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(54) **Luminaire**

(57) According to one embodiment, a luminaire (100) includes a cylindrical main case (1) opened at both ends in a longitudinal direction and opened on a front surface side. A light source section (3) is attached to the inside of the main case (1). The openings at both the ends in the longitudinal direction of the main case (1) are closed by two end plate members (14). A seal-member disposing section (8) continuous in an annular shape is provided

around the opening (11) on the front surface side of the main case (1). The seal-member disposing section (8) is provided over the main case (1) and the two end plate members (14). A ring-shaped seal member (62) is attached to the seal-member disposing section (8). A cover (6) having translucency configured to close the opening on the front surface side is attached in contact with the seal member (62).

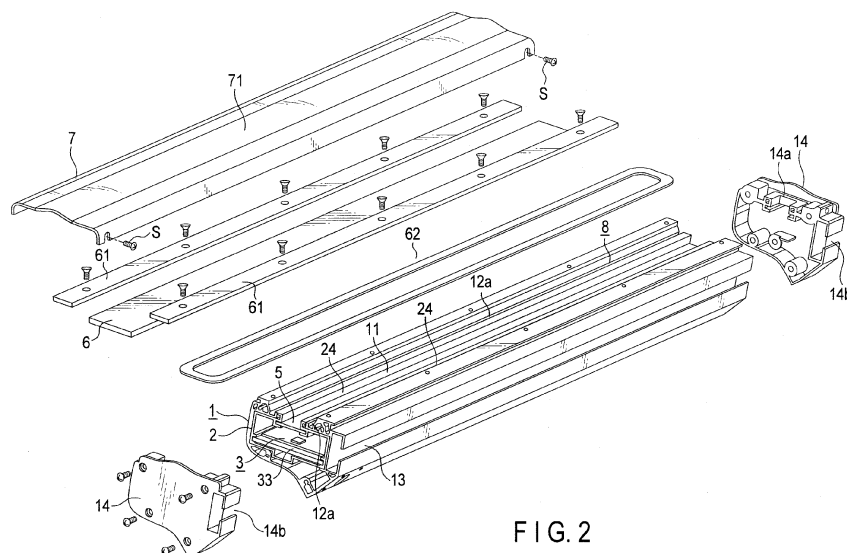


FIG. 2

Description

FIELD

[0001] Embodiments described herein relate generally to a luminaire having waterproof performance suitable for outdoor use.

BACKGROUND

[0002] In the past, a luminaire used outdoors includes, in order to prevent moisture such as rainwater from intruding into an appliance main body, a waterproof structure in which a seal member or the like is disposed in the appliance main body. In the luminaire of this type, in some case, for example, a metal case functioning as a shell is integrally molded in a cylindrical shape by extrusion molding and an LED or the like is housed in the case as a light source.

[0003] In the case of such a luminaire, end plate members are attached to close openings on both end sides of the case. A translucent cover is attached to an opening on a front surface side of the case (an opening for irradiating light).

[0004] However, in the case of the luminaire explained above, because of the structure of the luminaire, it is difficult to secure highly reliable waterproof performance, for example, in joint portions of the end plate members and ends of the translucent cover.

[0005] Therefore, there is a demand for development of a luminaire having sufficient waterproof performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006]

FIG. 1 is a perspective view of a luminaire according to an embodiment;

FIG. 2 is a disassembled perspective view of the luminaire;

FIG. 3 is a sectional view of the luminaire taken along a line X-X shown in FIG. 1;

FIG. 4 is a diagram for explaining a method of assembling the luminaire;

FIG. 5 is an enlarged perspective view of an end plate member on the left side in FIG. 2;

FIG. 6 is a side view of the end plate member viewed from the inner side;

FIG. 7 is a plan view of the luminaire from which a second cover member and a seal member are removed; and

FIG. 8 is a plan view of a state in which the seal member is attached to a seal-member disposing section shown in FIG. 7.

DETAILED DESCRIPTION

[0007] In general, according to one embodiment, a lu-

minaire includes a cylindrical main case opened at both ends in a longitudinal direction and opened on a front surface side. A light source section is attached to the inside of the main case. The openings at both the ends in the longitudinal direction of the main case are closed by two end plate members. A seal-member disposing section continuous in an annular shape is provided around the opening on the front surface side of the main case. The seal-member disposing section is provided over the main case and the two end plate members. A ring-shaped seal member is attached to the seal-member disposing section. A cover having translucency configured to close the opening on the front surface side is attached in contact with the seal member.

[0008] A luminaire 100 according to an embodiment is explained below with reference to FIGS. 1 to 8. In the figures, the same components are denoted by the same reference numerals and signs and redundant explanation of the components is omitted.

[0009] It is assumed that the luminaire 100 according to this embodiment is mainly used outdoors. For example, the luminaire 100 is used for irradiating light on and lighting up an outer wall of a building in order to reproduce a beautiful night scene. A luminaire shown in FIG. 1 has a structure in which two luminaires 100 are coupled in a longitudinal direction.

[0010] As shown in FIG. 1, the luminaire 100 includes an attachment member F fixed to a structure such as a building. The attachment member F includes a pedestal p and an arm a. The pedestal p is fixed to the structure. The luminaire 100 is attached to a distal end side of the arm a. The arm a can pivot with one end side set as a fulcrum. When the luminaire 100 is set, a direction of light irradiated from the luminaire 100 can be changed as appropriate by adjusting a pivoting angle of the arm a. In FIG. 1, the light irradiated from the luminaire 100 is directed upward in the figure.

[0011] The attachment member F is not limited to the configuration explained above and only has to be an attachment member that can support the luminaire 100 attached thereto. One luminaire 100 may be set or plural luminaires 100 may be coupled and set. The number of luminaires 100 only has to be selected as appropriate according to an object on which light is irradiated.

[0012] As shown in FIGS. 1 to 4, the luminaire 100 includes a main case 1, an inner case 2 housed and arranged on the inside of the main case 1, a light source section 3 arranged on the inside of the inner case 2, a power supply circuit 4, an optical component 5 and a first cover 6 disposed on a front surface side of the light source section 3 (a light irradiating direction side), and a second cover 7 disposed on the front surface side of the first cover 6. The front surface side indicates a side on which the light of the light source section 3 is extracted. The front surface side is an upper side in FIG. 1.

[0013] The main case 1 is molded in a cylindrical shape by extrusion molding of an aluminum material having high thermal conductivity. More specifically, the main case 1

has a laterally long shape extending in a substantially horizontal direction. A space for housing the inner case 2 explained later is provided on the inside of the main case 1. The main case 1 is opened at both ends in a longitudinal direction thereof. An opening 11 (see FIG. 2) having a rectangular shape along the longitudinal direction is formed on the front surface side of the main case. The opening 11 functions as an irradiation opening for irradiating the light of the light source section 3. As shown in FIG. 4, two openings at both the ends in the longitudinal direction of the main case 1 are connected at both ends in the longitudinal direction of the opening 11.

[0014] The main case 1 is desirably molded by the extrusion molding. However, this is not a limitation. A method of molding the main case 1 is not specifically limited and may be any method.

[0015] Supporting sections 12 for supporting the first cover 6 are formed at both edges along the longitudinal direction of the opening 11 of the main case 1 (see FIG. 3). The supporting sections 12 include groove-shaped sections 12a extending in the longitudinal direction. In other words, the groove-shaped sections 12a are respectively linearly provided along both the edges of the opening 11.

[0016] Further, an attachment supporting section 13 for connecting the attachment member F is provided on an outer surface of the main case 1. The attachment supporting section 13 is provided over substantially the entire length of the main case 1. As shown in FIG. 3, the cross section of the attachment supporting section 13 has a C shape. An attachment rail (not shown) is inserted into the attachment supporting section 13 and fixed to the attachment member F by bolts. The main case 1 is attached to the attachment member F and supported.

[0017] A pair of end plate members 14 that respectively close the two openings at the both ends in the longitudinal direction of the main case 1 are attached to the openings. As shown in FIGS. 5 and 6, the end plate members 14 have a shape substantially the same as the openings (see FIG. 2) of the main case 1. In FIGS. 5 and 6, the end plate member 14 on the left side in FIG. 2 is representatively shown. The end plate members 14 include groove-shaped sections 14a at edges on the front surface side. The groove-shaped sections 14a have a continuous shape bent in a substantially U shape.

[0018] Further, the end plate members 14 include attachment supporting sections 14b having a C shape in cross section to be continuous to the attachment supporting section 13 of the main case 1.

[0019] The end plate members 14 are screwed and attached to the openings at both the ends in the longitudinal direction of the main case 1 via seal members 14c (shown in FIG. 7 and not shown in FIG. 2).

[0020] When the two end plate members 14 are attached to both the ends of the main case 1 in this way, as shown in FIG. 7, a seal-member disposing section 8 connected in an annular shape is formed around the

opening 11 of the main case 1. The seal-member disposing section 8 is a groove in which the groove-shaped sections 12a formed at the edges of the opening 11 of the main case 1 and the groove-shaped sections 14a formed at the edges on the front surface side of the two end plate members 14 are connected in an annular shape.

[0021] As shown in FIG. 8, a ring-shaped seal member 62 is attached to the seal-member disposing section 8. The length of the seal member 62 is substantially equal to the length of the seal-member disposing section 8. The seal member 62 is attached over the edges of the opening 11 of the main case 1 and the edges of the end plate members 14. In other words, the seal member 62 is attached across joining sections of the main case 1 and the end plate members 14. As the seal member 62, for example, an O ring circular in cross section formed of an elastic member such as synthetic rubber is used.

[0022] The inner case 2 is a resin case having an insulation property. Like the main case 1, the inner case 2 is molded in a cylindrical shape by extrusion molding. Both ends in the longitudinal direction of the inner case 2 are opened. A slit-shaped irradiation opening 21 extending along the longitudinal direction is formed on the front surface side of the inner case 2. The inner case 2 is inserted from one of the openings at both the ends of the main case 1 and arranged in the space on the inside of the main case 1. At this point, the inner case 2 is attached in a posture in which the irradiation opening 21 overlaps the opening 11 of the main case 1.

[0023] As shown in FIG. 3, the light source section 3 and the optical component 5 are attached to the inside of the inner case 2. Two holding grooves 22 for holding the light source section 3 are formed on a wall on the inner side of the inner case 2 to extend in the longitudinal direction. Holding grooves 23 for holding the optical component 5 are formed at both edges along the longitudinal direction of the irradiation opening 21 to extend in the longitudinal direction.

[0024] Two light blocking louvers 24 standing toward the front surface side are integrally formed at the edges of the irradiation opening 21. The light blocking louvers 24 extend straight in the longitudinal direction of the inner case 2. The light blocking louvers 24 play a function of blocking the light emitted from the light source section 3 and controlling to distribute the light.

[0025] As shown in FIGS. 2 to 4, the light source section 3 includes a substrate 31 and plural light-emitting elements 32 mounted on the substrate 31. The light source section 3 is attached to a substrate attachment plate 33 having insulation properties. The substrate attachment plate 33 is held by the holding grooves 22 of the inner case 2. Consequently, the light source section 3 is housed and arranged in the inner case 2.

[0026] The substrate 31 is formed in a substantially rectangular shape. The plural light-emitting elements 32 are mounted linearly side by side with a predetermined space apart from one another along the longitudinal di-

rection of the substrate 31. A distance between the light-emitting elements 32 adjacent to each other is substantially fixed. In this embodiment, the distance is about 50 mm.

[0027] The substrate 31 is formed of a flat plate of glass epoxy resin (FR-4), which is an insulating material. On a surface side of the substrate 31, a wiring pattern formed of a copper foil is formed. A white resist layer is formed on the surface side of the substrate 31. When the material of the substrate 31 is the insulating material, a glass composite substrate (CEM-3), a ceramics material, or the like can be applied. When the substrate 31 is made of metal, a base substrate of metal in which an insulating layer is superimposed over the entire surface of a base plate having high thermal conductivity and excellent in thermal radiation properties such as aluminum can be applied.

[0028] Each of the light-emitting elements 32 is, for example, a light-emitting diode (LED) and is an LED package of a surface mounting type. The light-emitting element 32 schematically includes an LED chip disposed in a main body formed of ceramics or synthetic resin and translucent resin for mold such as epoxy resin or silicone resin for sealing the LED chip.

[0029] The LED chip is, for example, an LED chip that emits blue light. A phosphor is mixed in the translucent resin. An yellow phosphor that emits yellowish light, which is in a complementary relation with blue light, is used as the phosphor to enable the light-emitting element 32 to emit white light.

[0030] As the LED, a bare chip of the LED may be directly mounted on the substrate 31 or an LED of a bullet type may be mounted. A mounting system or method is not specifically limited.

[0031] The power supply circuit 4 is provided on the substrate 31 of the light source section 3. Specifically, circuit components 41 such as a rectifier, a capacitor, and a resistance element included in the power supply circuit 4 are mounted on the substrate 31 of the light source section 3. Therefore, the light-emitting elements 32 and the circuit components 41 are mounted on the same substrate 31.

[0032] Specifically, the circuit components 41 are desirably mounted along a row of the linearly arranged light-emitting elements 32 and on both sides or one side of the row. Consequently, it is possible to effectively use a mounting area of the substrate 31.

[0033] The power supply circuit 4 is connected to a not-shown commercial alternating-current power supply via a not-shown power supply line connected to a power supply terminal 42. The power supply circuit 4 functions to receive power supply from the commercial alternating-current power supply and generate a direct-current output. The power supply circuit 4 is configured by, for example, connecting a smoothing capacitor between output terminals of a full-wave rectifier circuit and connecting a direct-current voltage converting circuit and current detecting means to the smoothing capacitor. The power supply circuit 4 is connected to the light-emitting ele-

ments 32 via the wiring pattern. The power supply circuit 4 supplies the direct-current output to the light-emitting elements 32 and controls to light the light-emitting elements 32.

[0034] The optical component 5 is, for example, a prism sheet. The prism sheet 5 has translucency and is formed in an elongated rectangular shape. Both ends along the longitudinal direction of the prism sheet 5 are held in the holding grooves 23 of the inner case 2. The prism sheet 5 closes the irradiation opening 21 of the inner case 2 and is arranged on the front surface side of the row of the light-emitting elements 32.

[0035] The prism sheet 5 has fine grooves formed on a surface and has a function of refracting and diffusing lights emitted from the light-emitting elements 32 in the longitudinal direction.

[0036] As shown in FIGS. 2 and 3, the first cover 6 has a rectangular tabular shape and is, for example, a transparent glass plate. Both end edges along the longitudinal direction of the glass plate 6 are placed at front ends of the light blocking louvers 24 formed in the inner case 2 and placed on the supporting sections 12 of the main case 1. The front surface side of both the end edges of the glass plate 6 along the longitudinal direction is pressed from the front surface side by two pressing plates 61 and fastened and fixed to the main case 1. The height of the light blocking louvers 24 is designed to height flush with the supporting sections 12 of the main case 1 in a state in which the inner case 2 is housed and arranged in the main case 1.

[0037] Each of the pressing plates 61 has plural (in this embodiment, five) screw holes spaced apart in the longitudinal direction. The pressing plates 61 are screwed and fixed to the front surface side of the main case 1.

[0038] When the pressing plates 61 are screwed and fixed, a seal member 62 housed and arranged in the annular seal-member disposing section 8 formed by the groove-shaped sections 12a of the main case 1 and the groove-shaped sections 14a of the end plate members 14 is pressed by the glass plate 6 toward the supporting sections 12 and elastically deformed. Therefore, the opening 11 of the main case 1 is sealed by the glass plate 6 and the seal member 62 to prevent moisture and dust from intruding into the inside of the main case 1. As a result, waterproof performance can be secured.

[0039] The second cover 7 is disposed to be spaced apart on the front surface side of the first cover 6 and functions to cover the front surface side of the main case 1. A center 71 of the second cover 7 is bent to be slightly convex to the front surface side. At least the center 71 has translucency. The second cover 7 configured in this way has a function of further improving the waterproof performance and protecting the first cover 6.

[0040] Since the first cover 6 is pressed by the pressing plates 61 at both the end edges along the longitudinal direction on the front surface side, steps are formed between a front surface of the first cover 6 and front surfaces of the pressing plates 61. Therefore, as shown in FIG. 3,

a concave section is formed on the front surface side of the first cover 6 by the pressing plates 61 on both the sides of the first cover 6.

[0041] Therefore, if the second cover 7 is not provided, it is likely that water accumulates in the concave section and deterioration in the waterproof performance and deterioration in transmissivity of light due to adhesion of soil to a surface of the first cover 6 occur.

[0042] However, if the second cover 7 is provided as in this embodiment, for example, water dropping and adhering to a surface of the second cover 7 flows down according to the convex shape of the center 71. Therefore, it is possible to secure the waterproof performance for a long period. Further, it is possible to suppress the adhesion of soil to the first cover 6 and suppress the deterioration in the transmissivity of light.

[0043] An example of process for assembling the luminaire configured as explained above is schematically explained mainly with reference to FIGS. 2 to 4.

[0044] First, as shown in FIG. 4, the light source section 3 (including the power supply circuit 4) attached to the substrate attachment plate 33 and the prism sheet functioning as the optical component 5 are incorporated into the inner case 2. In this case, the substrate attachment plate 33 is inserted through from one side of the openings at both the ends of the inner case 2 and slid to the holding grooves 22 of the inner case 2 to be mounted. The prism sheet 5 is slid to the holding grooves 23 of the inner case 2 to be mounted. Consequently, the light source section 3 and the optical component 5 are held by the insulative inner case 2.

[0045] Subsequently, the inner case 2 is attached to the main case 1. Specifically, the inner case 2 is slid to the space on the inner side of the main case 1 and inserted from one side of the openings at the both ends of the main case 1.

[0046] Subsequently, as shown in FIG. 2, the end plate members 14 are screwed and attached to the openings at both the ends of the main case 1 via the seal members 14c (shown in FIG. 7). As shown in FIGS. 3 and 8, the ring-shaped seal member 62 is disposed in the seal-member disposing section 8 formed by the groove-shaped sections 12a of the main case 1 and the groove-shaped sections 14a of the end plate members 14.

[0047] Thereafter, the first cover 6 is arranged in a place for closing the opening 11 of the main case 1 to cover the seal member 62. The two pressing plates 61 are arranged to be partially placed on both the edges of the first cover 6. The two pressing plates 61 are screwed and fixed to the main case 1. The first cover 6 has a size for covering the entire seal member 62. Therefore, by fastening and fixing the first cover 6 using the two pressing plates 61, the seal member 62 arranged around the opening 11 is uniformly pressed over the entire length of the seal member 62 and air tightness is improved.

[0048] Subsequently, the second cover 7 is slid to the front surface side of the main case 1 and arranged from one side at both the ends of the main case 1. Thereafter,

two attachment screws S (FIG. 2) are screwed into screw holes 14e provided on sidewalls of the end plate members 14 from a side to fix the second cover 7.

[0049] According to the luminaire of the embodiment explained above, the seal member 62 is arranged in the seal-member disposing section 8 formed by connecting the groove-shaped sections 14a on the front surface side of the end plate members 14, which closes the openings at both the ends in the longitudinal direction of the main case 1, and the groove-shaped sections 12a on the front surface side of the main case 1. Consequently, it is possible to improve the air tightness of the opening 11 of the main case 1 and secure the sufficient waterproof performance.

[0050] With the luminaire 100 according to this embodiment, the light source section 3 and the optical component 5 can be inserted and incorporated from the opening of the inner case 2. The inner case 2 in which the light source section 3 and the optical component 5 are disposed can be inserted and incorporated from the opening of the main case 1. Therefore, according to this embodiment, it is possible to simplify the process for assembling the luminaire 100.

[0051] Since the light source section 3 is incorporated in the resin case having an insulating property, which is the inner case 2, it is possible to secure an insulating property with a compact form.

[0052] The opening 11 of the main case 1 is sealed over the groove-shaped sections 12a of the main case 1 and the groove-shaped sections 14a of the end plate members 14 and using the ring-shaped seal member 62. Therefore, it is possible to improve the waterproof performance and realize an effect that work for attaching the seal member 62 is simplified.

[0053] In a set state of the luminaire 100, when electric power is supplied to the power supply circuit 4 via the substrate 31, the light-emitting elements 32 are energized and lit. Lights emitted from the light-emitting elements 32 are transmitted through the prism sheet functioning as the optical component 5 and the first and second covers 6 and 7 and irradiated in a target direction.

[0054] In this case, when the lights emitted from the light-emitting elements 32 to travel straight mainly in the front surface side direction are made incident on the optical component 5, the lights travel to be refracted and diffused in the longitudinal direction. In other words, the lights emitted from the light-emitting elements 32 are diffused to spread in the longitudinal direction. Therefore, even if the light-emitting elements 32 are spaced apart, continuity of the lights in the longitudinal direction is suppressed from being interrupted. Therefore, it is possible to secure the continuity of the lights.

[0055] Further, since the light blocking louvers 24 are provided at the edges of the irradiation opening 21, it is difficult to visually recognize the lights directly emitted from the light-emitting elements 32. Therefore, it is possible to show an irradiated surface as if the irradiated surface is uniformly shining and further secure the con-

tinuity of the lights.

[0056] The ring-shaped seal member 62 is disposed in the seal-member disposing section 8 formed in the annular shape to be continuous to the opening edges on the front surface side in the main case 1 and the edges on the front surface side of the end plate members 14. Therefore, it is possible to secure the waterproof performance and realize improvement of reliability.

[0057] As explained above, according to this embodiment, it is possible to improve the waterproof performance and simplify the work for attaching the seal member 62. Therefore, it is possible to provide a luminaire having satisfactory assembly workability.

[0058] While certain embodiments have been described, these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

[0059] For example, a solid-state light-emitting element such as an LED or an organic EL, a discharge lamp, or the like can be applied to the light source section 3. The type of the light source section 3 is not specifically limited.

[0060] Further, the luminaire 100 is suitably used outdoors. However, this is not a limitation. The luminaire 100 may be used indoors. The present invention can be applied to various luminaires used outdoors and indoors.

Claims

1. A luminaire **characterized by** comprising:

a cylindrical main case (1) opened at both ends in a longitudinal direction and opened on a front surface side;
a light source section (3) housed in the main case (1) and attached to face the opening on the front surface side;
two end plate members (14) attached to close the openings at both the ends of the main case (1);
a seal-member disposing section (8) provided continuously in an annular shape to extend to the two end plate members (14) along an edge of the opening on the front surface side of the main case (1) and surround an entire periphery of the opening of the front surface side;
a ring-shaped seal member (62) disposed in the seal-member disposing section (8); and
a cover (6) having translucency attached via the seal member (62) to close the opening on the

front surface side.

2. The luminaire of claim 1, **characterized in that** the seal member (62) is held, elastically deformed, and intervened between the seal-member disposing section (8) and the cover (6).
3. The luminaire of claim 2, **characterized in that** the seal member (62) is an O ring.
4. The luminaire of claim 1, **characterized by** further comprising a pressing plate (61) arranged to be placed on an edge on the front surface side of the cover (6) and fastened and fixed to the main case (1).
5. The luminaire of claim 4, **characterized by** further comprising another cover (7) attached to the main case (1) to cover the front surface side of the cover (6) and the pressing plate (61).
6. A luminaire **characterized by** comprising:
 - a case (1) including a first opening and a second opening (11);
 - a light source (3) arranged in the case (1) via the first opening;
 - a lid (14) configured to close the first opening;
 - an annular seal member (62) arranged across the case (1) and the lid (14) to surround the second opening (11); and
 - a cover (6) having translucency attached in contact with the seal member (62) to cover the second opening (11).
7. The luminaire of claim 6, **characterized in that** the first opening and the second opening (11) are connected.
8. The luminaire of claim 6, **characterized by** further comprising a pressing plate (61) arranged to be placed on an edge of the cover (6) and configured to press the cover (6) against the case (1) and fasten and fix the cover (6) to the case (1).
9. The luminaire of claim 8, **characterized by** further comprising another cover (7) attached to the case (1) to cover the cover (6) and the pressing plate (61).

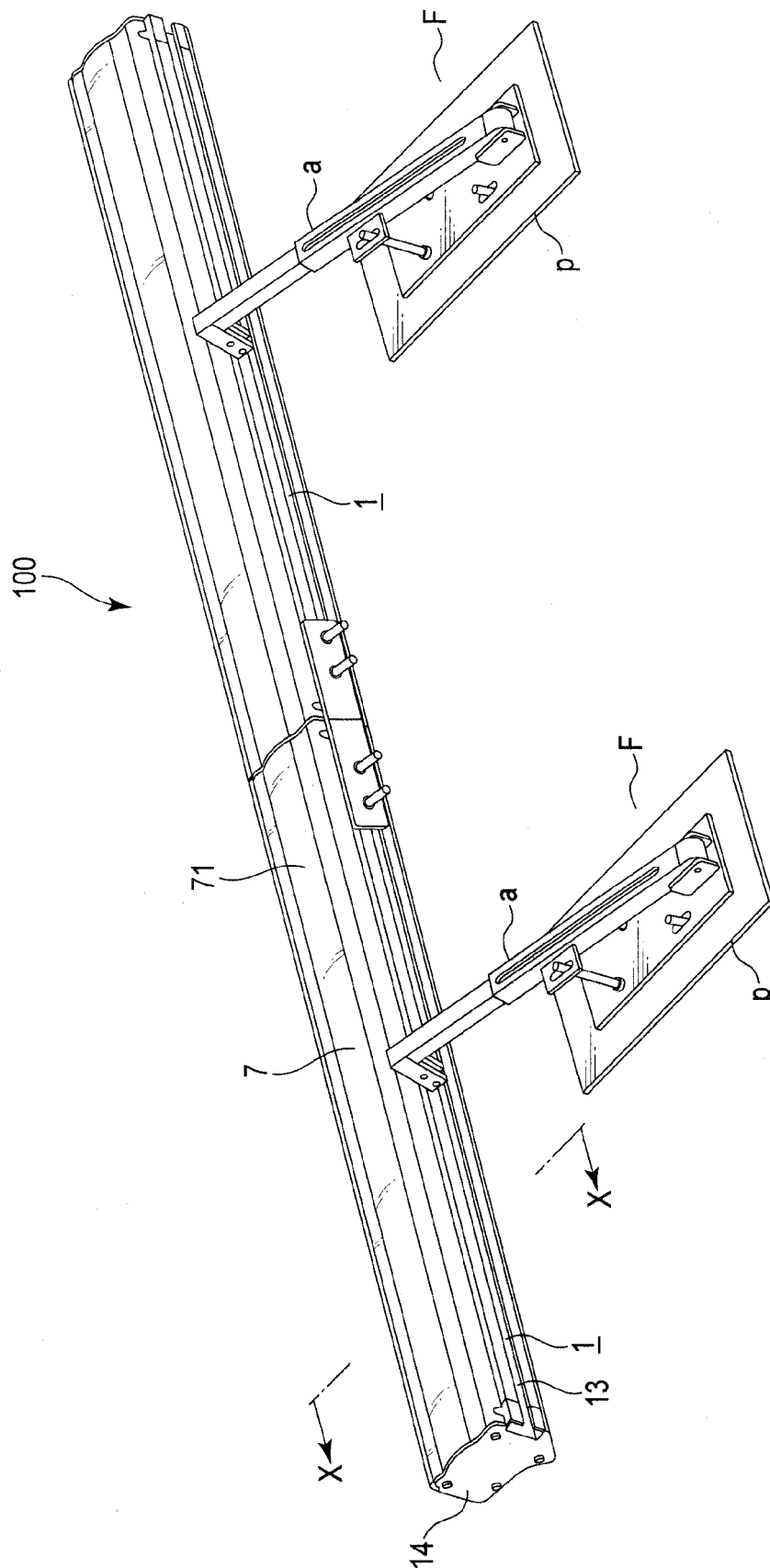


FIG. 1

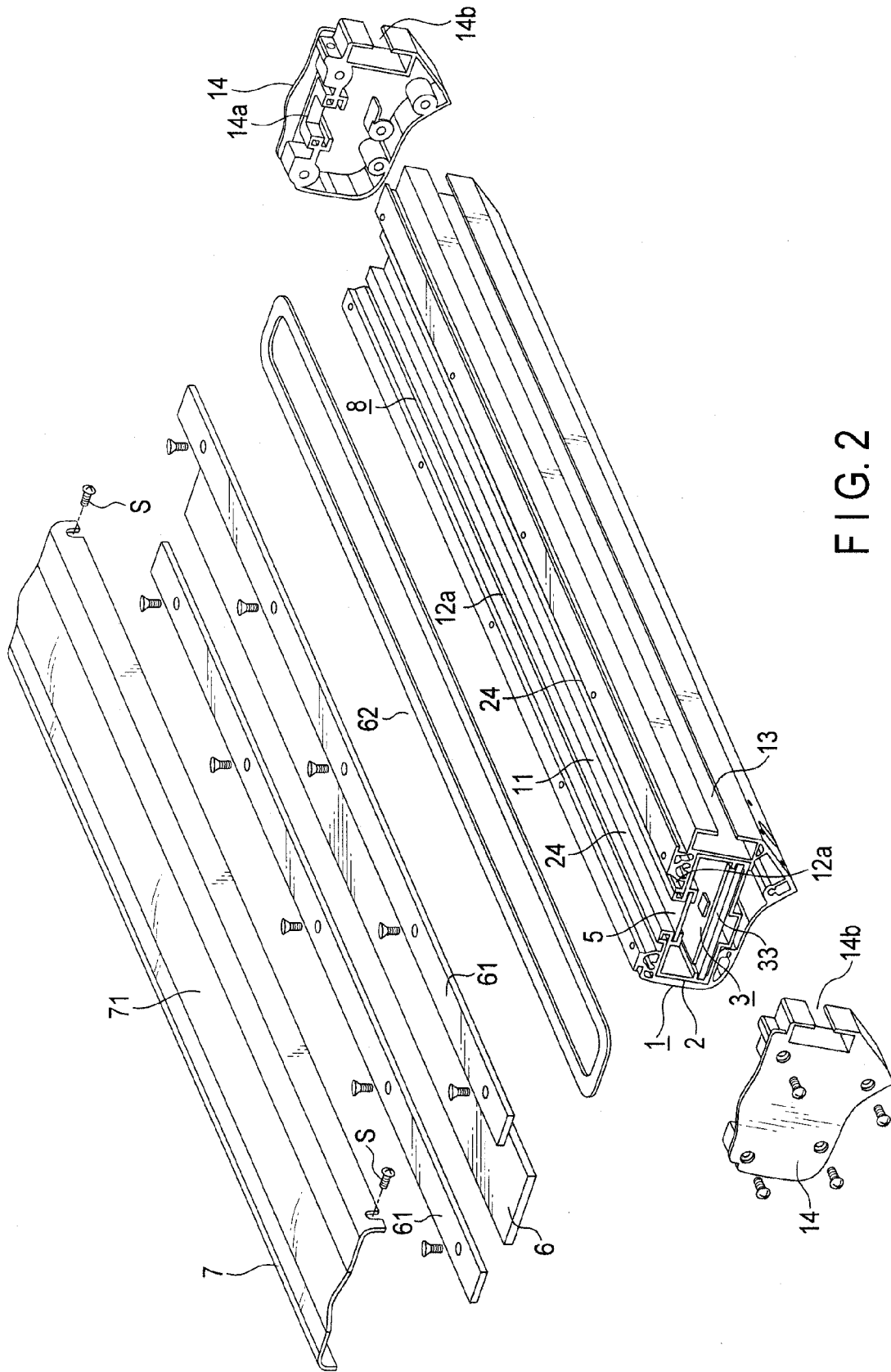


FIG. 2

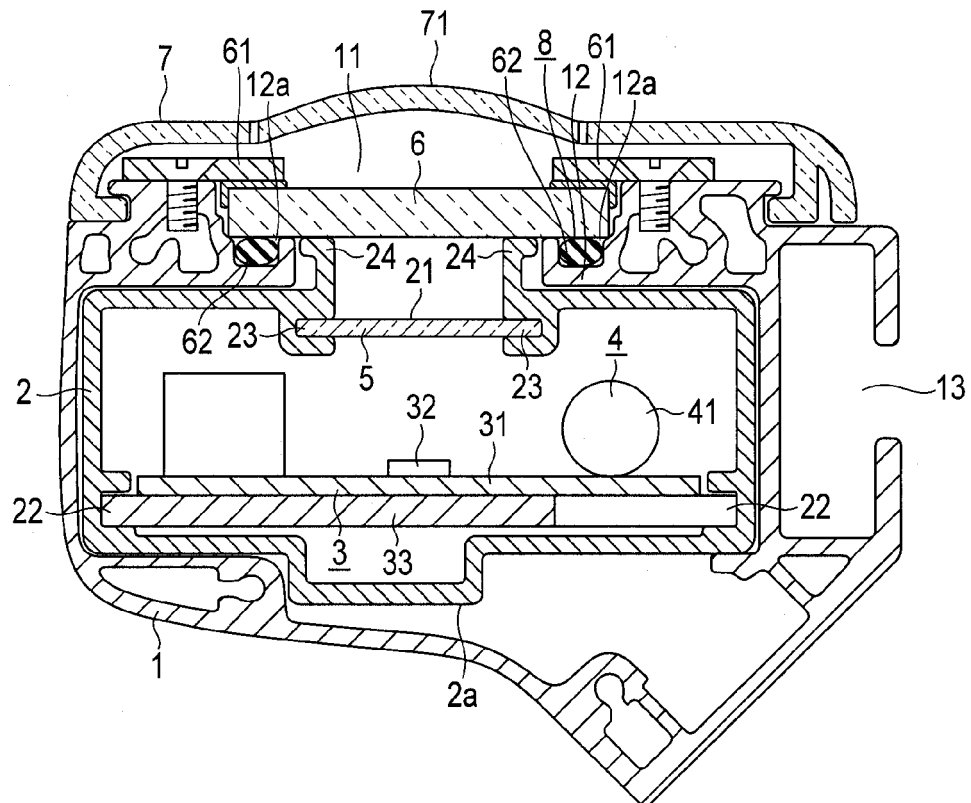


FIG. 3

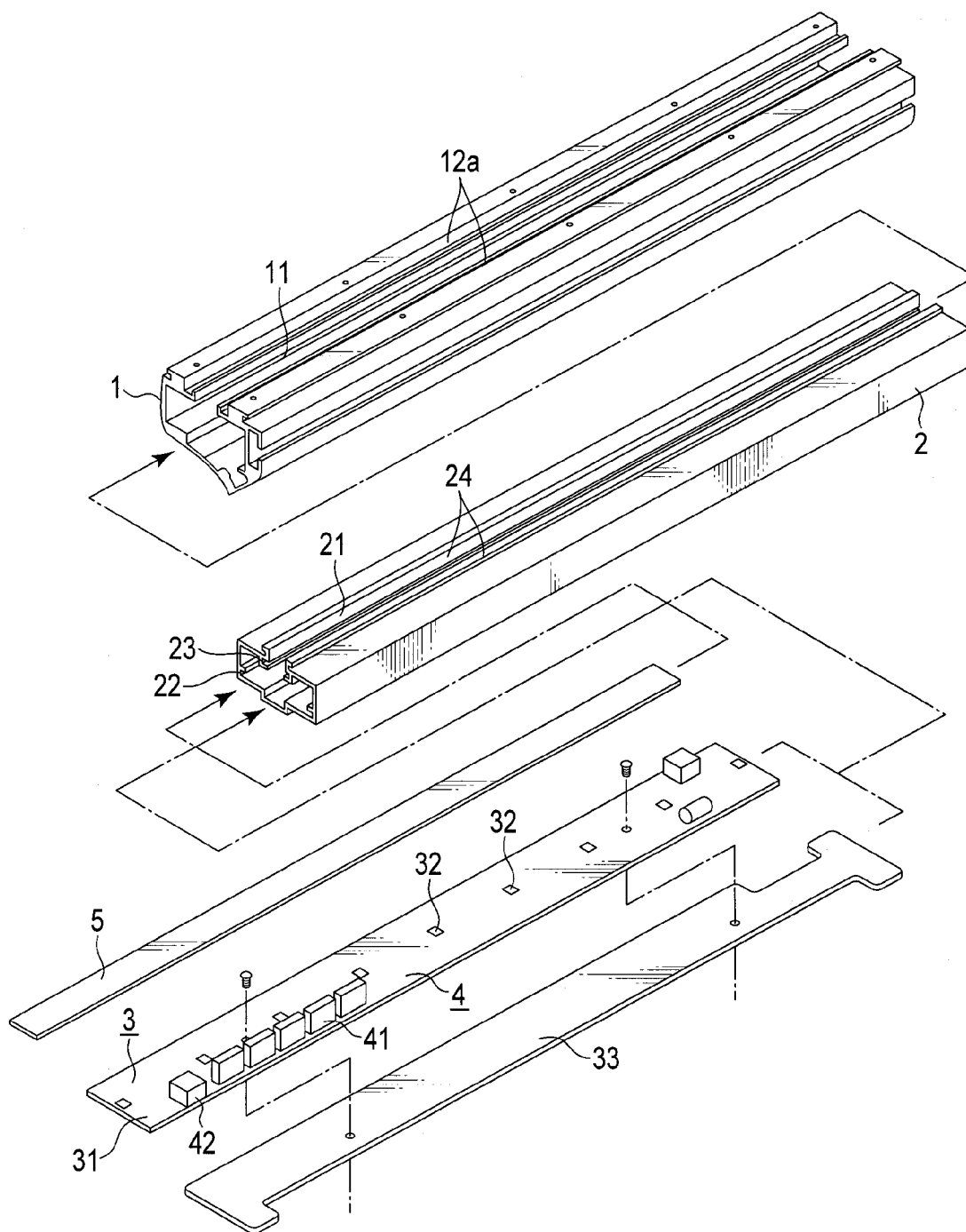


FIG. 4

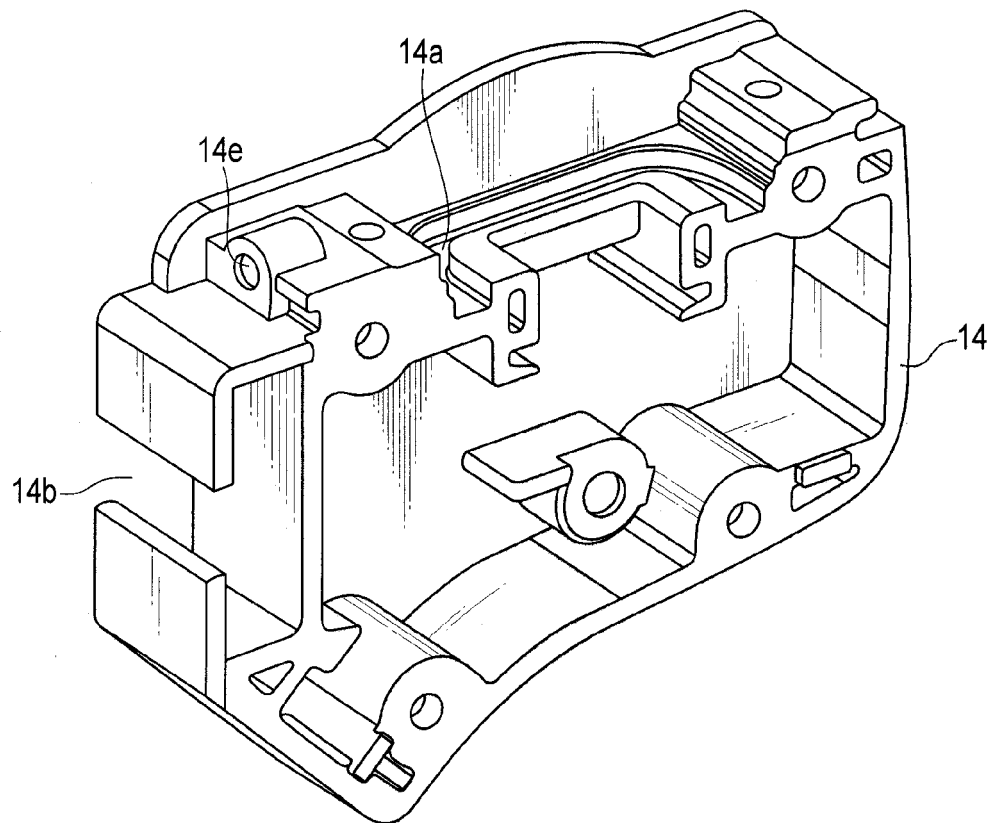


FIG. 5

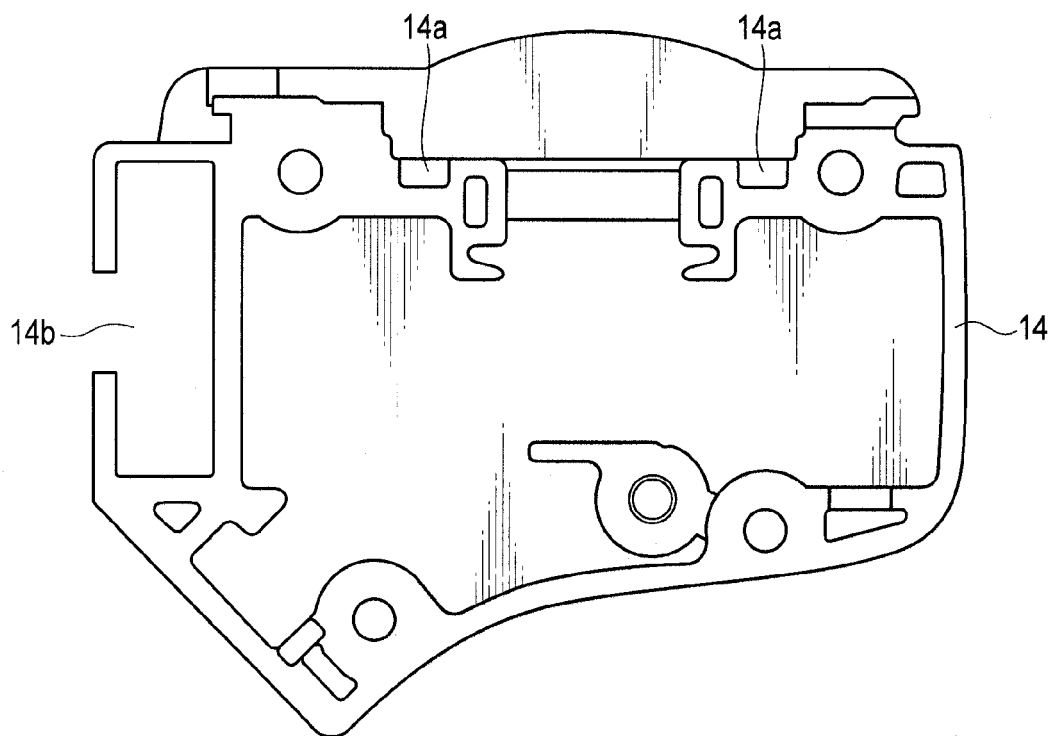


FIG. 6

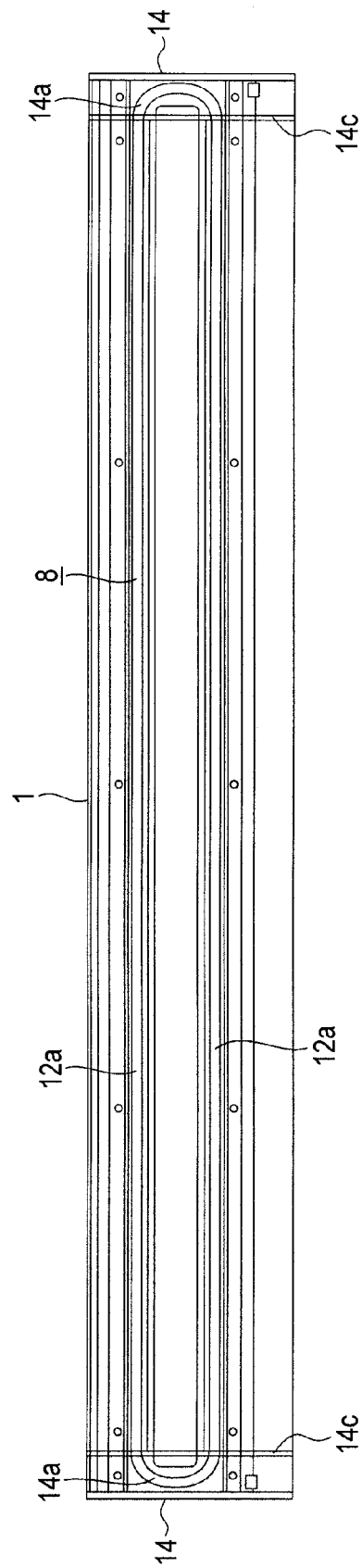


FIG. 7

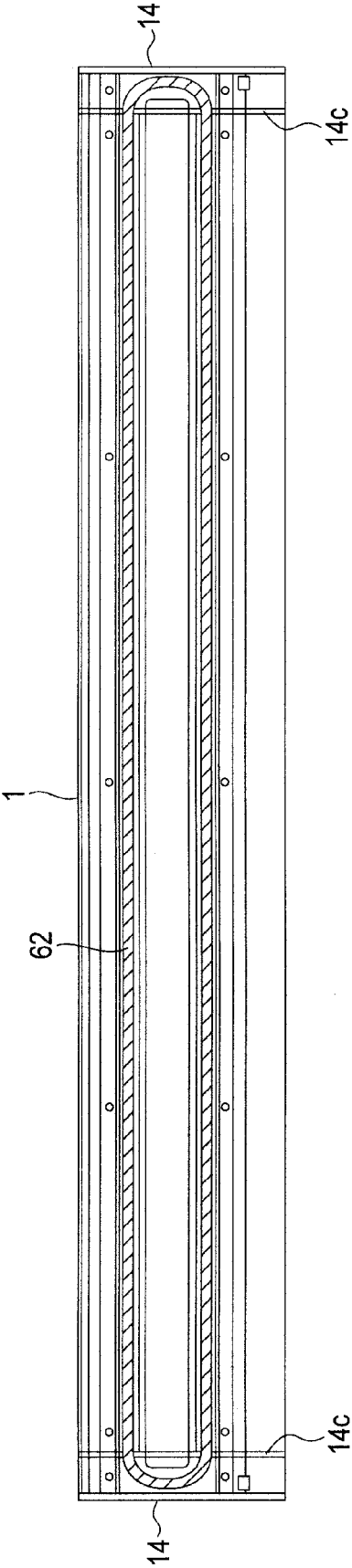


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 9347

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 6 663 261 B1 (RHEE SHIN W [US]) 16 December 2003 (2003-12-16)	1-4,6-8	INV. F21V15/01
Y	* column 2, line 1 - line 17; figures 6-8 *	5,9	F21V15/015 F21V31/00 F21S4/00

X	US 5 154 507 A (COLLINS WILLIAM J [US]) 13 October 1992 (1992-10-13)	1-4,6-8	ADD. F21W131/10 F21Y103/00
	* column 3, line 37 - line 59; figures 4,5,11 *		

X	US 2010/296287 A1 (HUANG XING-GUI [CN]) 25 November 2010 (2010-11-25)	1-4,6,8	
	* the whole document *		

Y	DE 20 2008 017219 U1 (PYROSWIFT HOLDING CO LTD [HK]) 16 April 2009 (2009-04-16)	5,9	
	* figure 1 *		

			TECHNICAL FIELDS SEARCHED (IPC)
			F21V
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 19 September 2012	Examiner Chaloupy, Marc
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 9347

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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19-09-2012

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 6663261	B1	16-12-2003	US	6663261 B1	16-12-2003
			US	6962425 B1	08-11-2005

US 5154507	A	13-10-1992	AU	1275892 A	27-08-1992
			CA	2100752 A1	19-07-1992
			US	5154507 A	13-10-1992
			WO	9213230 A1	06-08-1992

US 2010296287	A1	25-11-2010	CN	101893172 A	24-11-2010
			US	2010296287 A1	25-11-2010

DE 202008017219	U1	16-04-2009	NONE		
