown in FIG. 7;
FIG. 9 is an assembled perspective view of the third embodiment of the invention;
FIG. 10 shows an embodiment with multiple series of lighting modules;
FIG. 11 shows an embodiment with a tube connected to the seat;
FIG. 12 shows an embodiment with a pivotal connection between the seat and U-shaped frame; and
FIG. 13 shows an embodiment with a hood.

### DETAILED DESCRIPTION OF THE INVENTION

**[0008]** Please refer to FIGs. 1-4, which illustrate the modularized lighting device according to the invention. The modularized lighting device includes a support structure 100, a plurality of lighting modules 200, a cover 300 and a plurality of fasteners 400.

**[0009]** The support structure 100 includes a hollow frame 110' and a pair of rails 120, 130. The hollow frame 110' is a substantially U-shaped frame 110. Electrical components such as a transformer and power cord can be accommodated in the U-shaped frame 110. The pair of rails 120, 130 separately outwards extend from the open end on the bottom side of the U-shaped frame 110. Additionally, a plurality of grooves 140 are separately provided at the closed end of the U-shaped frame 110 and rails 120, 130.

**[0010]** The lighting modules 200 are mounted on the support structure 100 in a row. Each of the lighting modules 200 includes a heat dissipation base 210, an LED assembly 220 and fins 230.

**[0011]** The heat dissipation base 210 connects to the bottom of the rails 120, 130. The heat dissipation base 210 is made of material with good thermo-conductivity, such as, but not limited to, copper or aluminum.

**[0012]** The LED assembly 220 is mounted on the bottom of the heat dissipation base 210.

**[0013]** The LED assembly 220 is provided with a circuit board 221 mounted on the heat dissipation base 210 and LEDs 222 mounted on the circuit board 221. A thermoconductive media may be applied between the circuit board 221 and heat dissipation base 210 for increase efficiency of heat dissipation.

**[0014]** The fins 230 are fixed on both sides of the heat dissipation base 210 to fasten the U-shaped frame 110 therebetween. The fins 230 are fixed on the heat dissipation base 210 by welding or integratedly forming process. The fins 230 are made of material with good thermoconductivity such as copper or aluminum. Each of the fins 230 is provided with an indent 231 for accommodating one of the rails 120, 130.

**[0015]** The heat dissipation base 210 may additionally be fixed to the rails 120, 130 by fasteners 400. The heat dissipation base 210 also can be positioned. The fasteners 400 may be screws or adhesive.

**[0016]** The cover 300 seals up one end of the U-shaped frame 110. The cover 300 is provided with through holes 310 separately corresponding to the grooves 140. The fasteners 400 separately penetrate the through holes 310 to screw into the grooves 140 for fastening the cover 300 on the front end of the support structure 100.

**[0017]** The rear ends of the rails 120, 130 are formed with extended portions 121, 131. When the lighting modules 200 are arranged on the U-shaped frame 110 in a row, the rearmost one of the lighting modules 200 will be blocked by the extended portions 121, 131. And the series of lighting modules 200 are clamped between the cover 300 and the extended portions 121, 131.

**[0018]** Additionally, the invention further includes a plurality of lighting modules 200' which are the same as the lighting modules 200.

**[0019]** Please refer to FIGs. 5 and 6. The quantity of the lighting modules 200 may be changed according to practical needs. In other words, the lighting modules 200 may increase or decrease in number. The invention may serve as a street lamp.

**[0020]** Please refer to FIGs. 7 and 8. The lighting device of the invention may be preferably provided with a pair of shields 500, each of which is composed of a shade 510 and a rod 520. One side of the shade 510 is embedded into the groove 140 atop the U-shaped frame 110. The other side of the shade 510 is supported by the rod 520 fixed on the heat dissipation base 210. The shields 500 may prevent the fins 230 from being wetted by rains or covered by dusts.

**[0021]** Please refer to FIG. 9. The invention may serve as a wash wall light. The support structure further includes a seat 150 and a pivot 160. The U-shaped frame 110 is provided with a pivot hole 111 for accommodating the pivot 160 so that the U-shpaed frame 110 can rotate against the seat 150.

**[0022]** Please refer to FIG.10. Plural series of lighting modules 200 can be parallelly arranged in columns. The invention further includes one or more connecting boards 600 for transversely connecting a plurality of support structure 100 and a mount 700 for transversely connecting a plurality of seats 150.

**[0023]** Please refer to FIG. 11. The support structure 100 may further include a tube 170 connected to the seat 150. A hole 151 is provided in the seat 150 for accommodating a power cord in the U-shaped frame 110.

**[0024]** Please refer to FIG. 12. The seat 150 may be pivotally connected to the U-shaped frame 110. A pivot portion is disposed atop the U-shaped frame 110. The pivot hole 111 is just in the pivot portion and passed through by the pivot 160.

**[0025]** Please refer to FIG. 13. The invention further includes a hood 800 covering the support structure 100, lighting modules 200 and shields 500 with exposing the LED assembly 220. In this embodiment, the pivot hole 111 is disposed in the hood 800 so that the hood 800 can rotate against the seat 150.

**[0026]** Those skilled in the art will appreciate that numerous changes and modifications can be made to the preferred embodiments of the invention, and that such changes and modifications can be made without departing from the spirit of the invention.

## Claims

1. A modularized lighting device comprising:

   a support structure (100), being a substantially U-shaped frame (110) whose open side is extended with a pair of rails (120, 130); and
   a plurality of lighting modules (200, 200') mounted on the support structure (100) in series, wherein each of the lighting modules (200, 200') further comprises a heat dissipation base (210) connecting the rails (120, 130), a light emitting diode (LED) assembly (220) mounted on the heat dissipation base (210) and fins (230) fixed on the heat dissipation base (210), and each of the fins (230) is provided with an indent (231) for accommodating one of the rails (120, 130).

2. The modularized lighting device of claim 1, further comprising a cover (300) sealing up one end of the U-shaped frame (110), fasteners (400), through holes (310) provided in the cover and a plurality of grooves (140) separately provided at a closed end of the U-shaped frame (110) and rails (120, 130), wherein the through holes (310) separately corresponds to the grooves (140), the fasteners (400) separately penetrate the through holes (310) to screw into the grooves (140).

3. The modularized lighting device of claim 1, wherein the LED assembly (220) comprises a circuit board

(221) mounted on the heat dissipation base (210) and LEDs (222) mounted on the circuit board (221).

**4.** The modularized lighting device of claim 1, wherein each of the rails (120, 130) is formed with an extended portion (121, 131) for blocking the heat dissipation base (210).

**5.** The modularized lighting device of claim 1, further comprising a pair of shields (500), wherein each of the shields (500) comprises a shade (510) and a rod (520), one side of the shade (510) connects to the U-shaped frame (110), and the other side of the shade (510) is supported by the rod (520).

**6.** The modularized lighting device of claim 1, wherein the support structure further comprises a seat (150) and a pivot (160) connecting to the seat (150), and the U-shaped frame (110) is provided with a pivot hole (111) for accommodating the pivot (160).

**7.** The modularized lighting device of claim 6, wherein the support structure further comprises a tube (170) connecting to the seat (150), and the seat (150) is provided with a hole (151) communicating with the tube (170).

**8.** The modularized lighting device of claim 6, further comprising an another support structure (100), one or more connecting boards (600) transversely connecting the two support structure (100) and a mount (700) transversely connecting the seat (150).

**9.** The modularized lighting device of claim 1, further comprising a hood (800) covering the support structure (100) and the lighting modules (200, 200').

**10.** The modularized lighting device of claim 9, wherein the support structure further comprises a seat (150) and a pivot (160) connecting to the seat (150), and the hood (800) is provided with a pivot hole (111) for accommodating the pivot (160).

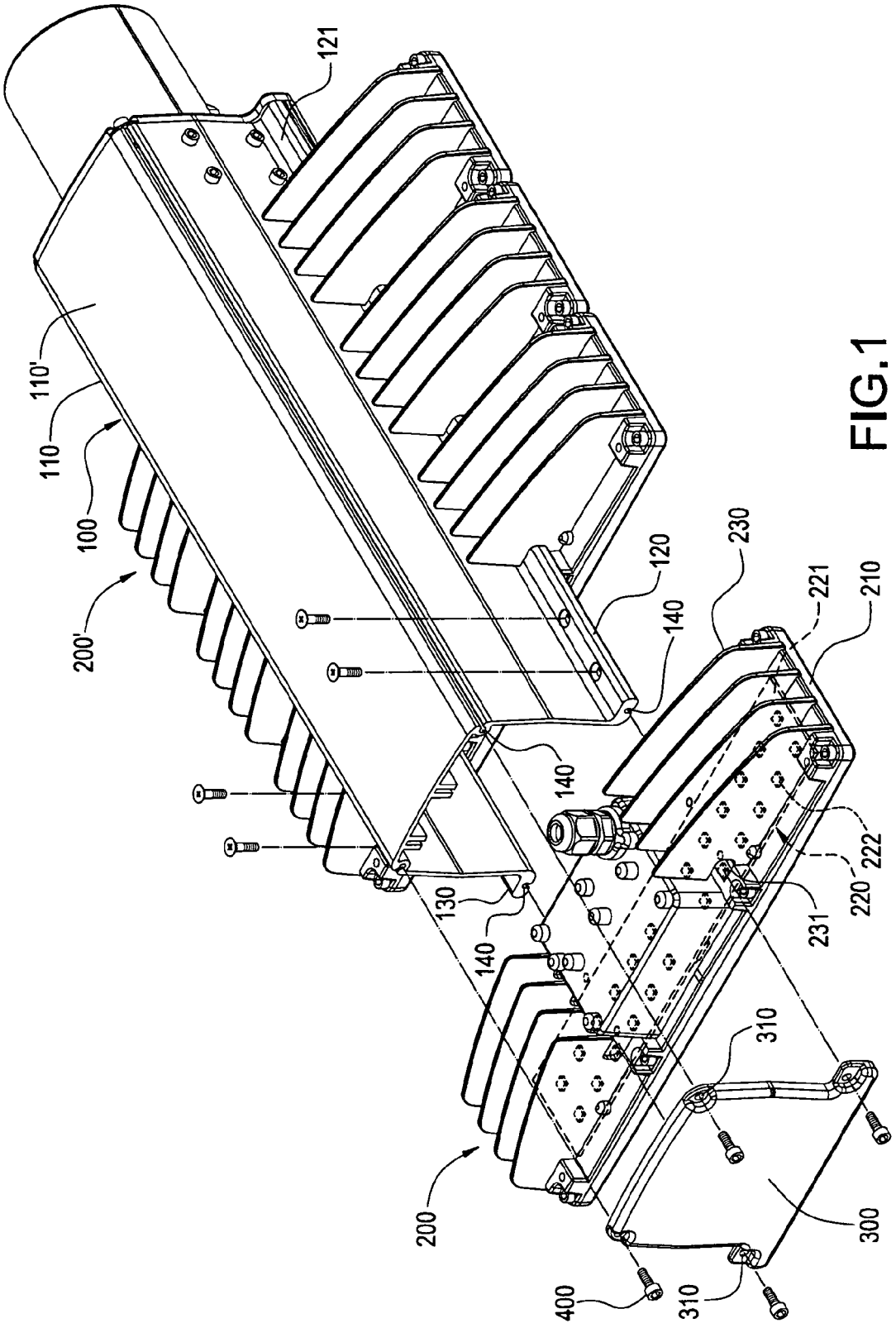
121
110'
110
100
200'
120
230
221
210
140
140
222
220
231
130
140
310
200
300
400
310

FIG.1

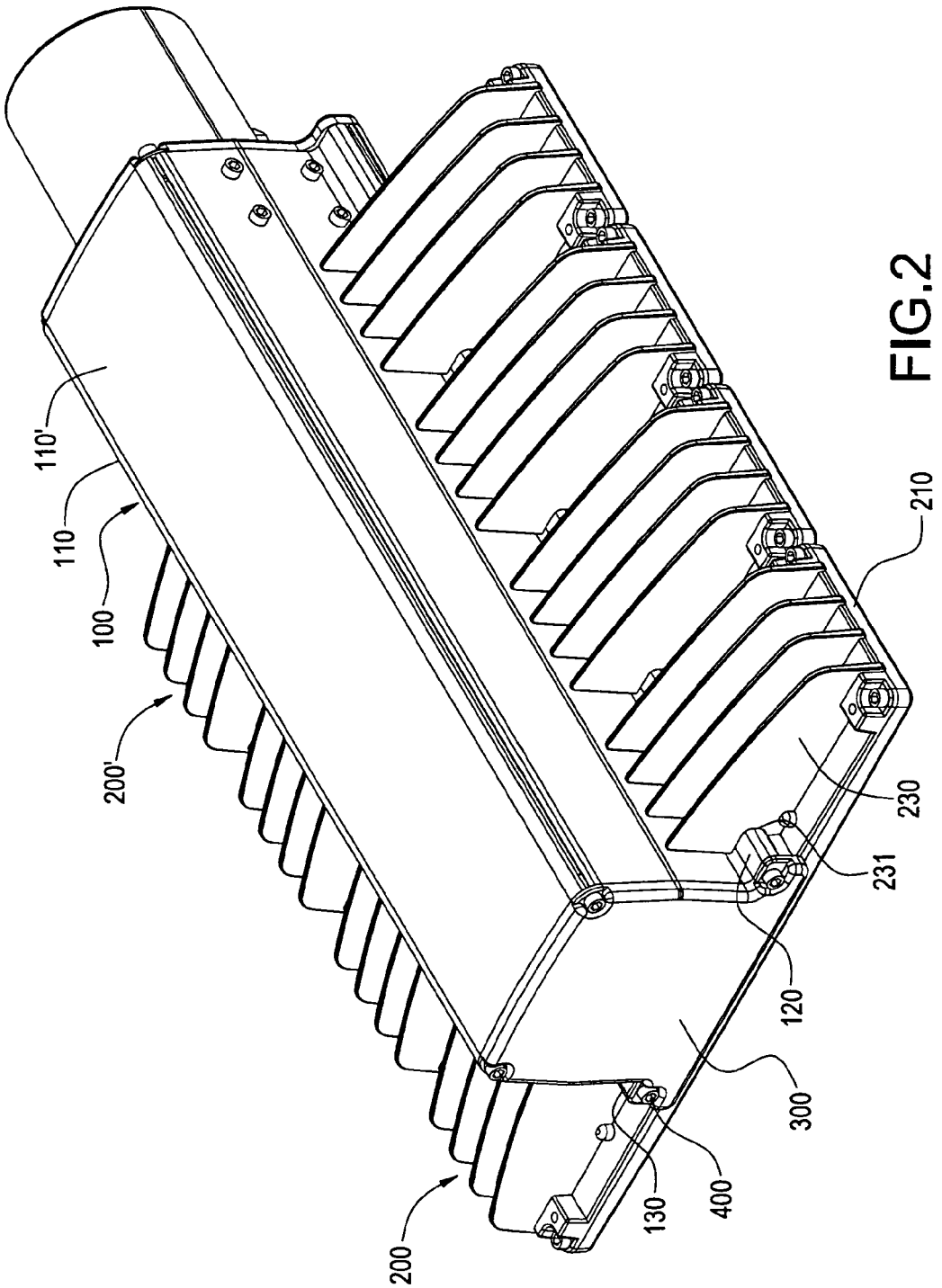


FIG.2

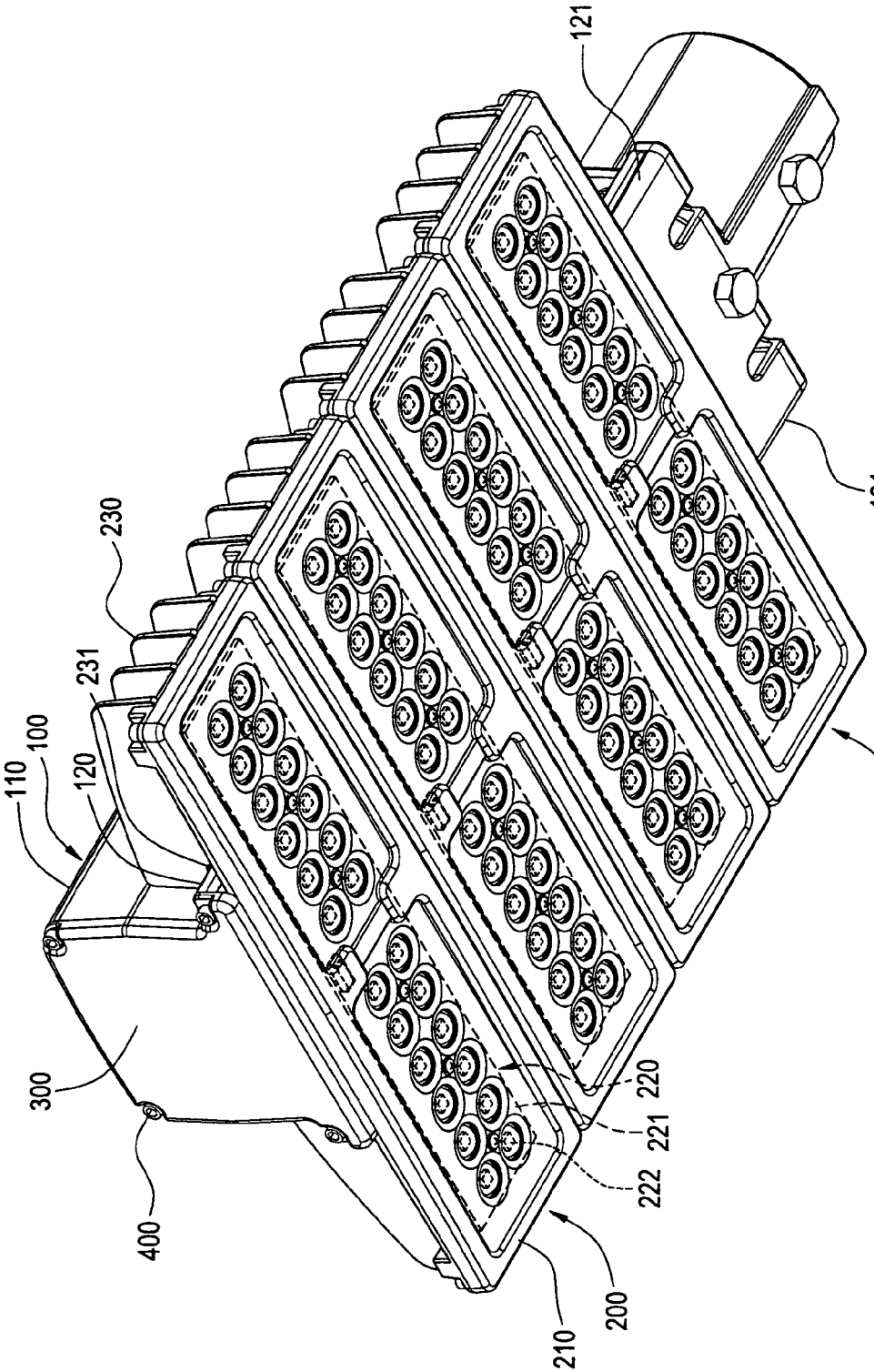


FIG.3

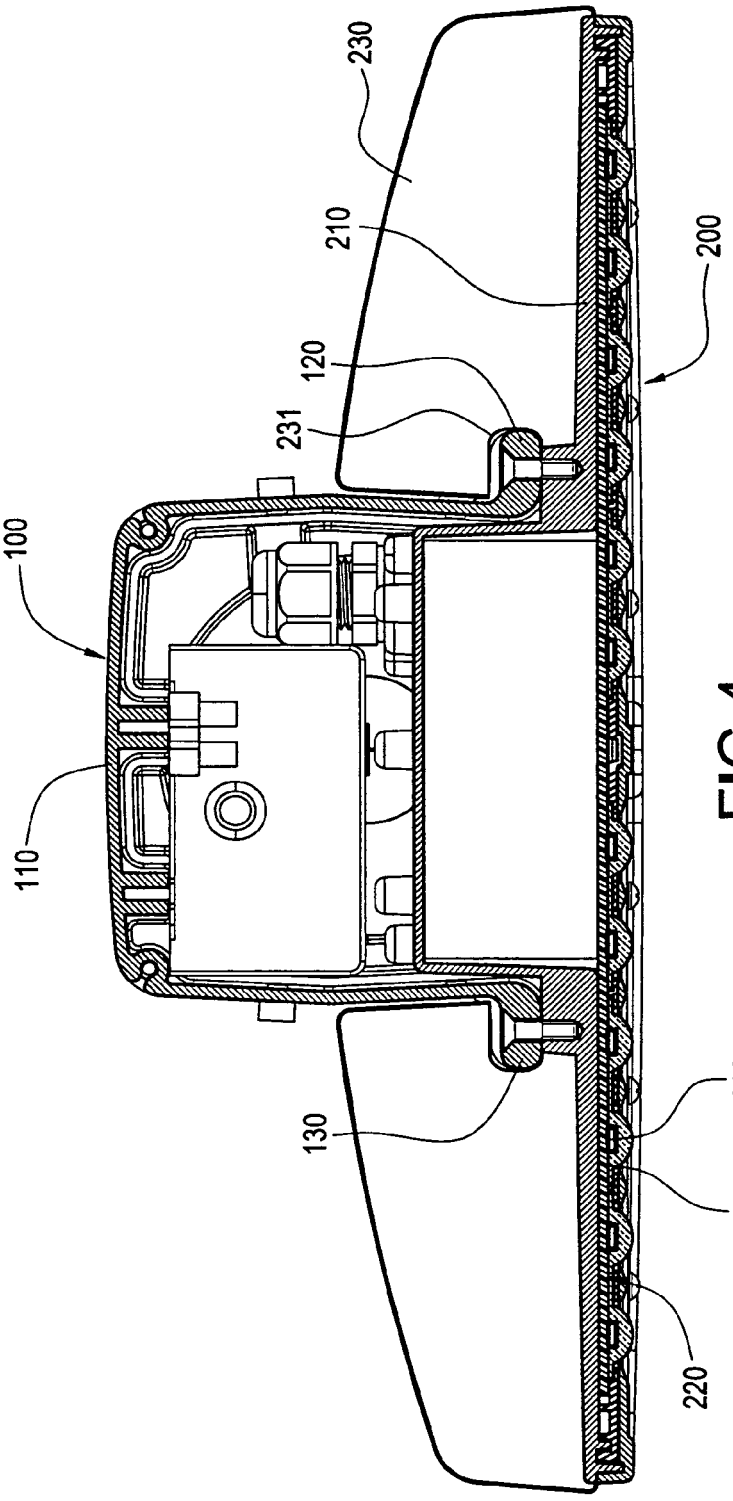


FIG.4

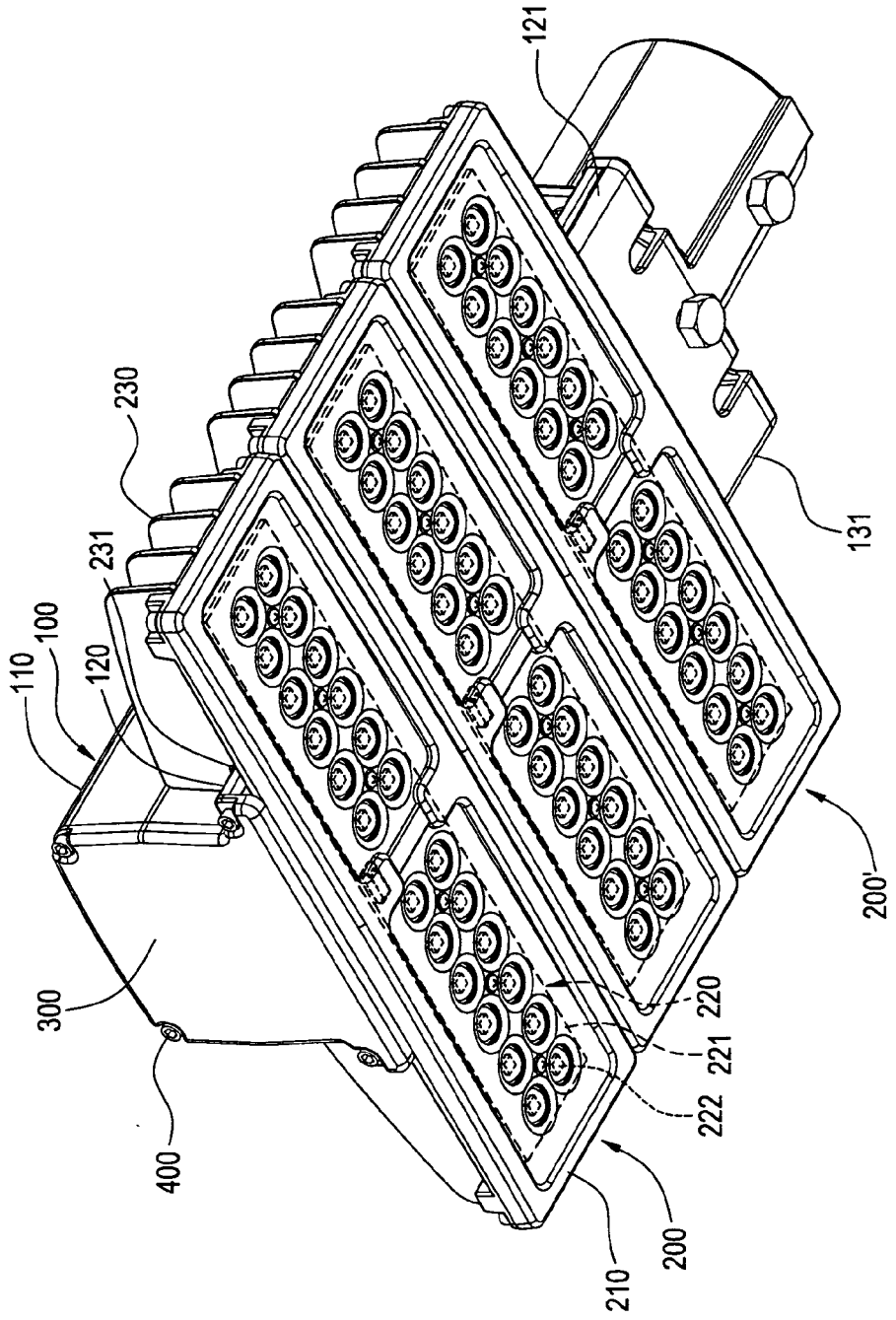


FIG.5

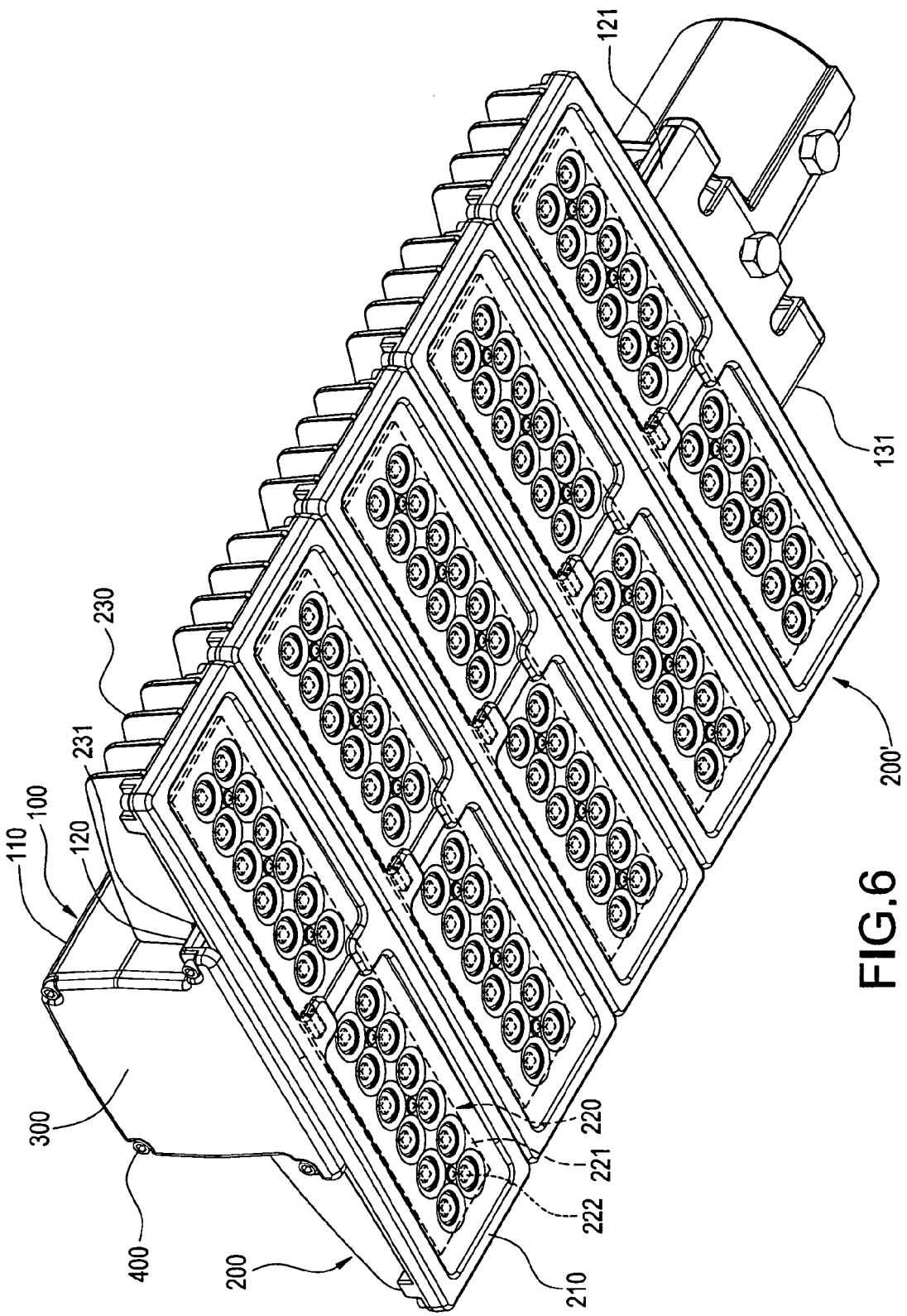


FIG.6

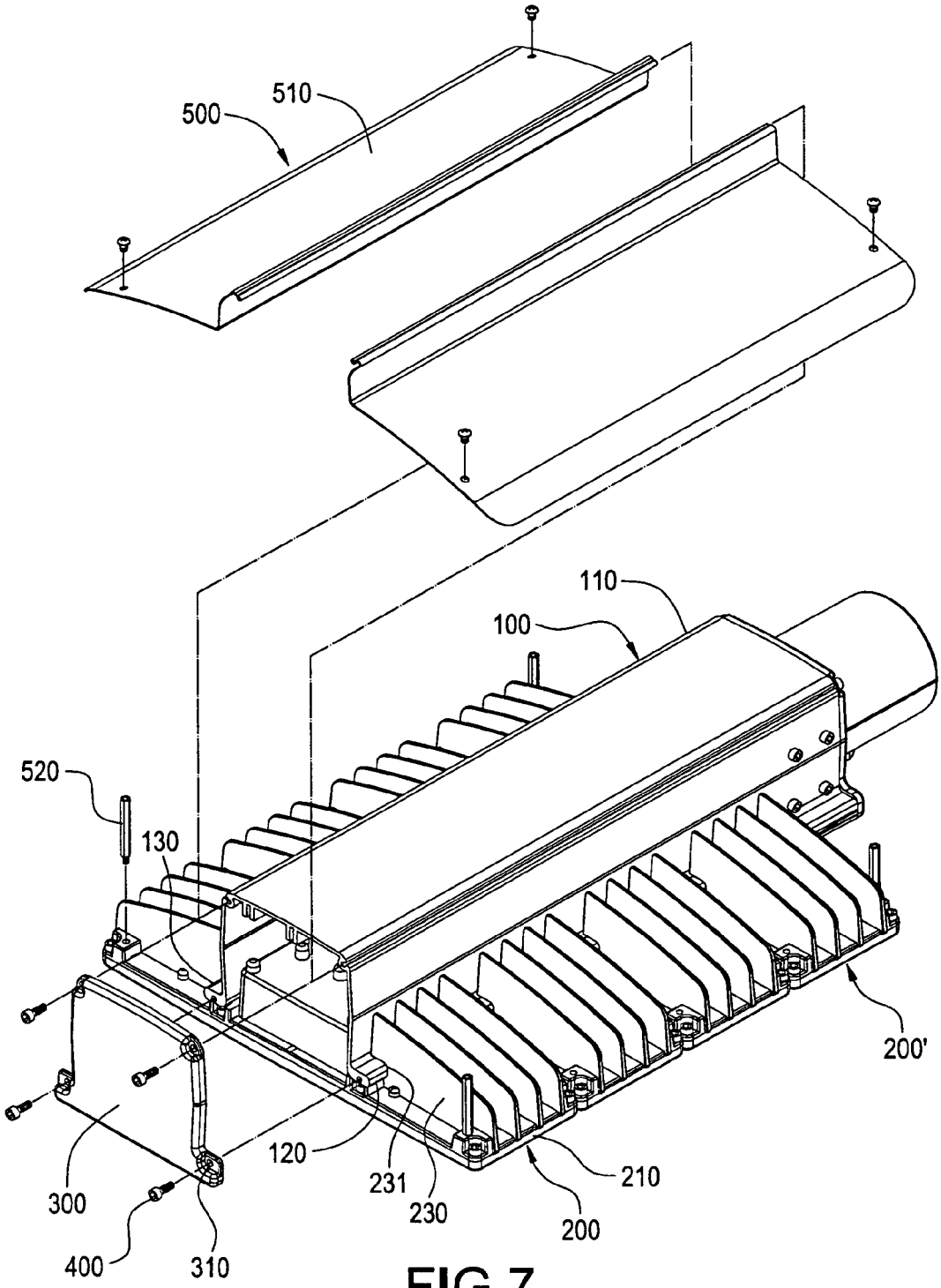


FIG.7

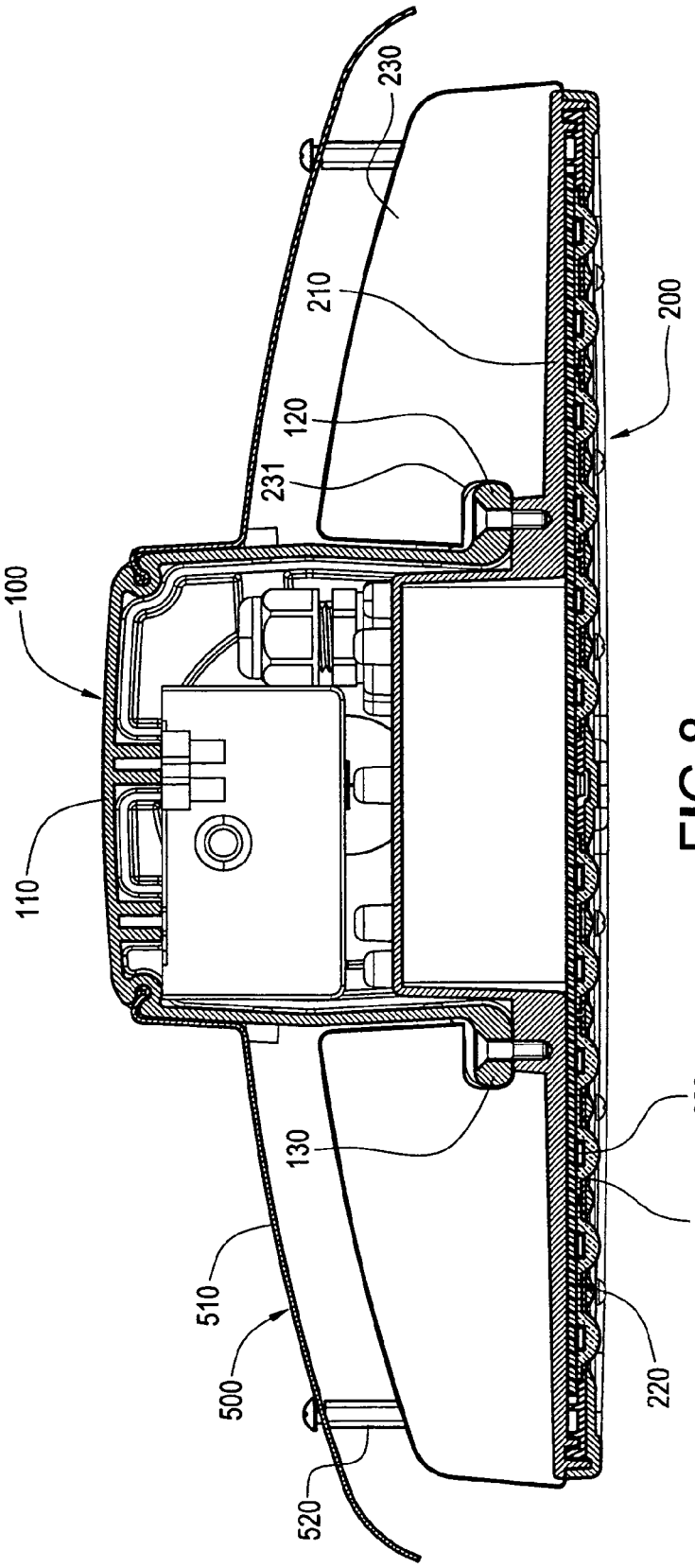


FIG.8

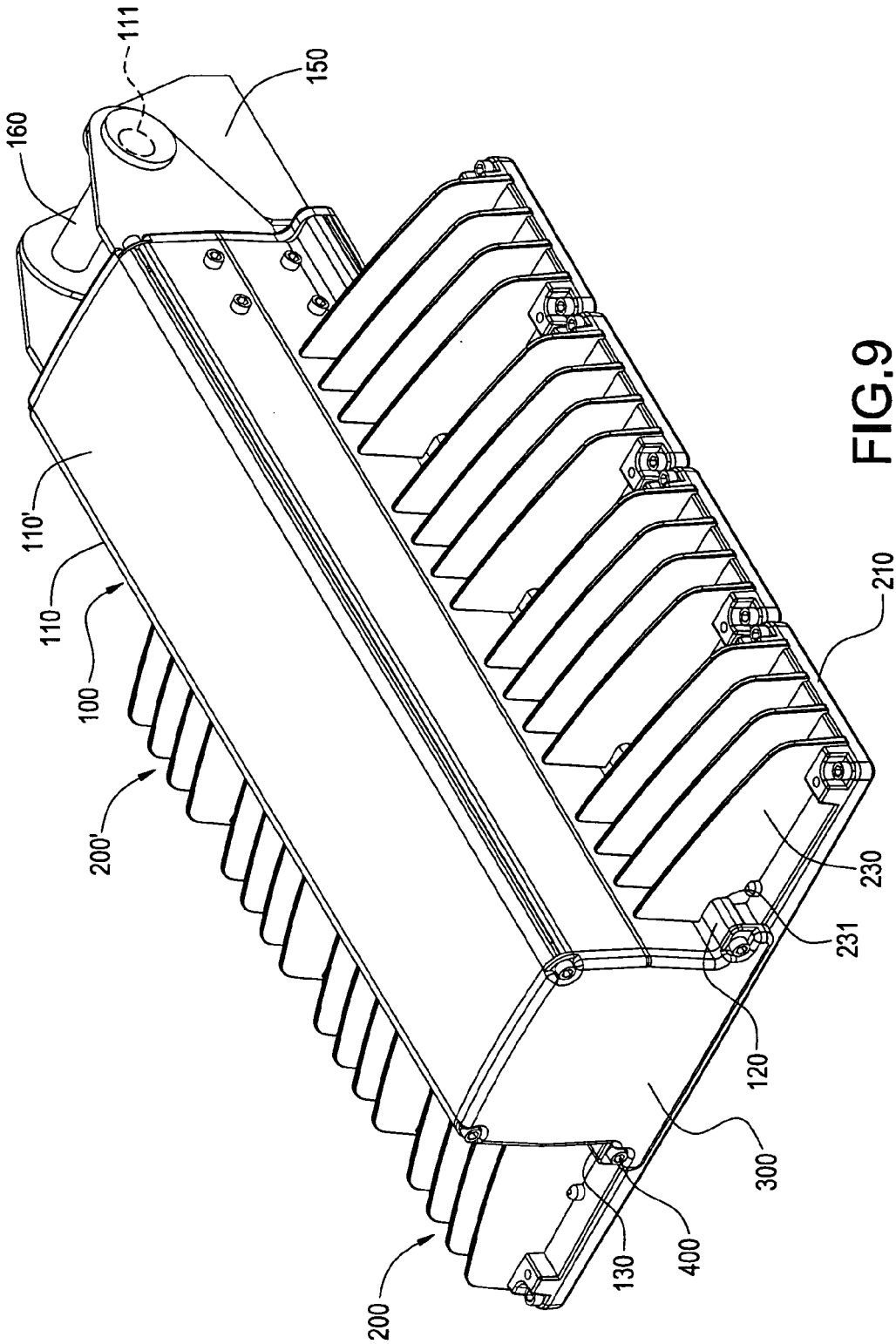


FIG.9

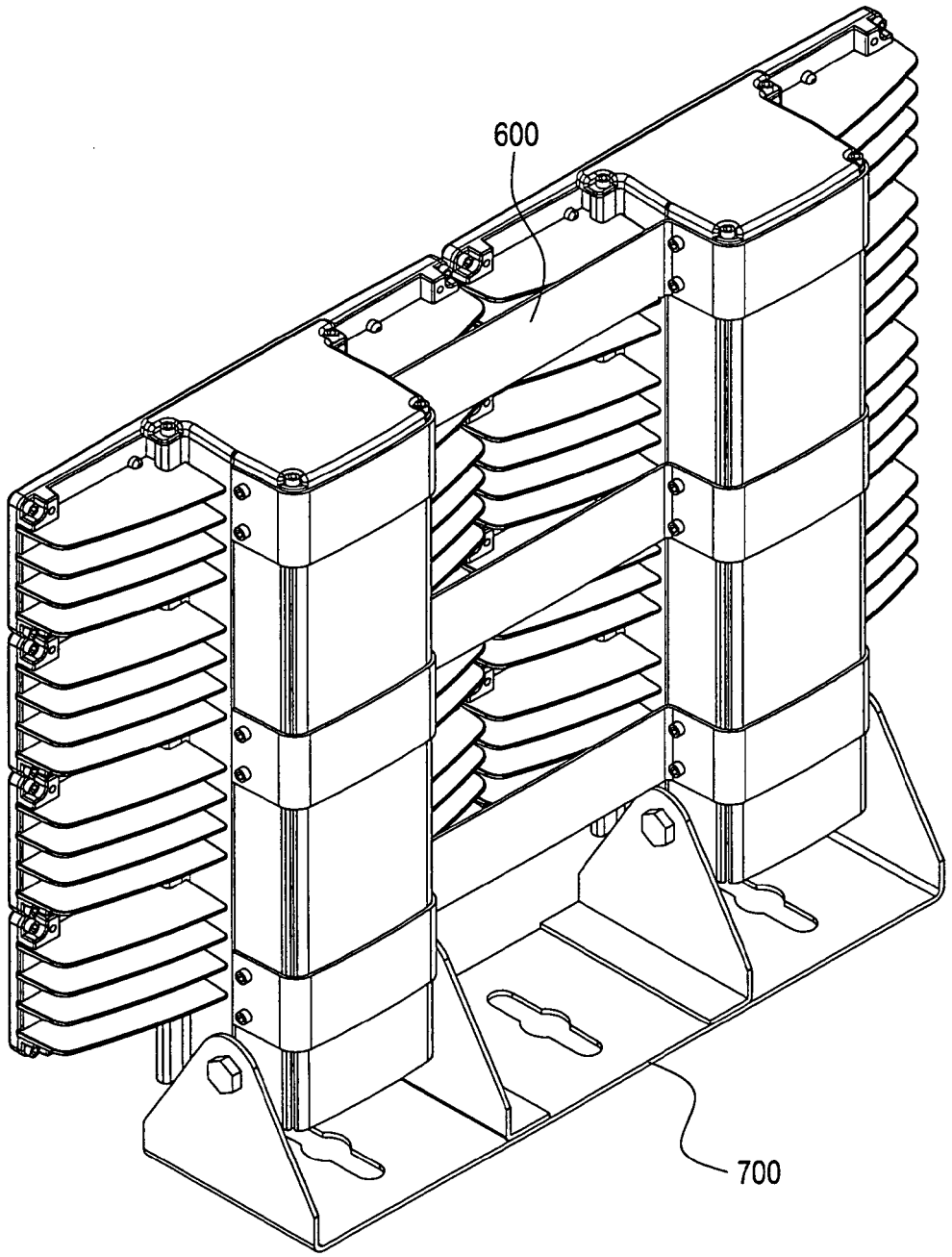


FIG.10

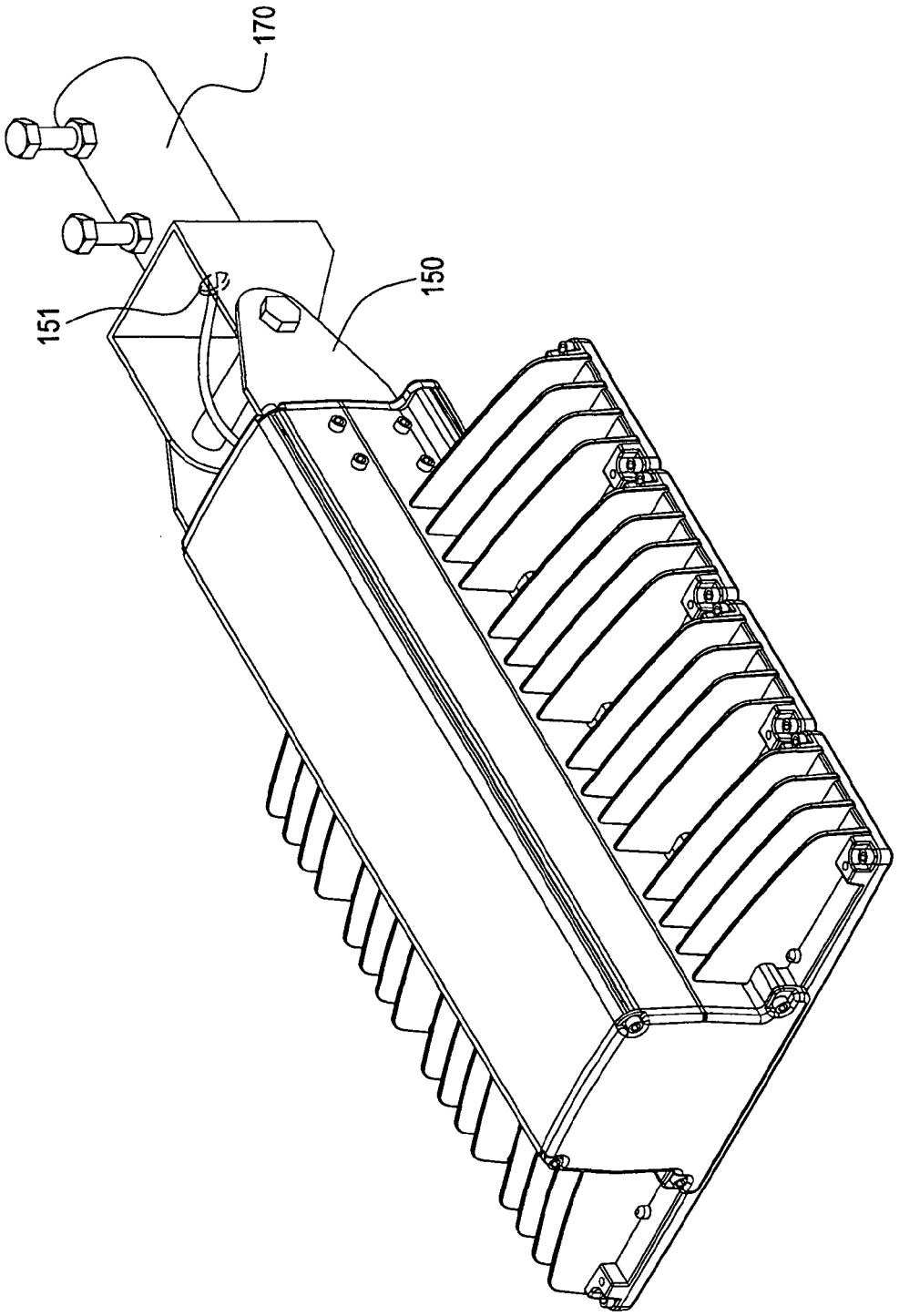


FIG.11

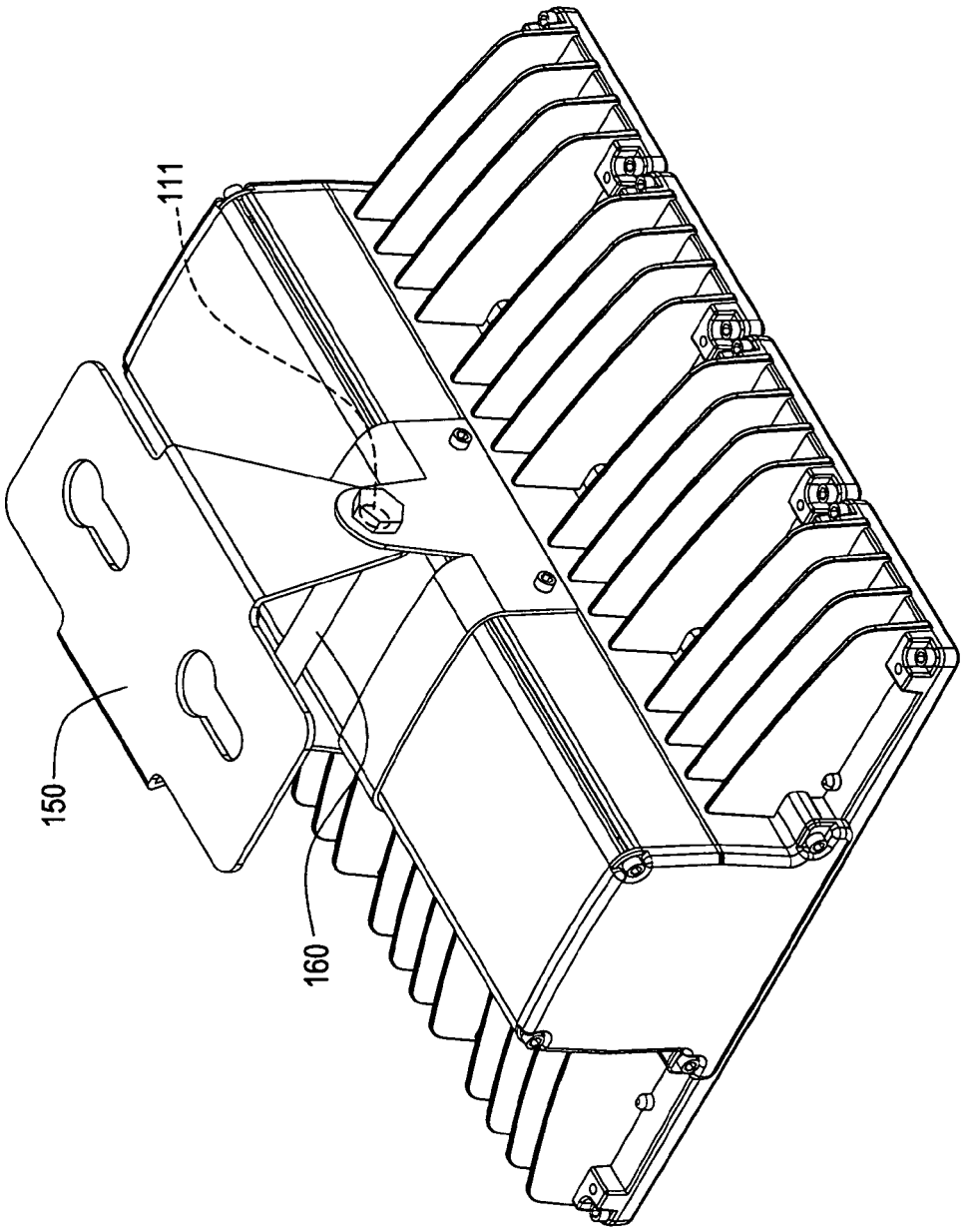


FIG.12

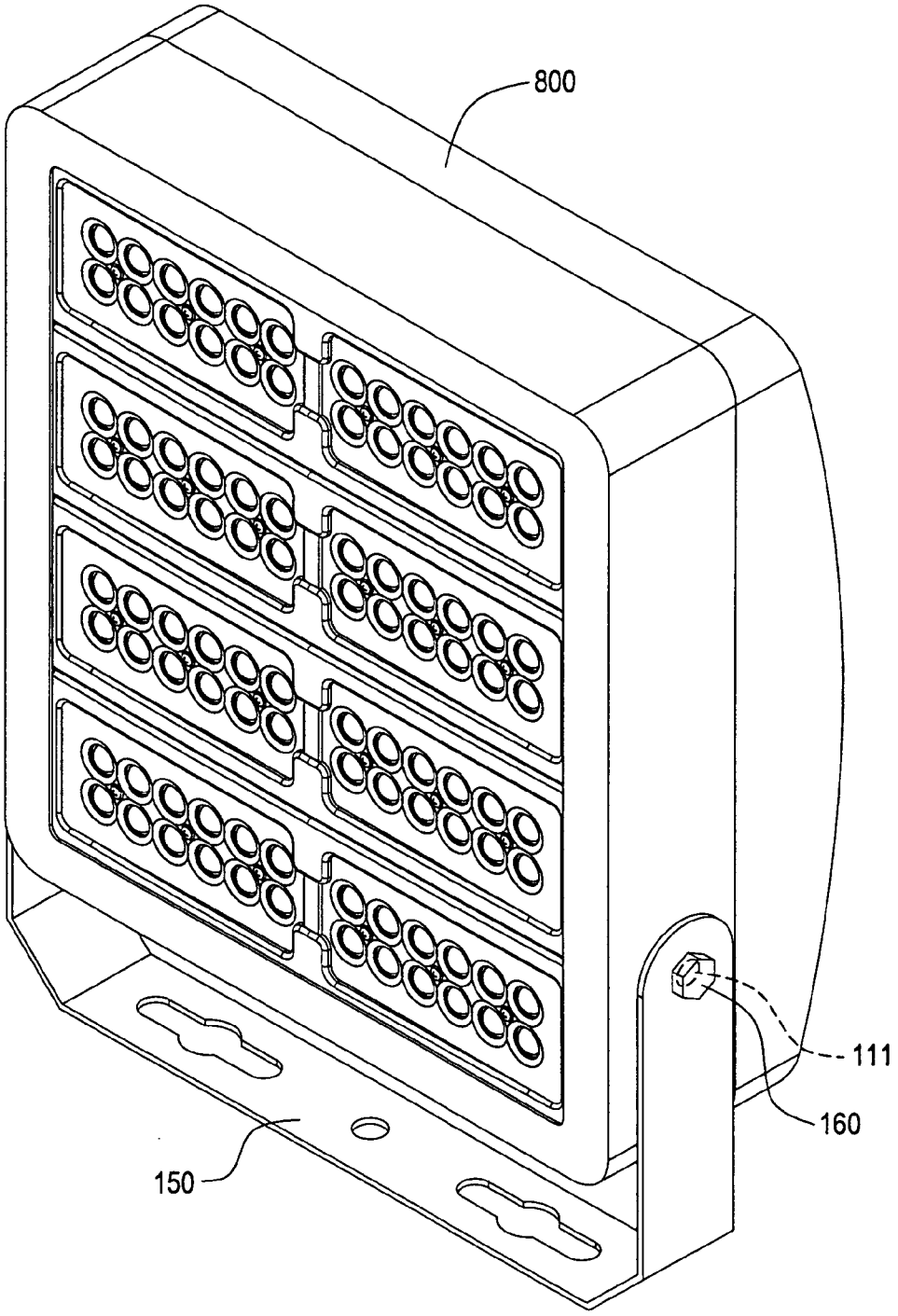


FIG.13

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# EUROPEAN SEARCH REPORT

Application Number
EP 10 00 8689

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
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TECHNICAL FIELDS SEARCHED (IPC)

F21V
F21S

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 31 January 2011 | Allen, Katie |

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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 00 8689

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31-01-2011

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