(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 327 930 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
17.07.2013 Bulletin 2013/29

(51) Int Cl.:
F21V 29/00 *(2006.01)* ***F21S 2/00*** *(2006.01)*
F21V 15/01 *(2006.01)* ***F21V 21/30*** *(2006.01)*
F21V 19/00 *(2006.01)* *F21Y 101/02* *(2006.01)*

(21) Application number: **10008689.1**

(22) Date of filing: **19.08.2010**

(54) **Modular lighting device**

Modularisierte Beleuchtungsvorrichtung

Dispositif d'éclairage modularisé

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

(30) Priority: **26.11.2009 TW 98222175 U**

(43) Date of publication of application:
01.06.2011 Bulletin 2011/22

(73) Proprietor: **Alliance Optotek Co.,Ltd.**
Chupei City
Hsin chu 30267 (TW)

(72) Inventors:
- **Chen, Li-Wei**
  Chupei City
  Hsin chu 30267 (TW)
- **Cheng, Shiou-Shiung**
  Chupei City
  Hsin chu 30267 (TW)
- **Chen, Tsung-Chieh**
  Chupei City
  Hsin chu 30267 (TW)
- **Tsai, Cheng-Yu**
  Chupei City
  Hsin chu 30267 (TW)

(74) Representative: **Riemann, Jörg**
Ter Meer Steinmeister & Partner
Mauerkircherstrasse 45
81679 München (DE)

(56) References cited:
EP-A1- 1 906 081
US-A1- 2002 196 623
US-A1- 2009 251 898

EP 2 327 930 B1

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.

Document US 2002/0196623 A1 describes a conventional LED lamp according to the preamble of claim 1.

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 thermo-conductive 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 thermo-conductivity 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 scope of the invention as defined by the claims.

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), **characterised in that** 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).

Patentansprüche

1. Modularisierte Beleuchtungsvorrichtung, umfassend:

   eine Stützstruktur (100), die ein im Wesentlichen U-förmiger Rahmen (100) ist, dessen offene Seite durch ein Paar von Schienen (120, 130) verlängert ist; und
   mehrere Beleuchtungsmodule (200, 200'), die in Reihe auf der Stützstruktur (100) montiert sind, wobei jedes der Beleuchtungsmodule (200, 200') ferner eine Wärmeableitungsbasis (210), die die Schienen (120, 130) verbindet, eine Leuchtdiodenanordnung (LED-Anordnung) (220), die auf der Wärmeableitungsbasis (210) montiert ist, und Rippen (230), die auf der Wärmeableitungsbasis (210) befestigt sind, umfasst, **dadurch gekennzeichnet, dass** jede der Rippen (230) mit einer Vertiefung (231) zum Aufnehmen einer der Schienen (120, 130) versehen ist.

2. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, die ferner eine Abdeckung (300), die ein Ende des U-förmigen Rahmens (110) abdichtet, Befestigungselemente (400), Durchgangslöcher (310), die in der Abdeckung vorgesehen sind, und mehrere Schlitze (140), die getrennt an einem geschlossenen Ende des U-förmigen Rahmens (100) vorgesehen sind, und Schienen (120, 130) umfasst, wobei die Durchgangslöcher (310) getrennt den Schlitzen (140) entsprechen und die Befestigungselemente (400) getrennt in die Durchgangslöcher (310) eindringen, um in die Schlitze (140) geschraubt zu werden.

3. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, wobei die LED-Anordnung (220) eine Leiterplatte (221), die auf der Wärmeableitungsbasis (210) montiert ist, und LEDs (222), die auf der Leiterplatte (221) montiert sind, umfasst.

4. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, wobei jede der Schienen (120, 130) mit einem erweiterten Abschnitt (121, 131) zum Blockieren der Wärmeableitungsbasis (210) gebildet ist.

5. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, die ferner ein Paar von Abschirmungen (500) umfasst, wobei jede der Abschirmungen (500) einen Lampenschirm (510) und eine Stange (520) umfasst, wobei eine Seite des Lampenschirms (510) mit dem U-förmigen Rahmen (110) verbunden ist und die andere Seite des Lampenschirms (510) von der Stange (520) getragen wird.

6. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, wobei die Stützstruktur ferner eine Aufnahme (150) und eine Drehachse (160), die mit der Aufnahme (150) verbunden ist, umfasst und der U-förmige Rahmen (110) mit einem Drehachsenloch (111) zum Aufnehmen der Drehachse (160) versehen ist.

7. Modularisierte Beleuchtungsvorrichtung nach Anspruch 6, wobei die Stützstruktur ferner ein Rohr (170) umfasst, das mit der Aufnahme (150) verbunden ist, und die Aufnahme (150) mit einem Loch versehen ist, das mit dem Rohr (170) in Verbindung ist.

8. Modularisierte Beleuchtungsvorrichtung nach Anspruch 6, die ferner eine weitere Stützstruktur (100), eine oder mehrere Verbindungsplatten (600), die quer die beiden Stützstrukturen (100) verbinden, und eine Halterung (700), die quer die Aufnahme (150) verbindet, umfasst.

9. Modularisierte Beleuchtungsvorrichtung nach Anspruch 1, die ferner eine Haube (800) umfasst, die die Stützstruktur (100) und die Beleuchtungsmodule (200, 200') abdeckt.

10. Modularisierte Beleuchtungsvorrichtung nach Anspruch 9, wobei die Stützstruktur ferner eine Aufnahme (150) und eine Drehachse (160), die mit der Aufnahme (150) verbunden ist, umfasst und die Haube (800) mit einem Drehachsenloch (111) zum Aufnehmen der Drehachse (160) versehen ist.

Revendications

1. Dispositif d'éclairage modularisé, comprenant :

   une structure de support (100), qui est un cadre sensiblement en forme de U (110) dont le côté ouvert est prolongé avec une paire de rails (120, 130) ; et
   une pluralité de modules d'éclairage (200, 200') montés sur la structure de support (100) en série, dans lesquels chacun des modules éclairage (200, 200') comprend en outre une base de dissipation de chaleur (210) qui connecte les rails (120, 130) un assemblage (220) à diodes électroluminescentes (LED) monté sur la base de dissipation de chaleur (210) et des ailettes (230) fixées sur la base de dissipation de chaleur (210), **caractérisé en ce que** chacune des ailettes (230) est dotée d'un creux (231) pour loger l'un des rails (120, 130).

2. Dispositif d'éclairage modularisé selon la revendication 1, comprenant en outre un couvercle (300) qui étanche une extrémité du cadre en forme de U (110), des éléments de fixation (400), des trous traversants (310) ménagés dans le couvercle, et une pluralité de rainures (140) prévues séparément dans une extrémité fermée du cadre en forme de U (110) et des rails (120, 130), dans lequel les trous traversants (310) correspondent séparément aux rainures (140), les éléments de fixation (400) pénétrant séparément dans les trous traversants (310) pour se visser dans les rainures (140).

3. Dispositif d'éclairage modularisé selon la revendication 1, dans lequel l'assemblage (220) à diodes électroluminescentes comprend une carte à circuits (221) montée sur la base de dissipation de chaleur (210) et des diodes électroluminescentes (222) montées sur la carte à circuits (221).

4. Dispositif d'éclairage modularisé selon la revendication 1, dans lequel chacun des rails (120, 130) est formé avec une portion en extension (121, 131) pour bloquer la base de dissipation de chaleur (210).

5. Dispositif d'éclairage modularisé selon la revendication 1, comprenant en outre une paire de masques (500), dans lesquels chacun des masques (500) comprend un écran (510) et une tige (520), un côté de l'écran (510) est connecté au cadre en forme de U (110), et l'autre côté de l'écran (510) est supporté par la tige (520).

6. Dispositif d'éclairage modularisé selon la revendication 1, dans lequel la structure de support comprend en outre un siège (150) et un pivot (160) connecté au siège (150), et le cadre en forme de U (110) est pourvu d'un trou de pivot (111) pour recevoir le pivot (160).

7. Dispositif d'éclairage modularisé selon la revendication 6, dans lequel la structure de support comprend en outre un tube (170) connecté au siège (150), et le siège (150) est pourvu d'un trou (150) qui communique avec le tube (170).

8. Dispositif d'éclairage modularisé selon la revendication 6, comprenant en outre une autre structure de support (100), une ou plusieurs carte(s) de connexion (600) qui connecte(nt) transversalement les deux structures de support (100) et une monture (700) connectée transversalement au siège (150).

9. Dispositif d'éclairage modularisé selon la revendication 1, comprenant en outre un capot (800) qui couvre la structure de support (100) et les modules d'éclairage (200, 200').

10. Dispositif d'éclairage modularisé selon la revendication 9, dans lequel la structure de support comprend en outre un siège (150) et un pivot (160) connecté au siège (150), et le capot (800) est pourvu d'un trou de pivot (111) pour recevoir le pivot (160).

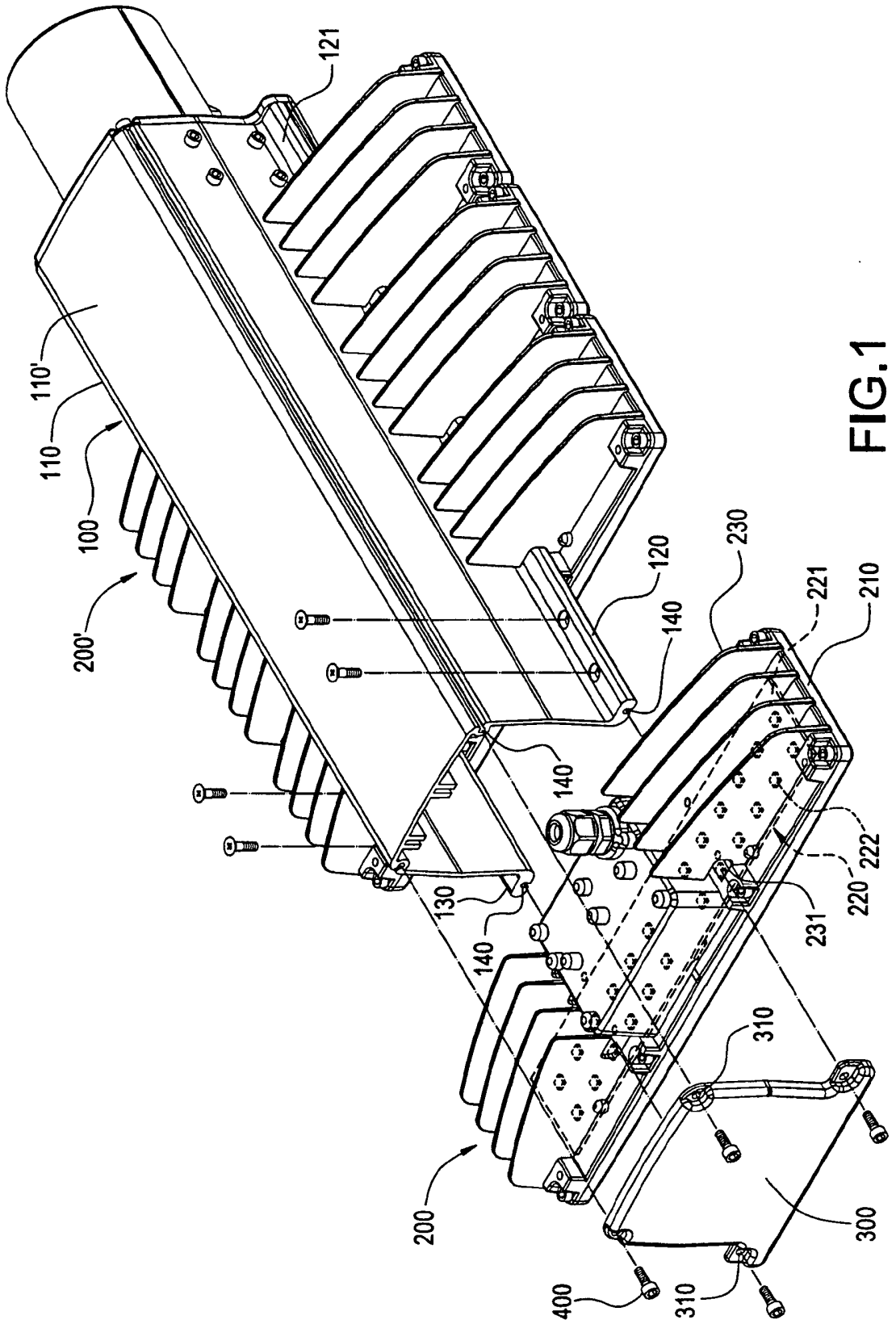
121
110'
110
100
200'
120
230
221
210
140
140
222
220
231
130
140
310
200
300
400
310

FIG.1

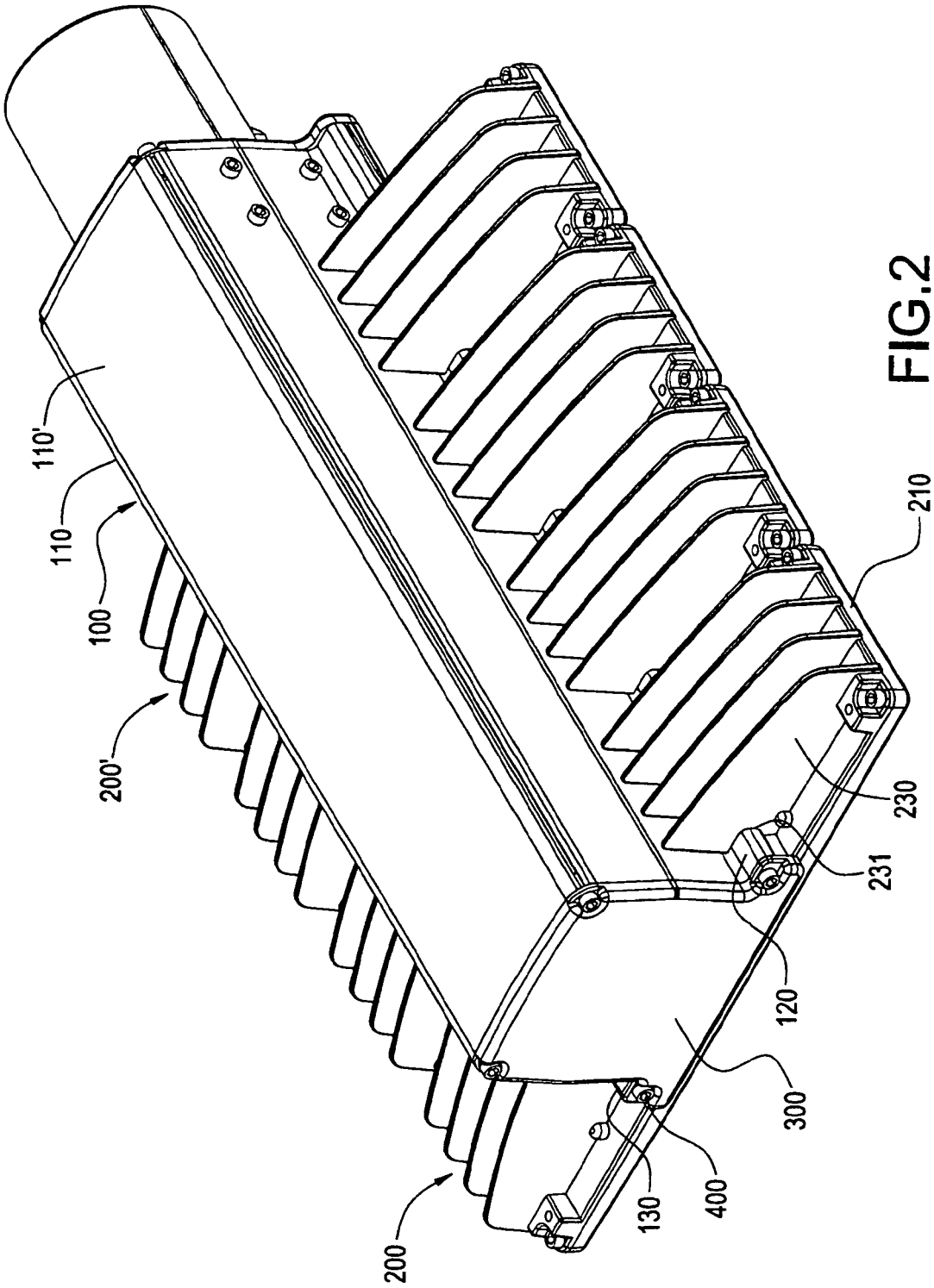

FIG.2

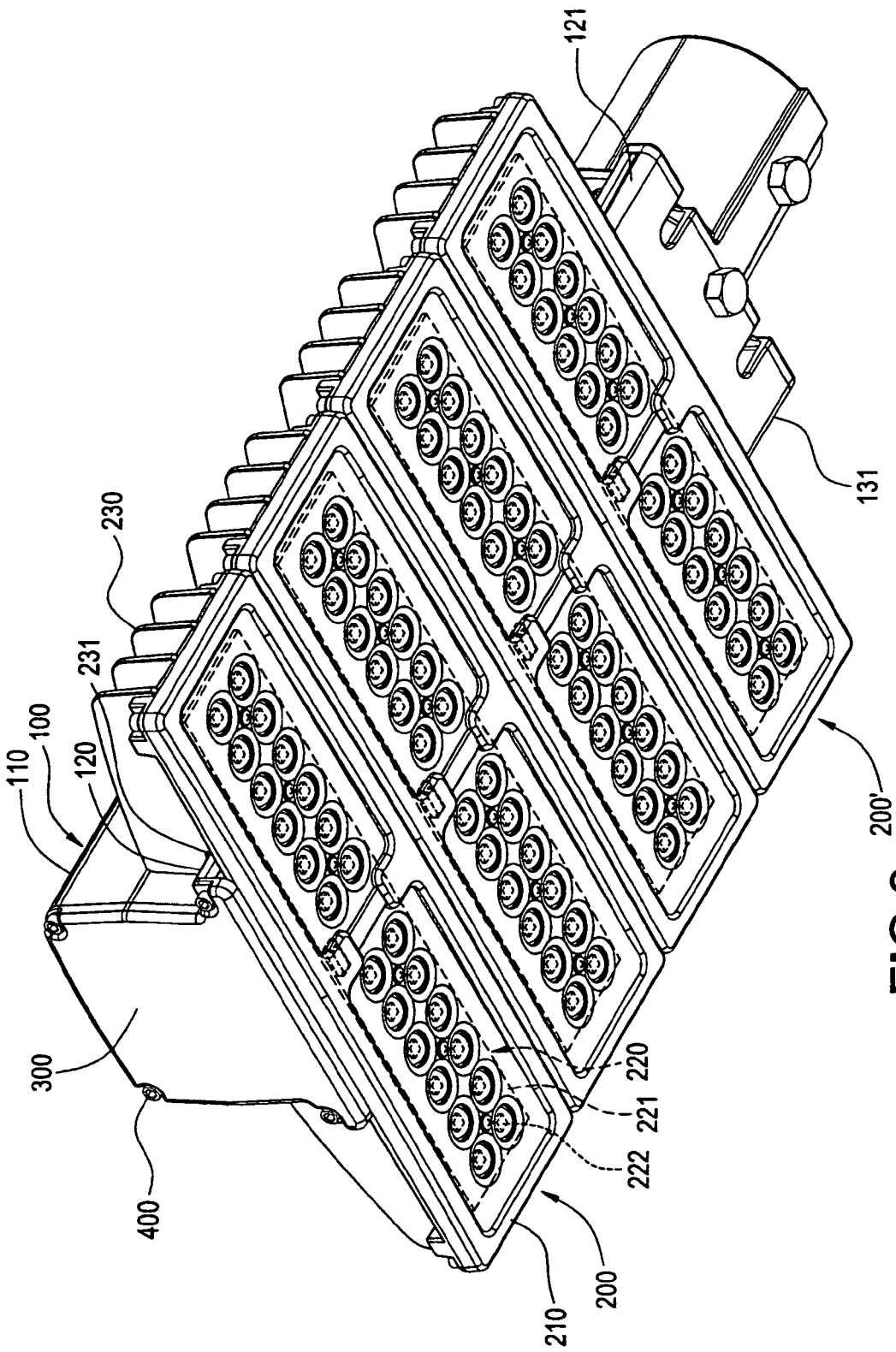

FIG.3

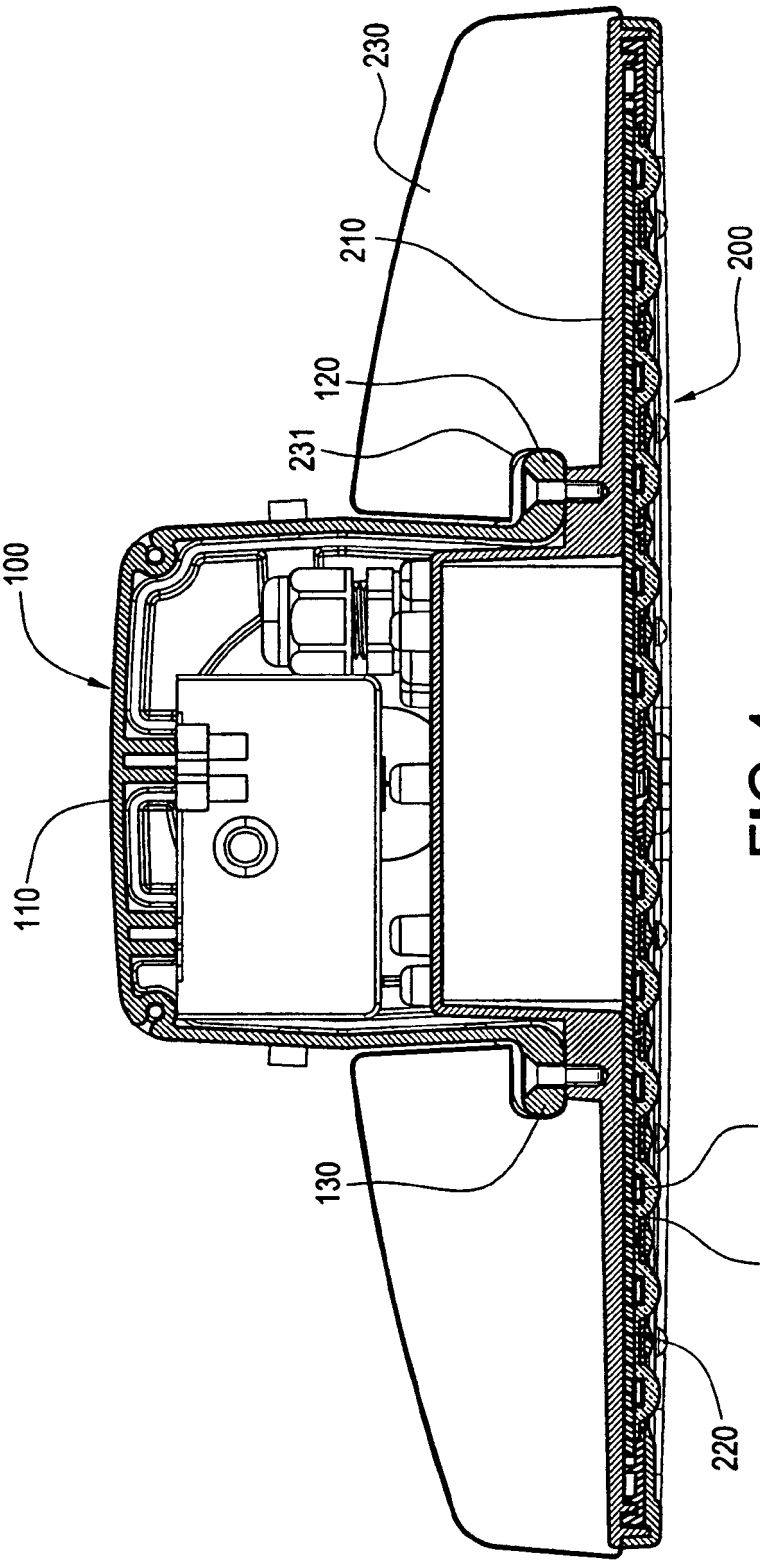

FIG.4

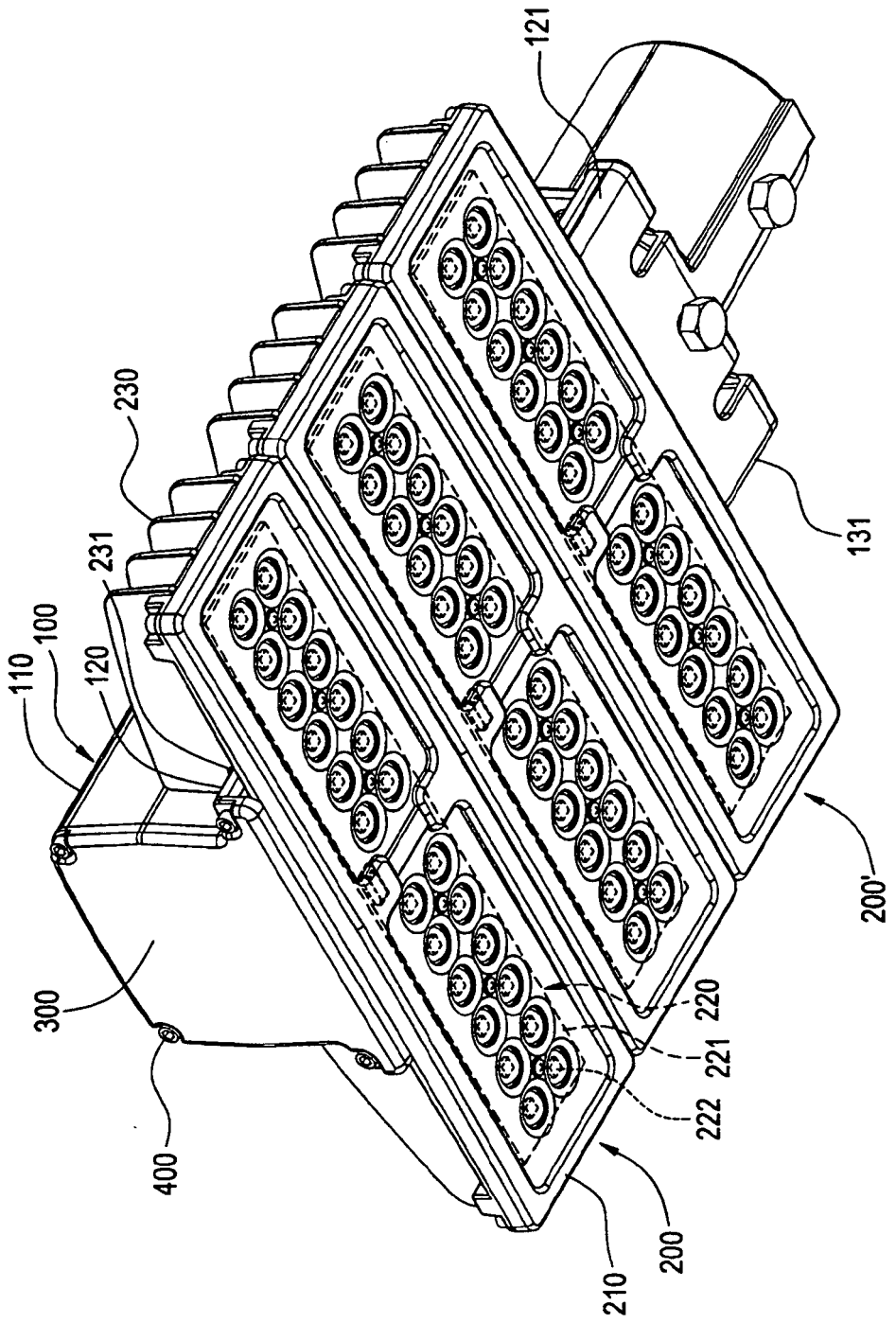

FIG.5

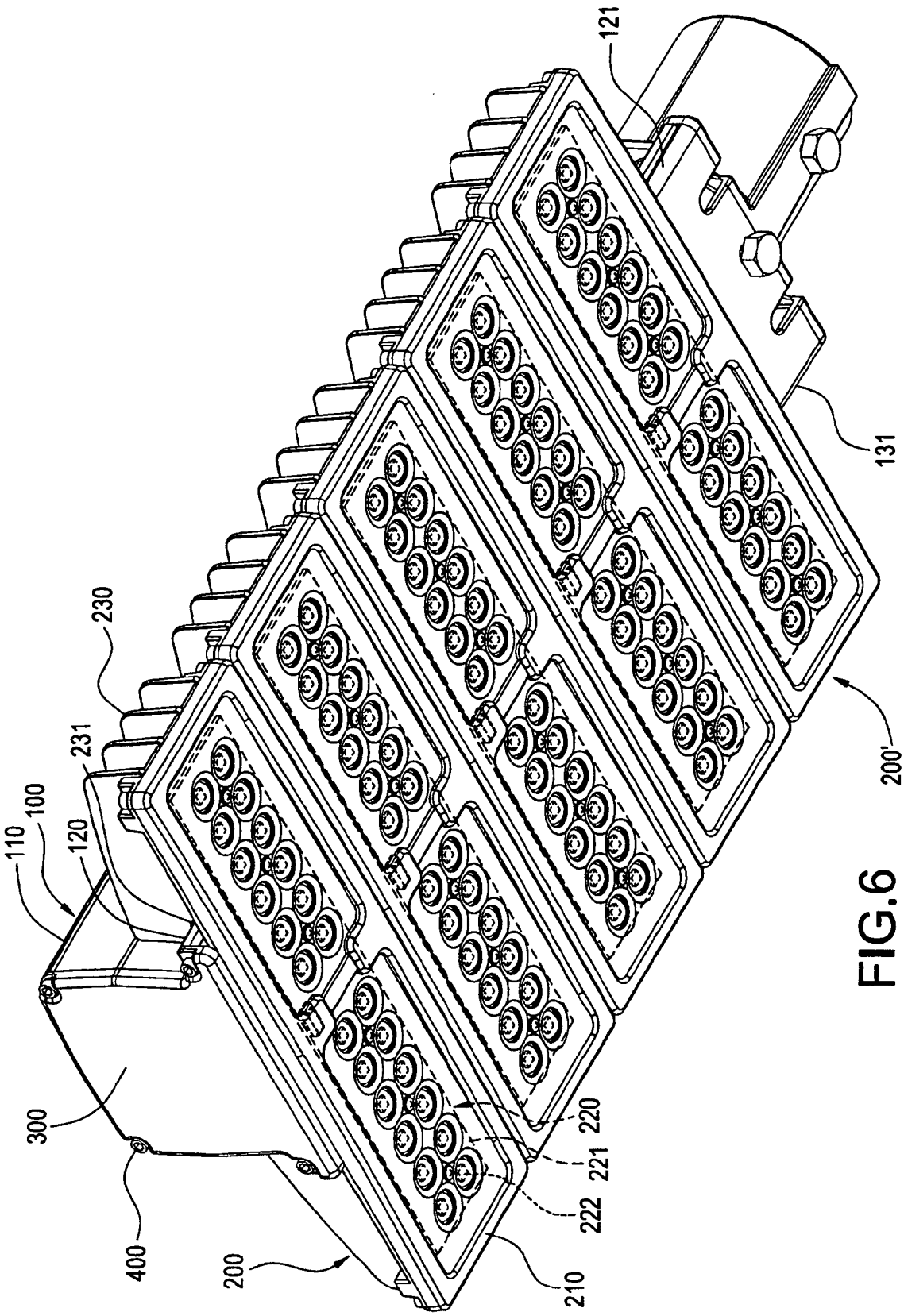

FIG.6

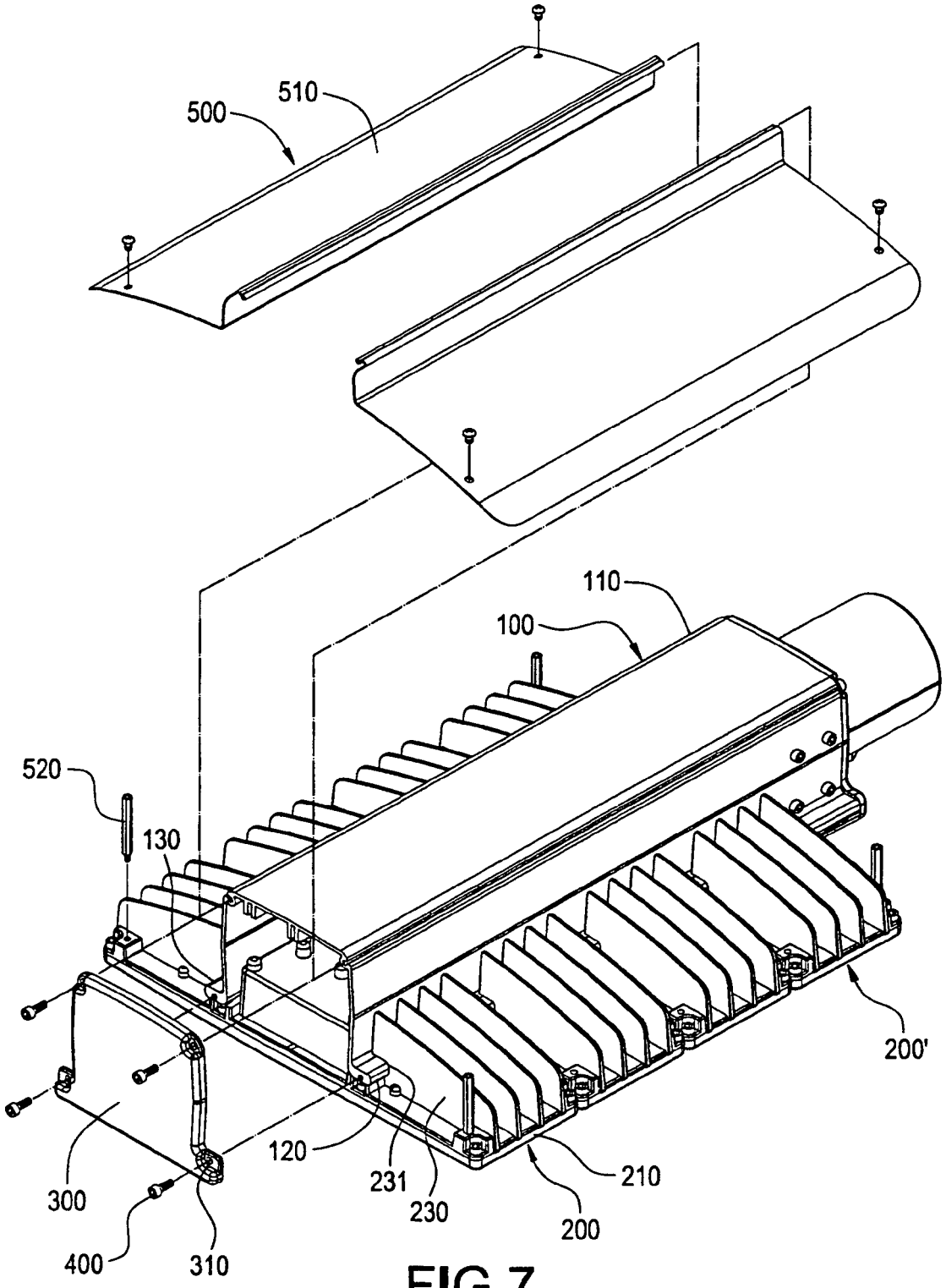

FIG.7

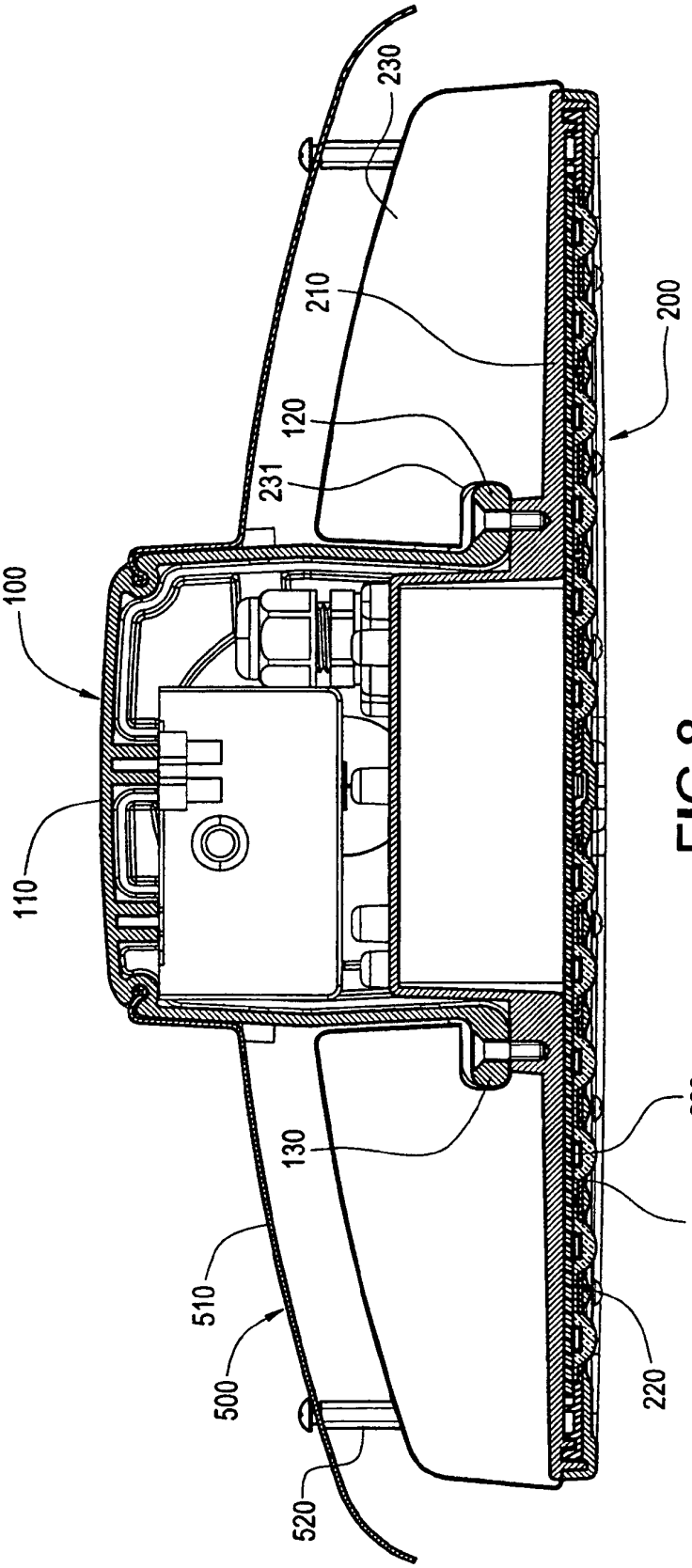

FIG.8

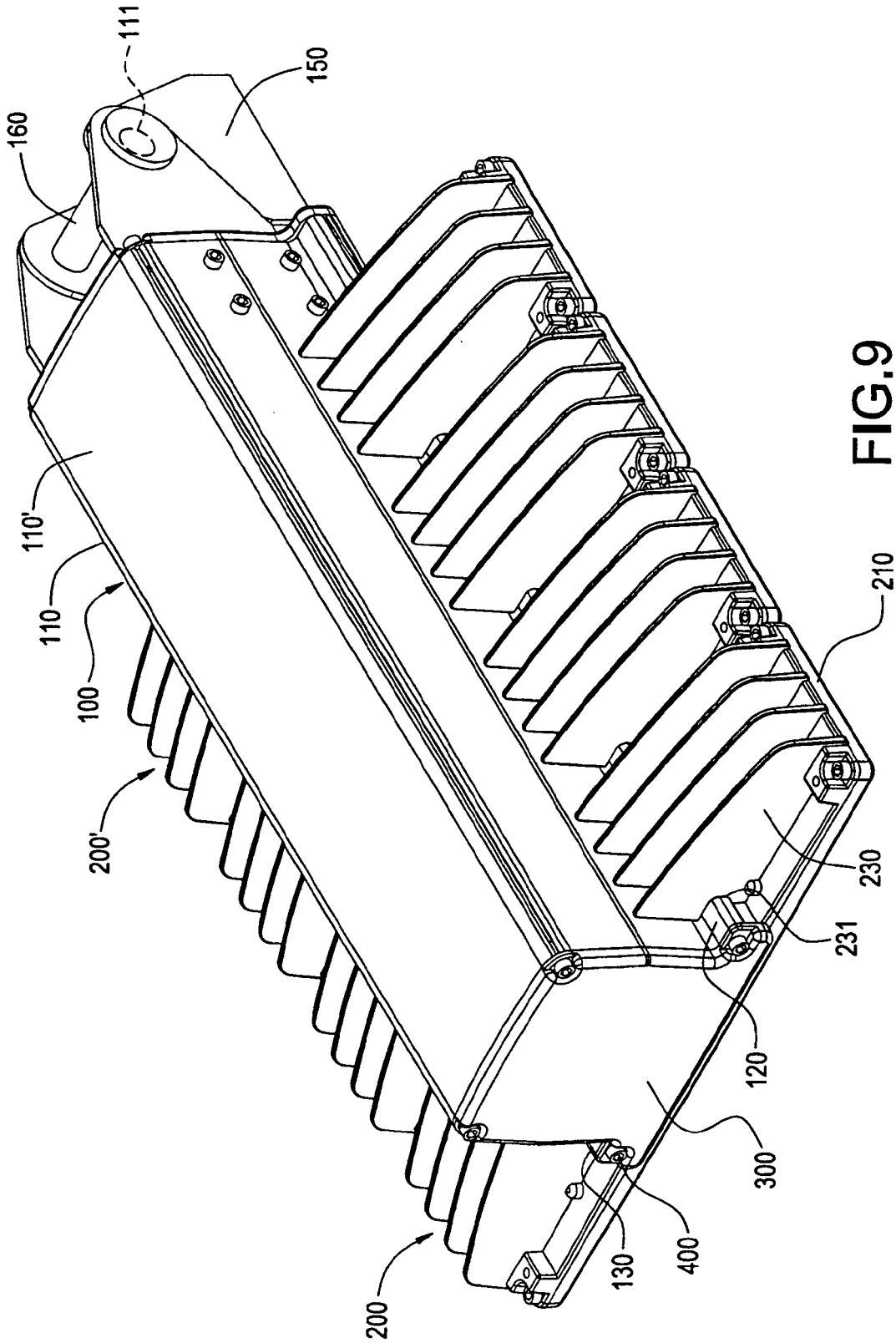

FIG.9

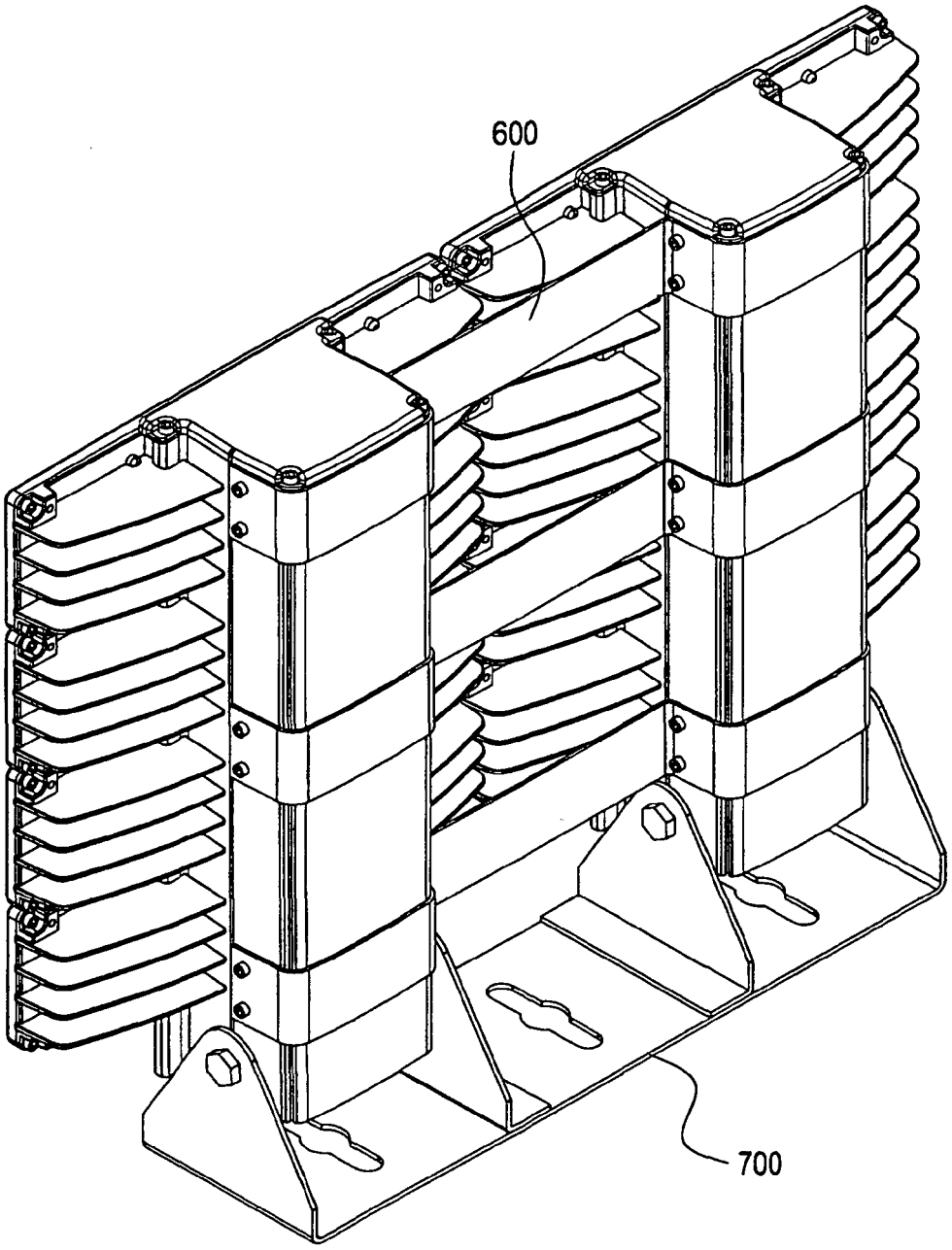

FIG.10

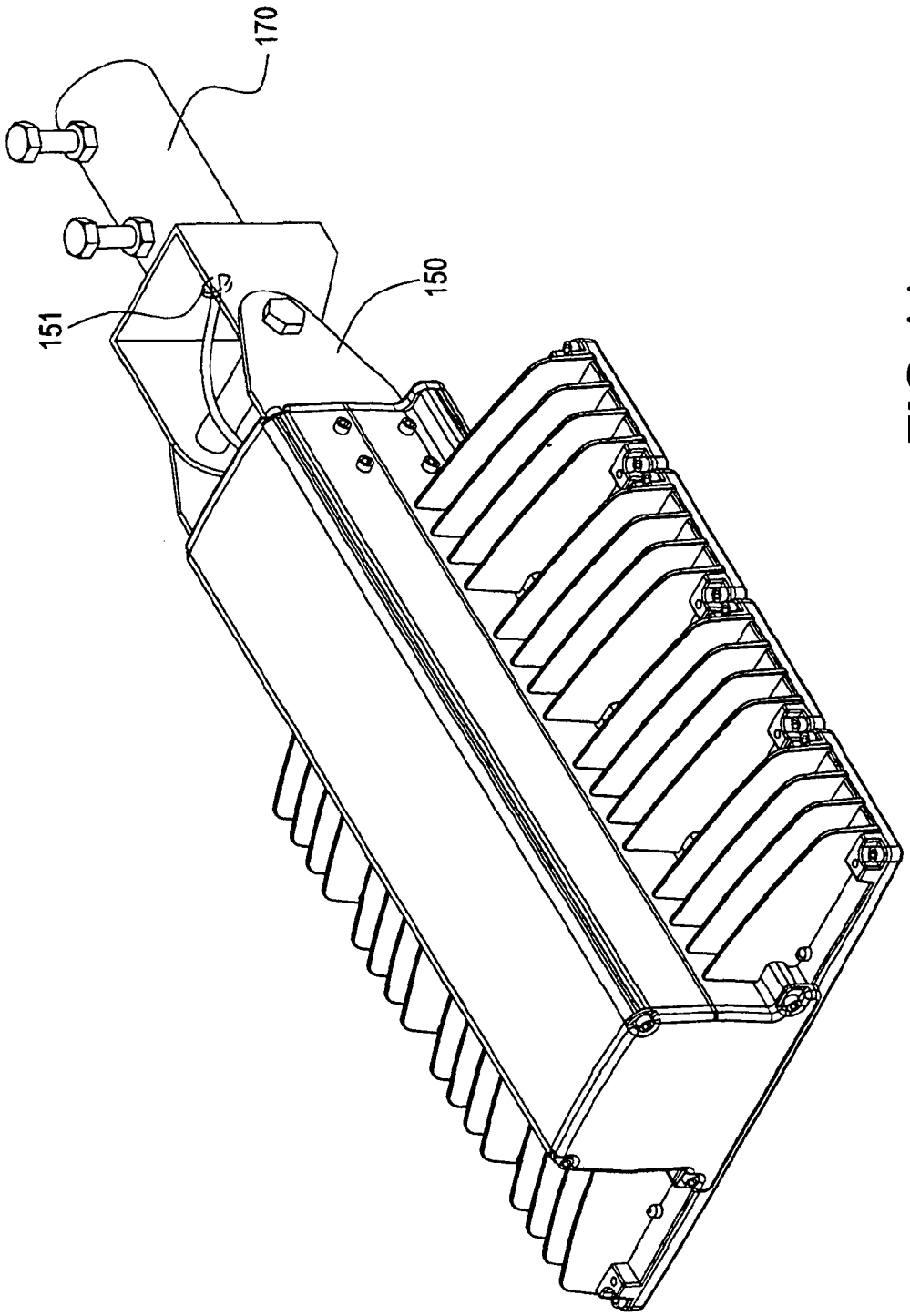

FIG.11

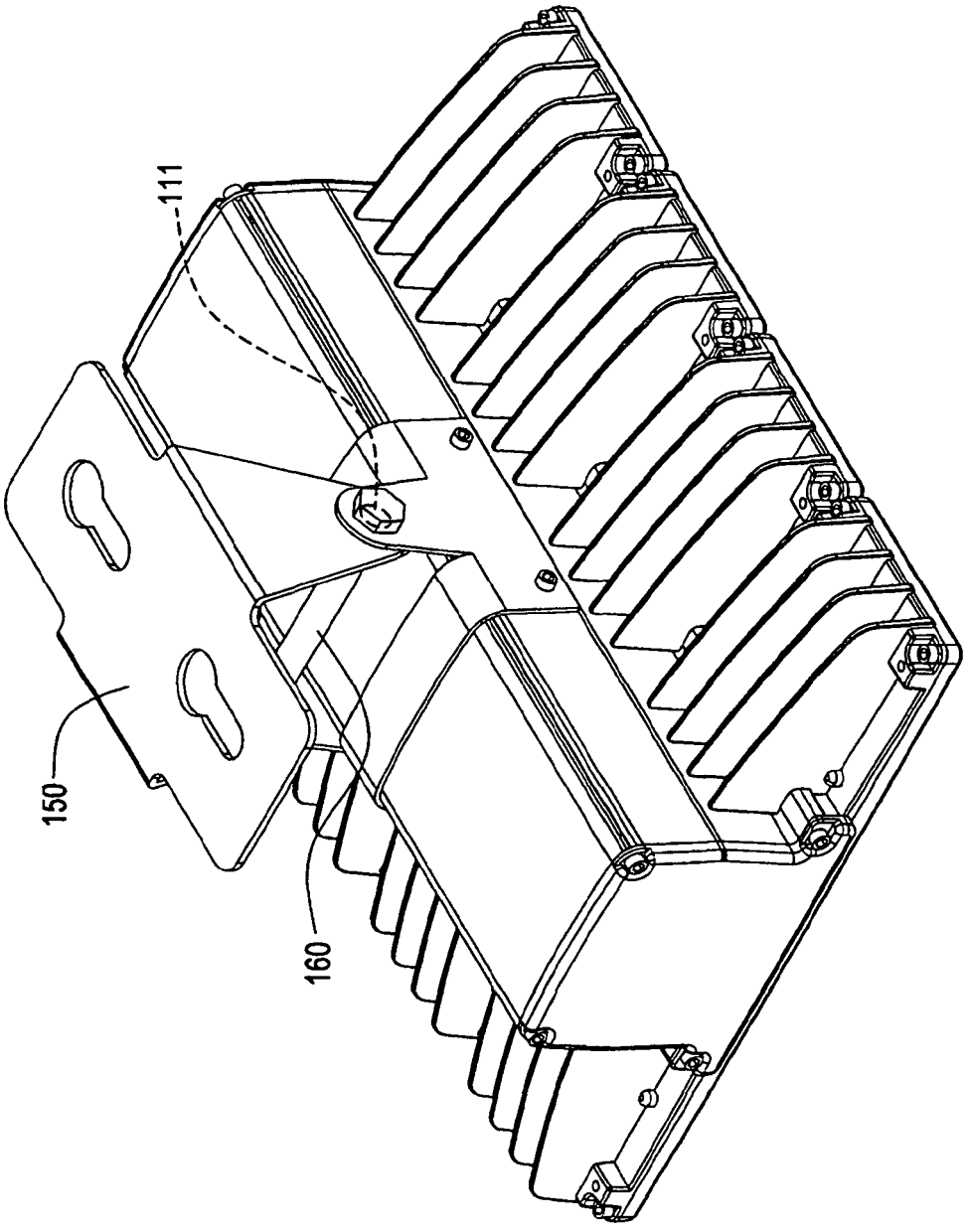

FIG.12

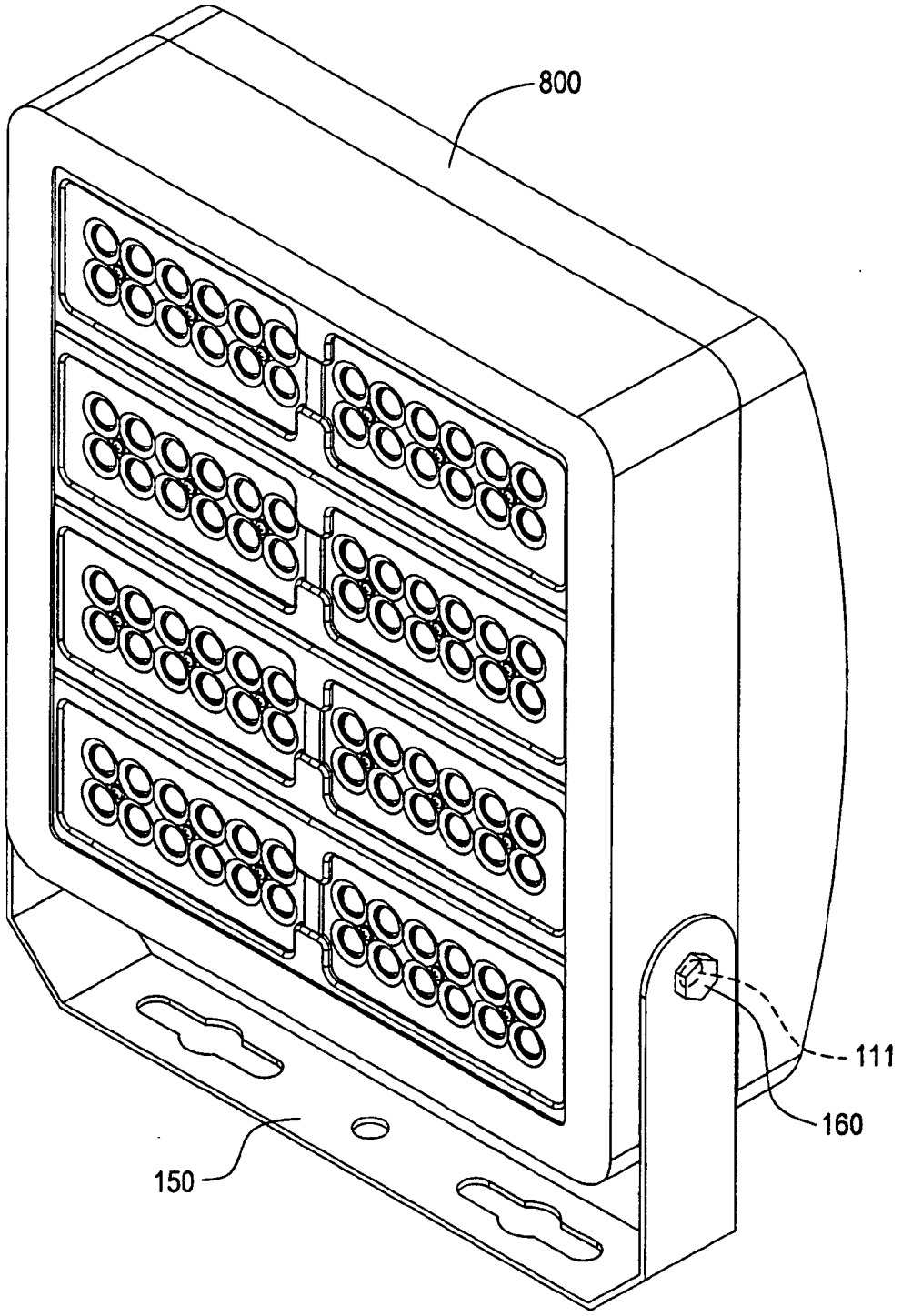

FIG.13

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 20020196623 A1 **[0003]**